Canadian/U.S. Exchange Rates and Nonresident Investors: Their Influence on Residential Property Values

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Abstract. **Factors external to a home's characteristics may influence the sales price. This analysis focuses on Bellingham, Washington, because of several influences including the Canadian economy and nonresidents. First estimated is a constant-quality Bellingham housing price index, which is used as the dependent variable in a reduced-form model of market price to estimate the impact of the exchange rate. The analysis (1984–94) suggests that a 10% rise in the exchange rate leads to a 7.7% rise in Bellingham home prices. Additionally, in 1990, non-county buyers paid 4% to 6% more than county residents and non-county sellers received 6% to 8% less.**

Introduction

Factors that influence residential real estate values may be classified as being either internal or external to the structure and location. Most studies of the determinants of home value have examined internal factors—the hedonic elements such as the physical characteristics of the house, the quality of construction, age and the view afforded by its location. This study focuses on the factors that are external to the property or home characteristics, including the exchange rate of a neighboring country's currency and the place of residence of transacting buyers and sellers. While most of the factors that affect a home's value are related to the local market, this study examines a set of factors that are essentially non-local in origin.

The empirical results of this study should interest real estate valuers, investors and marketers. In particular, valuation professionals whose area of operations include markets that are adjacent to a foreign country should find these results useful. Several regions of the United States include border areas with Canada and Mexico, and property values in these regions could be significantly impacted by changes in cross-border economic activity and exchange rates. These include the northern tier of states as well as states from Texas to California. Even states such as Florida and Hawaii (see Miller, Sklarz and Ordway, 1988), where there is significant foreign investment

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in real estate, have properties that may be impacted by exchange rate fluctuations in other countries. On an *international* scale, there are numerous areas throughout the world where the value of property in one country may be influenced by economic activity in another country (neighboring or not), as well as by currency exchange rates between the two countries. In those areas it is important for real estate participants to closely monitor exchange rate movements in neighboring countries because of their impact on local market conditions. Ignoring the influence of exchange rate movements could result in omitting a significant real estate market force.

The influence of exchange rates on real estate values could be either direct, by affecting foreigner purchases and sales of homes in a market, or indirect, by affecting the general level of economic activity that, in turn, has an impact on the local housing market. In an earlier article, Benson, Hansen, Schwartz and Smersh (1997) examined a local market where there is a direct impact of foreign buyers and sellers. (That article is described later.) That research suggests that, on average, where the impact is direct, a 10% rise in the Canadian dollar leads to a 14% increase in real estate values in that U. S. market, after a three to six month lag period. This article focuses on a local market where the influence of the Canadian exchange rate on home prices is much more indirect, because the primary impact of exchange rate changes is on local economic activity, with only an indirect impact on the housing market. The evidence presented here suggests that, where the impact is indirect, a 10% rise in the Canadian dollar leads to a 7.7% rise in real estate values, on average, after three to six months.

In addition to the influence of exchange rates, this article further hypothesizes that the residency of the buyer or seller is a factor that may affect the selling price in real estate markets. A buyer or seller who does not reside in the city where the property is located may have both an informational and a locational disadvantage compared to residents of that city. Nonresidents not only would find it more difficult to acquire information about the market, but would also be more anxious to consummate a trade so they can get settled in their new community. This article provides the first evidence to suggest that nonresident market transactors may be at a disadvantage compared to local participants. The findings are that nonresident buyers pay about 5% more and nonresident sellers receive about 7% less compared to resident buyers and sellers. This reinforces the notion that most residential real estate markets are essentially local in nature. Real estate marketers will find this evidence instructive, particularly if they have nonresident clients.

For this study, the area of analysis is Bellingham, Washington, a city of approximately 57,000 inhabitants located in the northwest corner of the U.S. Bellingham's single-family home market appears especially suitable to examine the impact of external forces upon it because it has many nonresident participants and because it is adjacent to a large Canadian metropolitan area, Vancouver, British Columbia. There are a large number of nonresident market participants due to in-migration of people and jobs to Bellingham. In addition, employee turnover and relocation, from a number of manufacturing facilities and a regional comprehensive university, has resulted in a

great deal of nonresident market participation. Because of the relative closeness of the Canadian border, the Canadian influence on the economy can be very strong, especially in the retail sector. The Canadian/U.S. exchange rate is a major determinant of the strength of this influence.

To analyze the influence of the Canadian/U.S. exchange rate on residential real estate prices in Bellingham, a constant-quality Bellingham housing price index is estimated using hedonic techniques The estimation employs data obtained from the Whatcom County Assessor's Office on characteristics of single-family residential properties sold in Bellingham during the period January, 1984, through June, 1994, plus data gathered in the field by the authors. The resulting price index is then employed as the dependent variable in a reduced-form model of market price, which is used to estimate the impact of the exchange rate and other market conditions on the residential Bellingham market.

Next, the impact of nonresident buyers and sellers is estimated using a hedonic pricing model for all single-family home sales in 1990. This estimation uses data reported to the County Assessor as well as data gathered by the authors. It is hypothesized that nonresident buyers pay more and nonresident sellers receive less than residents of Bellingham primarily because of higher information and search costs for nonresidents.

An overview of the Bellingham real estate market is provided in the next section. The following sections are a review of related studies, the methodology, the data and empirical results for the price index estimation. The final section is the conclusion.

An Overview of the Bellingham Residential Real Estate Market

Exhibit 1 contains home price statistics for Whatcom County, Washington. Though separate statistics are not available for Bellingham, real estate sales in the city make up about 55% to 60% of the overall county market, and countywide trends are indicative of the Bellingham market. Observation of these statistics and the evidence presented later suggest a very strong single-family home market in Bellingham beginning in the late 1980s.

This section presents an overview of the various factors influencing the real estate market in Bellingham and Whatcom County. Demand elements include economic expansion and job creation, population in-migration as well as the superior amenity package of the area. Supply limitations such as growth controls are discussed as well.

Bellingham is the county seat and the largest city in Whatcom County. The population of Bellingham in 1994 was about 57,000, up from about 46,000 in 1984. Whatcom County's population rose from about 112,000 to approximately 145,000 over that period.

Bellingham is located in the northwestern corner of the continental United States, ninety miles north of Seattle and forty-five miles south of Vancouver, British Columbia (see Exhibit 2). Traditionally, the area's economic base has been natural resource

Exhibit 1
Whatcom County Single Family Home Sales, 1984–1994

Year	Number of Sales	Average Sales Price ($)	Total Transaction Volume ($ millions)	Price per Sq. Ft. ($)
1984	1,624	63,068	102	49
1985	1,769	59,940	106	46
1986	1,833	62,183	114	46
1987	1,954	65,081	127	49
1988	2,663	70,201	187	51
1989	3,173	82,347	261	60
1990	2,683	109,351	293	85
1991	2,431	116,353	283	85
1992	2,733	124,788	341	91
1993	2,623	132,104	347	94
1994	2,455	140,008	344	93

Source: *Whatcom County Real Estate Research Reports, 1984–1995.*

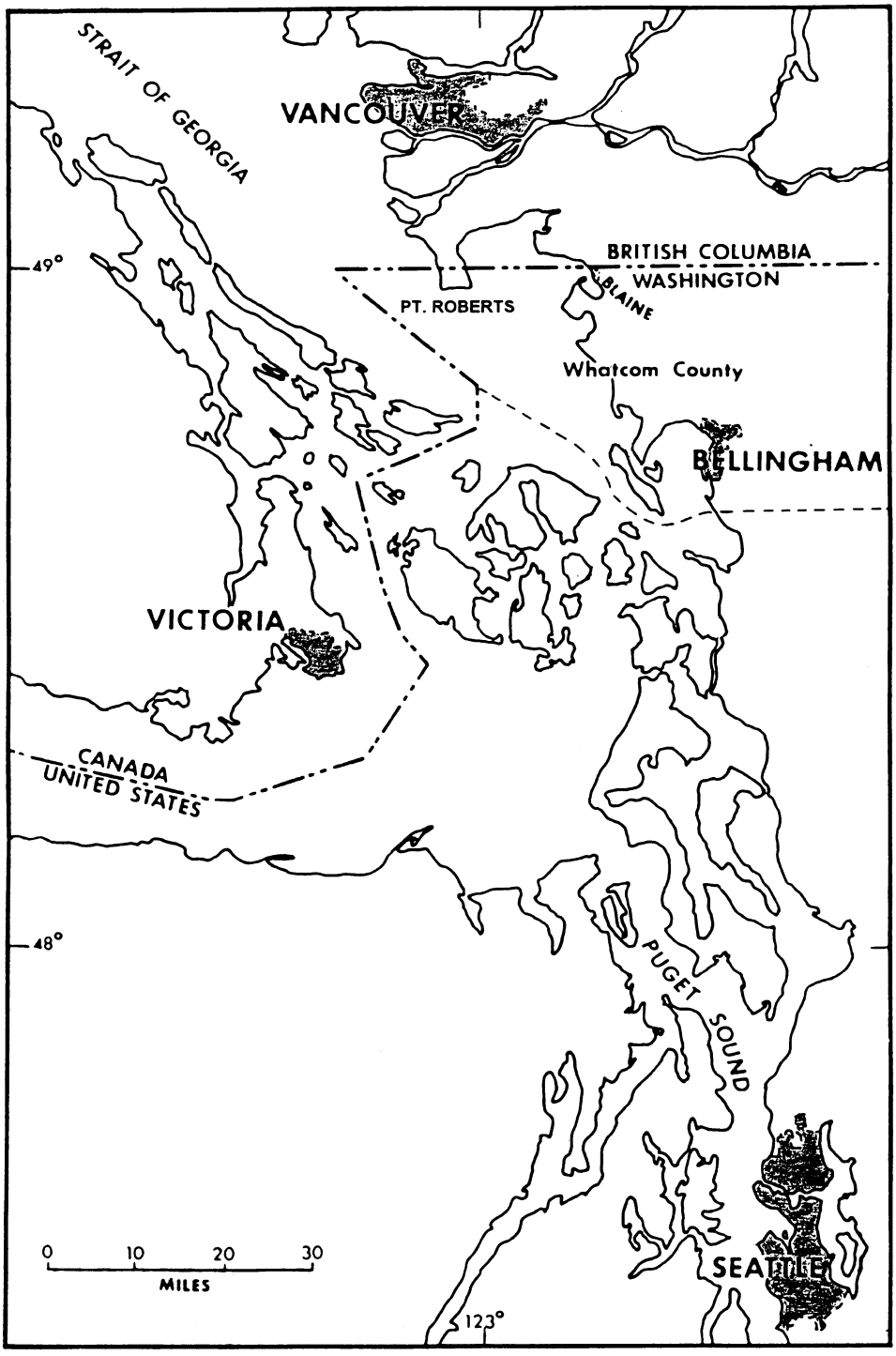
related with several large wood products plants in the area including a large pulp mill in Bellingham, a large fishing fleet that uses Bellingham as its base and a substantial agricultural sector in the northern area of the county. Several oil refineries are located north and southwest of Bellingham. From 1982 to 1994, manufacturing employment in Whatcom County rose from about 6,900 to over 8,600, a 24% increase.[1]

In recent years, the service sector, particularly retail, provided many new jobs. From 1982 and 1994, countywide non-manufacturing employment rose from 28,000 to over 51,000, an 80% increase, with almost 8,000 new jobs created in wholesale and retail sectors. Many of these jobs are related to the opening of a large shopping mall and several smaller shopping centers. Bellingham's retail outlets have a substantial Canadian clientele as the area is adjacent to Vancouver's 1.7 million person market. During the late 1980s and up until 1992, the Canadian dollar's purchasing power rose substantially and Canadian shoppers increased spending at Bellingham retail outlets.

Average home price statistics presented in Exhibit 1 suggest a strong, rising market beginning in the late 1980s. Price gains appear to be due to several factors including a substantial increase in building lot values. Other influences include renovation of older homes, some evidence of urban gentrification and a general upgrading in the quality of new homes.

Among Bellingham's many amenities are the spectacular bay, island, lake and mountain views available from many homes. The city offers numerous other amenities that include a very low violent crime rate, easy access to large urban centers, many recreational opportunities and an excellent transportation infrastructure. These and other amenities have helped fuel demand for homes in Bellingham.

Exhibit 2
Location map of Bellingham and the Surrounding Area



Bellingham may be participating in a trend observed in many Western states, which is a population migration to smaller urban and to rural areas from very large cities. Areas such as Bend, Oregon, Kalispell and Bozeman, Montana, Santa Fe, New Mexico and Jackson, Wyoming have all experienced recent population increases and large home price growth. These markets have benefited from an influx of affluent buyers from urban areas such as Los Angeles, Chicago and New York City. They have experienced employment growth as well. Typically, however, as is the case of Bellingham, wage levels grow more slowly than home prices, suggesting that new residents often bring buying power with them. The local economies alone do not appear to be generating enough income to fuel the high levels of house price appreciation, although relatively low mortgage interest rates may have contributed to that trend.

Bellingham's home price increases are also related to supply limitations. These include governmental and physical barriers that limit the supply of developable land. Bellingham is surrounded by water and mountains, creating natural limitations on the supply of building lots. Within the city limits of Bellingham, the amount of buildable vacant land is constantly diminishing and the city is not aggressively pursuing the annexation of raw land to the city. The surrounding area of Whatcom County has large areas of potentially developable land near Bellingham. However, county zoning policy has kept most of this property in agricultural or forest preserve use. State-mandated growth management plans now limit the extension of city services to the urban fringe. Large scale high density housing developments are difficult to undertake due to zoning and density restrictions.

A substantial portion of the observed home price appreciation in Bellingham is due to increases in land values. Since 1988, for example, the price of a basic home site has quadrupled from $10,000 to approximately $40,000. As the supply of available land diminishes due to the reasons discussed above, developable land values increase given the continued firm demand for homes in Bellingham. Other factors have also propelled home prices upward including increased material and labor costs, upgraded new home construction, and changing tastes and preferences.

In summary, Bellingham's real estate market contains all the classic elements for substantial price appreciation. Demand is driven by job creation, population immigration and many amenities. Supply is limited by legal and natural barriers.

Comparison to Previous Studies

Few previous studies have examined the impact of external factors on real estate values. One study, conducted by Miller, Sklarz and Ordway (MSO) (1988), looked at foreign residential investment in the U. S. They investigated Japanese purchases of homes and condominiums in Hawaii from January, 1986, to February, 1988. That period followed the dramatic appreciation of the yen relative to the U.S. dollar during the mid-1980s. The MSO study investigates approximately 400 home sales in the upscale Waialae-Kahala neighborhood of Honolulu. Approximately 30% of these

homes were purchased by Japanese nationals. The authors conclude that Japanese buyers paid more for similar properties than their local counterparts. They also conclude that the appreciating yen contributed to the soaring Oahu upscale residential market.

There appears to be no other study that looks at the impact of nonresidents on sales prices. However, an interesting study by Turnbull, Sirmans and Benjamin (1990) examines the impact of corporate relocations on home sales prices. They test whether corporate owned single-family homes sell for different prices than those sold by individuals. (In a typical corporate relocation the employee sells his home to the corporation, and the corporation is then responsible for selling the home to another buyer.) Their empirical evidence suggests that these corporate-owned homes sell for no different price than homes sold by individuals.

In contrast to the MSO study, this study looks at the impact of the resident status of both buyers and sellers on home sales prices. While the nonresidents are from both inside and outside the U.S., most live within the U.S. In contrast to the Turnbull, Sirmans and Benjamin study, this study looks only at homes that were purchased and sold by individuals.

Benson et al. (1997), referred to hereafter as BHSS, examine the influence of Canadian buyers and sellers in a study of 397 residential properties in Point Roberts, Washington. The BHSS study differs from the MSO study in that different variables are examined over a much longer period. The period of analysis is January, 1984, through June, 1994. Over that decade, the Canadian dollar fluctuated considerably in value against the U.S. dollar, allowing analysis during both declining and appreciating Canadian dollar market cycles. The real estate market of Point Roberts is dominated by foreigners, with at least 70% (and probably 80% to 90%) Canadian participation, a level that is more than double the 30% Japanese participation in the MSO study. Furthermore, the Point Roberts market has foreigners on both the demand and supply side of the market; whereas, the Hawaiian market in the MSO study was influenced primarily by foreign buyers, not sellers. Finally, most of the market participants in the Point Roberts market live in the Vancouver, British Columbia area. This allowed explicit consideration of supply and demand conditions in the Vancouver market to be included in the analysis.

The empirical results of BHSS suggest that home sales price movements in Point Roberts are closely correlated to home sales price movements in the nearby Vancouver, British Columbia market as well as to the Canadian/U.S. dollar exchange rate. The estimated elasticity with respect to the Vancouver real estate prices is 1.063. This implies that a 10% increase in the mean Vancouver price is associated with a 10.63% increase in the Point Roberts price level. Thus, Point Roberts real estate prices are only slightly more volatile than prices in the Vancouver metro area. In addition, the results showed that the impact of exchange rates lagged by two quarters produced an elasticity of 1.4. This suggests that three to six months after a 10% increase in the value of the Canadian dollar, home prices in Point Roberts will increase by 14%.

Thus, it is found that residential property prices in this U.S. market are heavily influenced by both exchange rates and by housing market conditions in a bordering Canadian city.

The external influences examined in the BHSS study are what could be called direct effects on the Point Roberts market because the market is dominated by Canadian buyers and sellers. Point Roberts is much more a satellite of the Vancouver metropolitan area, both physically and economically, than it is of any U. S. market. This study examines a real estate market where the Canadian influence is much more indirect—fewer than 3% of the buyers and sellers are Canadian. However, because of its proximity to Canada, the Bellingham economy is significantly influenced by cross-border trade and the general Canadian economic environment. (While both Point Roberts and Bellingham are in Whatcom County, the two are geographically separated by Boundary Bay and Canada, and it appears that the nature of the Canadian influence is markedly different between the two.)

In contrast to the Point Roberts study, this research examines the indirect impact of Canadian dollar movements on the residential real estate market in Bellingham. The Bellingham market is one where direct Canadian investment in residential properties is limited; however, Canadian involvement in the commercial sector, particularly the retail sector, is significant and volatile. While both studies examine the Canadian influence, the Point Roberts study involves the micro-involvement of Canadians in a small market with overwhelming direct Canadian participation in that market. This study examines the Canadian influence on a much larger real estate market where direct Canadian participation is limited.

The influence of the Canadian economy is estimated by examining the impact of the Canadian/U.S. exchange rate on residential property values in Bellingham. A higher Canadian dollar leads to an increase in Canadian purchases in the U.S., and leads to greater participation in the county by Canadians in commercial and industrial ventures of all kinds. In the Bellingham area this is especially visible in the form of higher retail sales, but has an impact on many of the region's commercial and industrial firms as well. It has been estimated, for example, that a 1¢ increase in the value of the Canadian dollar relative to the U.S. dollar stimulates an $8.4 million increase in Whatcom county taxable retail sales (Center for Economic and Business Research, WWU, 1994). Retail sales growth of this type initiates a local multiplier process in which the ultimate increase in local personal income exceeds the immediate increase due to the additional spending by Canadian shoppers. As local personal income rises, it is likely that the demand for housing in the area will rise as well. Thus, it is hypothesized that as the exchange rate rises, this will indirectly lead to higher real estate transaction prices; however, because the impact is indirect, it is expected that the size of the impact will be less than what has been observed in Point Roberts. The empirical findings support this hypothesis.

Price Index Estimation

Methodology

To estimate the effect of exchange rates on Bellingham housing prices, a constant-quality housing price index must first be constructed. There are several alternative methodologies for estimation of housing price indexes, all of which possess both advantages and disadvantages.[2] One alternative is the so-called explicit time-variable approach, in which data on dwelling characteristics are pooled across time periods, and time is included as an independent variable (see, for example, Clapp and Giaccotto, 1992; and Gatzlaff and Ling, 1994). In the log-linear functional form commonly used in the literature, the explicit time-variable model may be written as:

$$\ln P_{it} = \alpha + \sum_{j=1}^{k} \beta_j \ln X_{jit} + \sum_{t=2}^{T} c_t D_{it} + e_{it}, \quad (1)$$

where:

P_{it} = Sales price of property i at time t where $i = 1,...,n$, and $t = 1,...,T$;
X_{jit} = A vector of variables measuring property characteristic $j = 1,...,k$ for property i at time t; and
D_{it} = A vector of time dummy variables equal to 1 if the *ith* property is sold in time period t, and 0 otherwise.

In this approach, the log of the cumulative price index is given by the coefficients on the time dummy variables.

Pooling of data across time periods is appropriate only if the coefficients with respect to the hedonic characteristics of properties are constant over time. An alternative approach is to estimate the above equation separately for each time period (omitting the time dummy variables), and to use the resulting hedonic coefficient estimates for each time period to price a given property over time. In this approach, the given property would typically be the property with an average set of characteristics. Results of both the pooled and non-pooled approaches are discussed below.

Data

The sample of properties used in this study is drawn from a computer data file provided by the Whatcom County Assessor's Office in Bellingham, Washington. This file contains 12,075 real estate sales transactions in Bellingham for the period January, 1984, through June, 1994. The data file contains the sales price and date of sale for each property and a set of variables describing each property's current (1994) characteristics, such as year built, year remodeled, square footage, condition of the structure and type of sale.

Before the data could be used, a sizable number of transactions had to be removed from the data set so that it would include only single-family dwelling transactions

that could reliably be used in association with the accompanying set of descriptor variables. If the transaction was not for a single-family dwelling or if the data were not reliable, accurate, or complete, the transaction was discarded.[3] After removing these unusable property transactions, the data set is reduced to 7,268 single-family residential property sales. Many of these 7,268 transactions, however, represent repeat sales. The actual number of *different* properties in the sample is 5,076. Thus, 2,192 transactions were repeat sales, with some properties selling 3, 4 or 5 times during the ten-year period.

In addition to the data provided by the Whatcom County Assessor's Office, the authors collected further data for each of the 5,076 properties. Because the assessor's data provides no information on whether the property has a ''view,'' the authors collected this data by personal inspection of each property that had a potential view. Each property was classified into one of the eight view categories discussed in the Appendix. The authors, also, created several spatial variables using geographic information systems (GIS) techniques. The GIS variable used in this study is the distance from Bellingham Bay for properties having a bay/island view (referred to here as ''ocean'' view).[4]

Discussion of Variables

The hedonic model to be estimated is that developed in Benson et al. (1997) and may be represented as follows:

$$PRICE = F(VIEW, AGE, REMODEL, ACREAGE, QUALITY, QUALPM, CNDTN, HEAT, ROOF, TOTSF, GARAGE, FINBASM, DECK, TIME),$$

where *PRICE* is equal to the sales price of an individual piece of residential property in Bellingham during the period from 1984 to 1994. In the pooled approach, a single equation is estimated, with *TIME* being a vector of forty-one quarterly time dummies. In the non-pooled approach, the equation is estimated for each individual year, and *TIME* is a vector of three quarterly time dummies for the particular year. The Appendix provides the definition of all other explanatory variables.

Exhibit 3 provides descriptive statistics for all variables. The average property was approximately forty-four years old at the time of sale and the mean square footage is 1378. For dummy variables, the mean indicates the proportion of properties that have the particular characteristic. Almost a quarter of the sample was classified as view property.

Results

Results of estimating both the pooled hedonic model and separate equations for each of the eleven years were used to perform standard tests for whether pooling is appropriate. Statistical tests for structural change in the vector of hedonic coefficients (see Johnston, 1984) yield an *F*-Statistic. Based on the computed *F*-Statistic, the

Exhibit 3
Summary Statistics of Sample Variables, 1984–1994

	Mean	*n*	Std. Dev.	Min.	Max.
Panel A: Continuous variables					
PRICE	90,393		59,689	15,000	761,675
AGE	44		28	1	93
TOTSF	1,378		538	509	5,732
Panel B: Dummy variables					
OCNVIEW1	0.064	464			
OCNVIEW2	0.020	142			
OCNVIEW3	0.042	304			
OCNVIEW4	0.068	494			
LAKEFRNT	0.006	45			
LAKEVIEW	0.023	168			
MTNVIEW	0.009	65			
REMODEL	0.040	291			
ACREAGE	0.007	52			
QUAL1	0.008	59			
QUAL2	0.398	2,893			
QUAL4	0.051	373			
QUAL5	0.003	21			
QUALM	0.101	736			
QUALP	0.230	1,674			
COND1	0.009	66			
COND2	0.164	1,189			
COND4	0.216	1,571			
COND5	0.029	212			
HEATFA	0.547	3,976			
HEATHWHP	0.073	531			
ROOFCSSB	0.977	7,103			
ROOFTILE	0.011	81			
GARAGE	0.599	4,350			
FINBASM	0.080	579			
DECK	0.322	2,342			

Note: The mean for the dummy variables indicates the proportion of the 7,268 sample transactions for which this attribute exists.

hypothesis of equal hedonic coefficients across all eleven years was rejected. This is similar to results obtained by Gatzlaff and Ling (1994) and others. It was thus decided to use the non-pooled approach for constructing the Bellingham price index.

Results of ordinary least squares (OLS) estimation of the annual hedonic model are reported in Exhibits 3 and 4. All continuous variables, including the sales price, were transformed prior to estimation by computing the natural log. Thus, for the continuous variables shown in Exhibit 4, their names are preceded by ''LN.'' The coefficients on the continuous variables are estimated elasticities, measuring the percentage change in sales price associated with a 1% change in the property characteristic. For the dummy variables, the percentage impact on sales price may be computed as $100*(e^c - 1)$, where c is the coefficient value for the particular characteristic.[5]

Exhibit 4 provides the regression coefficient estimates for selected years during the sample period. [Estimates for only the odd-numbered years are provided due to space limitations. More detail of this model may be found in Benson et al. (1998).] The variables describing property characteristics are significant in most periods, with the expected sign. Sales prices are higher, the newer the house, the higher the quality and condition, the better the roof and heat source, and the greater the square feet.[6] Houses with acreage, a garage, a finished basement and a deck sell for higher prices as well. The view coefficients are positive and significant. The coefficient on *LAKEVIEW* of .155 in the 1993 regression indicates that a lake view home typically sells for a price that is 16.77% higher than a similar home with no view. The interpretation of the impact of the view variables for the ocean view properties is more complex because both the view dummy variable and the interactive distance variable must be considered.[7]

Using estimated hedonic coefficients, a home with average characteristics for the sample is priced in each quarter. Estimated constant-quality housing prices by quarter and the resulting price index are shown in Exhibit 5. Prices were at or below 1984 levels through the fourth quarter of 1987, indicating that prices decreased slightly during the first four years of the sample period. In 1988 and 1989, prices rose sharply and continued a moderate rise over the remainder of the period. The price index estimates indicate that prices rose about 126% (on a constant quality basis) from 1984 to 1994 for the residential transactions represented in our sample. For comparison purposes, the price index estimated from the pooled regression is shown in the right-hand column of the exhibit. As may be seen, the two indexes are very highly correlated.[8]

The Impact of the Canadian/U.S. Exchange Rate on Property Values

Methodology

The price index constructed from the individual year hedonic regressions is now used as the dependent variable in a reduced-form model of market price that includes the Canadian/U.S. exchange rate as an explanatory variable. The model may be written as:

Exhibit 4
Hedonic Regressions—Selected Years

	1985		1987		1989		1991		1993	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Constant	8.248	34.71	7.542	26.95	7.810	40.36	8.521	42.53	8.319	41.43
OCNVIEW1	0.634	11.40	0.522	9.95	0.614	12.20	0.600	11.48	0.559	13.15
OCND1	−0.456	−3.40	−0.332	−2.94	−0.285	−2.58	−0.450	−3.98	−0.264	−2.80
OCNVIEW2	0.512	3.33	0.382	3.56	0.623	9.17	0.558	2.83	0.448	5.73
OCND2	−0.194	−1.35	−0.235	−1.82	−0.366	−4.51	−0.185	−1.07	−0.300	−3.12
OCNVIEW3	0.208	2.79	0.395	5.62	0.290	3.68	0.857	4.65	0.317	6.85
OCND3	−0.154	−1.96	−0.258	−3.11	−0.122	−1.42	−0.441	−3.47	−0.109	−1.86
OCNVIEW4	−0.020	−0.28	0.196	2.80	0.240	4.30	0.905	3.43	0.215	3.57
OCND4	0.067	0.87	−0.151	−1.95	−0.140	−2.23	−0.472	−3.03	−0.164	−2.79
LAKEFRNT	0.518	5.99	0.704	5.29	0.760	8.05	0.843	11.91	0.822	7.03
LAKEVIEW	0.101	1.92	0.035	0.58	0.148	3.28	0.099	2.45	0.155	3.78
MTNVIEW	0.060	0.66	0.082	1.00	−0.004	−0.05	0.077	1.53	0.094	1.86
LNAGE	−0.081	−8.84	−0.118	−10.08	−0.090	−9.79	−0.054	−5.80	−0.043	−5.42
REMODEL	0.027	0.55	0.110	2.10	0.094	2.59	0.051	1.63	0.059	1.80
ACREAGE	0.036	0.34	0.281	2.23	0.518	6.55	0.451	4.64	0.436	5.20
QUAL1	−0.306	−4.07	−0.022	−0.17	−0.218	−2.83	−0.308	−4.58	−0.239	−3.85
QUAL2	−0.111	−4.86	−0.127	−4.90	−0.117	−6.27	−0.117	−6.26	−0.088	−4.74
QUAL4	0.311	6.83	0.219	4.49	0.141	3.81	0.223	7.14	0.223	6.26
QUAL5	—		—		0.062	0.42	0.315	4.44	−0.021	−0.12
QUALM	−0.044	−1.69	0.006	0.20	−0.029	−1.30	−0.065	−2.93	−0.066	−2.87
QUALP	0.054	2.51	0.068	2.79	0.052	3.01	0.078	4.61	0.024	1.41

Exhibit 4 (continued)
Hedonic Regressions—Selected Years

	1985		1987		1989		1991		1993	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
COND1	−0.120	−1.29	−0.208	−1.66	0.014	0.16	−0.143	−2.02	−0.161	−3.21
COND2	−0.074	−3.03	−0.101	−3.67	−0.067	−3.50	−0.132	−7.07	−0.067	−3.74
COND4	0.025	1.22	0.005	0.20	0.048	2.57	0.029	1.50	0.066	3.85
COND5	−0.183	−1.55	0.037	0.47	0.046	0.70	−0.032	−0.92	0.023	0.69
HEATFA	0.083	4.65	0.073	3.58	0.095	6.22	0.037	2.50	0.040	2.62
HEATHWHP	0.154	4.23	0.143	3.51	0.178	6.13	0.062	1.99	0.092	3.00
ROOFCSSB	0.053	0.72	0.104	1.03	0.165	3.35	0.043	0.59	0.121	2.16
ROOFTILE	0.132	1.49	0.232	1.85	0.216	2.33	0.110	1.07	0.207	1.59
LNTOTSF	0.377	12.28	0.484	13.85	0.447	17.75	0.426	17.35	0.453	17.86
GARAGE	0.079	4.52	0.068	3.59	0.068	4.76	0.033	2.36	0.039	2.78
FINBASM	0.181	5.68	0.219	6.80	0.202	7.46	0.185	7.26	0.143	5.91
DECK	0.073	3.90	0.063	2.94	0.055	3.20	0.064	3.98	0.031	1.99
Q2	0.008	0.31	0.028	1.02	0.104	5.10	0.022	1.13	0.069	3.66
Q3	−0.001	−0.05	0.010	0.36	0.161	8.23	0.044	2.31	0.060	3.16
Q4	−0.028	−1.11	0.027	0.94	0.240	11.80	0.040	2.06	0.089	4.71
R^2	0.847		0.810		0.834		0.869		0.837	
Adj. R^2	0.837		0.799		0.828		0.862		0.829	
S.E. of Regr.	0.178		0.212		0.201		0.166		0.163	
No. of Observ.	549		620		967		713		677	

Note: The dependent variable is *LNPRICE*. There are no observations for *QUAL5* in 1985 and 1987.

Exhibit 5
Price Index Estimation

	Estimation from Individual Year Regressions			Pooled Estimate
Quarter	Est. *LNPRICE*	Price ($)	Price Index	Price Index
84/1	10.915	54,991	1.000	1.000
84/2	10.921	55,302	1.006	0.969
84/3	10.899	54,110	0.984	0.956
84/4	10.873	52,751	0.959	0.940
85/1	10.883	53,240	0.968	0.930
85/2	10.890	53,658	0.976	0.940
85/3	10.881	53,171	0.967	0.936
85/4	10.855	51,788	0.942	0.904
86/1	10.870	52,577	0.956	0.923
86/2	10.857	51,886	0.944	0.910
86/3	10.866	52,377	0.952	0.913
86/4	10.872	52,669	0.958	0.916
87/1	10.850	51,508	0.937	0.911
87/2	10.877	52,954	0.963	0.942
87/3	10.859	52,013	0.946	0.915
87/4	10.876	52,906	0.962	0.927
88/1	10.914	54,943	0.999	0.978
88/2	10.932	55,929	1.017	0.994
88/3	10.968	57,996	1.055	1.023
88/4	10.995	59,586	1.084	1.050
89/1	11.027	61,510	1.119	1.099
89/2	11.131	68,254	1.241	1.207
89/3	11.188	72,283	1.314	1.282
89/4	11.267	78,169	1.421	1.381
90/1	11.361	85,883	1.562	1.522
90/2	11.472	95,977	1.745	1.704
90/3	11.494	98,151	1.785	1.747
90/4	11.497	98,426	1.790	1.746
91/1	11.498	98,507	1.791	1.784
91/2	11.520	100,661	1.831	1.820
91/3	11.542	102,957	1.872	1.862
91/4	11.538	102,563	1.865	1.859
92/1	11.565	105,291	1.915	1.878
92/2	11.572	106,103	1.929	1.908
92/3	11.623	111,591	2.029	1.993
92/4	11.615	110,788	2.015	1.996
93/1	11.611	110,341	2.007	1.989
93/2	11.680	118,177	2.149	2.128
93/3	11.671	117,135	2.130	2.146
93/4	11.700	120,620	2.193	2.189
94/1	11.696	120,045	2.183	2.217
94/2	11.729	124,121	2.257	2.281

$$\ln BPIX_t = \alpha + \sum_{j=1}^{k} \beta_j \ln X_{jt} + c_t \ln XRATE_t + e_t, \quad (2)$$

where:

$BPIX_t$ = The cumulative price index for Bellingham residential properties for period t,
X_{jt} = A vector of variables measuring supply and demand determinants $j = 1,...,k$, for period t; and
$XRATE_t$ = The Canadian/U.S. exchange rate for period t, expressed in terms of U.S. dollars per Canadian dollar.

It is hypothesized that the higher is the Canadian dollar (*i.e.*, the larger the quantity of U.S. dollars that the Canadian dollar will buy) the higher will be the Bellingham cumulative price index.

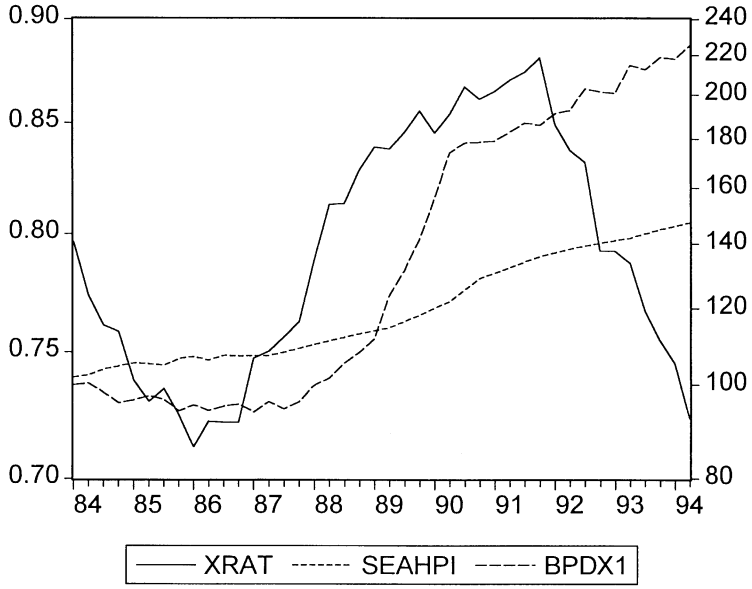
Discussion of Variables

A reduced form model would typically include several variables that measure determinants of both supply and demand for properties, including a construction cost index, a mortgage rate variable and variables measuring area population and income levels (see, for example, Peek and Wilcox, 1991). An alternative method would be to utilize a single variable that reflects most of these supply and demand conditions, but is not perfectly collinear with the Bellingham market. This method is equivalent to using a general market index, to see how the Bellingham market moves with the general market. The second method was selected as the preferred method because the first approach leads to severe multicollinearity problems in the regression model. A Seattle housing price index is used to represent market supply and demand conditions. That index was selected because it best reflects the general market supply and demand conditions in Western Washington.

For both theoretical and practical reasons it is probable that the impact of the exchange rate will occur with a lag of one or more quarters. Due to the hypothesized indirect impact of the exchange rate on housing prices, in which a change in the exchange rate first affects retail sales, then personal income, and, finally, the demand for housing; there is likely to be a significant lag between exchange rate changes and housing price changes. An additional reason to expect a lag is that the exchange rate variable used in the model is a quarterly average; and, thus, in a period of rising (falling) exchange rates will overestimate (underestimate) the current exchange rate for sales in the first half of the quarter, and underestimate (overestimate) the current exchange rate for sales in the second half of the quarter.

Exhibit 6 provides a graph of the relationship between the estimated Bellingham price index (*BPINDEX*), the Seattle housing price index (*SEAHPI*) and the Canadian/U.S. exchange rate (*XRATE*). This graph is revealing in that it shows that Bellingham real

Exhibit 6
U.S./Canadian Exchange Rate and Housing Price Indices for Bellingham and Seattle, 1984–1994



estate prices varied over a much wider range than did Seattle prices. More importantly, it shows that falling and low levels of exchange rates were associated with relatively flat or declining Bellingham real estate prices, and higher levels of exchange rates were more likely to be associated with rapidly rising Bellingham prices.

The model to be estimated follows from Equation (2) and may be represented as:

$$LBPINDEX = f(LXRATE, LSEAHPI),$$

where *LBPINDEX* is the natural log of the quarterly Bellingham price index calculated in the last section and shown in Exhibit 5. The explanatory variables are *LXRATE*, the natural log of the quarterly Canadian/U.S. exchange rate (*XRATE*), and *LSEAHPI*, the natural log of the Seattle housing price index. Estimation results for three specifications of the lag structure on *XRATE* are shown in Exhibit 7. One specification is a one-quarter lag, one is a two-quarter lag and a third is the following distributed lag specification of the exchange rate:

$$XRATE{:}DL = .5{*}XRATE(-1) + .5{*}XRATE(-2).$$

Thus, the distributed lag variable weights a one- and two-quarter lag equally. Other distributed lag specifications were tested, but provided a poorer fit than the one reported here.

Several tests were conducted to determine if additional variables might have some explanatory power in the model. Tests using a U.S. mortgage rate variable and a price index for U.S. construction costs shows that neither variable adds to the explanatory power of the model in the presence of the *LSEAHPI* variable. These variables were, therefore, not included in the final regressions. A low Durbin-Watson statistic for initial regressions indicated a high degree of autocorrelation of the residuals. A common approach in such cases is to model the error term as an autoregressive-moving average (ARMA) process (see, for example, Pindyck and Rubinfeld, 1991). Random residuals are achieved for our regressions when two auto-regressive variables, *AR*(1) and *AR*(6), are included.[9] All three regressions, therefore, include these two variables.

Estimation Results

From Exhibit 7 it can be seen that the log of the Bellingham housing price index is positively and significantly related to both the log of the Seattle housing price index (*LSEAHPI*) and the log of the exchange rate in all three regressions. The impact of the Seattle housing price index is roughly the same in all three regression equations, with the coefficient having an average value of about 2.54. Therefore, during this ten-year period, Bellingham prices tended to react much more strongly to market supply and demand forces relative to Seattle prices. A 10% increase (decrease) in Seattle housing prices was associated with a 25% increase (decrease) in the Bellingham real estate prices. The standard deviation of the Bellingham price index is more than triple

Exhibit 7
Regression Results: Impact of Canadian/U.S. Exchange Rate on the Bellingham Constant-Quality Real Estate Price Index

	Regression 1		Regression 2		Regression 3	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Constant	−9.809	−11.35	−10.557	−16.44	−10.290	−16.05
LXRATE(−1)	0.538	2.27				
LXRATE(DL)			0.769	3.84		
LXRATE(−2)					0.698	3.34
LSEAHPI	2.583	21.54	2.527	24.69	2.537	23.28
AR(1)	0.779	8.26	0.700	7.53	0.694	6.99
AR(6)	−0.253	−3.08	−0.340	−3.82	−0.345	−3.61
R^2	0.993		0.993		0.993	
Adj. R^2	0.992		0.992		0.992	
S.E. of Regr.	0.031		0.030		0.031	
DW Statistic	1.886		1.780		1.878	

Note: The dependent variable is *LBPINDEX*.

the standard deviation of the Seattle price index, with the Bellingham price index standard deviation at 48.5 versus 15.1 for the Seattle price index.

In terms of the size of the coefficient on the exchange rate variable, the distributed lag specification and the two-quarter lag specification of the exchange rate (Regressions 2 and 3) produce a higher coefficient than does the one-quarter lag specification (Regression 1). Judging by both the R^2 and the standard error of the regression, the model is best when the distributed lag specification is used. The coefficient on *LXRATE*(*DL*) of 0.77 indicates that Bellingham real estate prices rise by about 7.7% within three to six months after the exchange rate rises 10%.

It is interesting to compare these results for Bellingham, where the Canadian impact on real estate is largely indirect, with those obtained in the previous BHSS study (1997) of Point Roberts, where the Canadian impact on real estate values is direct. Both studies covered the same ten and one-half year period. The exchange rate coefficient (or elasticity) from the Point Roberts study was 1.43, nearly double the size of the coefficient obtained for Bellingham.[10] This tends to substantiate our characterization of the Canadian/U.S. exchange rate as having a direct impact on Point Roberts and an indirect impact on Bellingham real estate prices. A 10% increase in the exchange rate (for example, from a level of 0.80 to 0.88) could be expected to increase the price of a $100,000 single-family home in Point Roberts to approximately $114,000 after a few months. The average $100,000 home in Bellingham would increase in value to $107,700 with the same increase in exchange rates.

Empirical Analysis of the Effect of Nonresident Buyers and Sellers

Background and Data

The introductory section discussed the fact that a large number of nonresidents—including Canadians—participate in the Bellingham residential real estate market. In-migration has been significant because of regional growth, abundant recreational opportunities and the desirability of the area to retirees. In addition, there has been considerable movement of professionals into and away from Bellingham because of the many corporations with a physical presence in the region and because of the regional comprehensive university with a student population of about 10,000 students.

As previously mentioned, there appears to be a paucity of research on the issue of the disadvantages faced by nonresident market participants. The lack of easily accessible information could cause this nonresident disadvantage. In contrast to the securities market where information is readily available to the very large number of market participants, local residential real estate markets do not have significant sources of easily available information for all market participants. In fact, information is often only available through monopolistically controlled sources such as the Multiple Listing Service, Property Tax Assessor records, and the private files of Appraisers. This unavailability of information could be one source of the nonresident disadvantage that is hypothesized here.

Another source of the nonresident disadvantage is the higher level of anxiety, frustration and cost faced by nonresidents. Nonresident buyers may not have a place to live, and they may prefer to buy immediately, if possible, rather than rent or live in other temporary quarters such as a motel, while looking for housing. Nonresidents that live far away also have much higher search costs. Nonresident sellers are, also, often anxious to cash out so they can reinvest in their new location. Further, nonresident sellers are often being relocated by employers and may find that some of the relocation costs are paid for by the employer.

It is hypothesized that the higher cost of information and search, coupled with a more immediate need to purchase a home, leads nonresident buyers to pay more than local residents for a comparable home and to nonresident sellers to receive less than Bellingham residents. To test this hypothesis, additional data were collected for all sample properties sold in 1990—a year with a particularly high number of sales. This data includes the city and state (province) of residence of each buyer and seller of a single-family home as reported to the Whatcom County Assessors Office and as reported in the *Whatcom County Digest*. Supplemental information was collected through a telephone survey (see Note 11 for more information.)

Exhibit 8 provides summary data for 1990 on prices paid for the sample of Bellingham homes in this study, categorized by the place of residence of buyers and sellers. The

Exhibit 8
Prices Paid for the Sample of Single-Family Bellingham Homes in 1990 by Place of Residence of Buyers and Sellers

Place of Residence	Number	Average Price ($)	Maximum Price ($)	Minimum Price ($)
All	745	99,158	486,000	20,750
Buyer Residence				
Bellingham	446	97,831	486,000	20,750
Whatcom Co.	37	87,672	210,000	33,500
Other Wash.	75	89,500	285,000	35,000
California	49	122,674	348,000	52,500
Other U.S.	18	135,411	360,000	45,000
Canada	17	66,945	100,000	43,000
Non-U.S./Canada	2	161,950	199,000	124,900
Listed same address as house bought				
Refused to give info.	6	131,808	203,000	78,000
Could not be reached	95	89,877	253,000	32,500
Seller Residence				
Bellingham	620	103,041	486,000	33,500
Whatcom Co.	23	72,523	162,000	20,750
Other Wash.	53	81,363	220,000	33,500
California	28	90,185	205,000	50,625
Other U.S.	22	83,131	164,000	36,300
Canada	7	52,429	64,500	45,000

categories other than Bellingham include ''other'' Whatcom County, ''other'' Washington, California, ''other'' U.S., Canada, ''other'' non-U.S./Canada and ''same address.''[11] For home *buyers*, 22% are from non-Whatcom County addresses, 60% are from another Bellingham address and 5% are from Whatcom County outside of Bellingham. The buyer's former address could not be ascertained for 14% of the transactions (101 home sales). For *sellers*, 83% are residents of Bellingham, 3% are from Whatcom County outside of Bellingham and 14% are from non-Whatcom County addresses.

The average sale price for the 745 sample properties sold in 1990 is $99,158. Non-state resident tend to have the greatest deviations from this average, with Californians and other U.S. residents purchasing homes that sell for $23,000 to $35,000 more than average and Canadians purchasing homes that sell for $32,000 less than average. Whatcom County and other Washington State residents purchase homes that average about $10,000 below the overall average price. Much of this buyer data probably reflects average buyer household income, with the majority of out-of-state U.S. residents moving to Bellingham to earn higher white-collar salaries. On the other hand, Whatcom County residents are not moving into the city for salary reasons, but rather to make life style changes. Canadians may be purchasing lower value properties as second homes or as investment rental units.

Of the sellers, each of the nonresident categories show home sales prices that are, on average, lower than the average sales price for all homes sold.[12] County residents sell homes whose sales prices are more than $26,000 below average, and homes sold by residents of Canada sell at an average price of only $52,429, only slightly more than half the average price of a sale by Bellingham residents.

Analysis

These average price statistics discussed above suggest what are the typical market segments of resident and nonresident participants, but the statistics provide no evidence regarding whether nonresidents' transaction prices are favorable or unfavorable relative to those of resident market transactors. That issue is addressed next.

The hypothesis suggested above, that nonresident buyers may overpay and nonresident sellers may sell below market values, may be tested using regression analysis. The hedonic pricing model discussed in earlier is appropriate for this test. Equation (1) (with the coefficient estimates shown in Exhibit 4) was re-estimated for the 1990 data, with the following variables added:

BWASH = A dummy variable equal to 1 for Washington State, outside of Whatcom County buyers, otherwise 0;

BNONWASH = A dummy variable equal to 1 for non-Washington State buyers, otherwise 0;

BNOTELL = A dummy variable equal to 1 for buyers who listed the address of the house purchased and who refused to tell us their former address, otherwise 0;

BSAME = A dummy variable equal to 1 for buyers who listed the address of the house purchased and who could not be reached, otherwise 0;
SWASH = A dummy variable equal to 1 for Washington State, outside of Whatcom County sellers, otherwise 0; and
SNONWASH = A dummy variable equal to 1 for non-Washington State sellers, otherwise 0.

The omitted category for both buyers and sellers includes residents of Whatcom County. Non-Washington State buyers and sellers were aggregated due to small sample sizes in each of the individual categories (California, Canada, etc.). Summary statistics for the above categories may be calculated from the data provided in Exhibit 8.

Exhibit 9 presents the log-linear model coefficient estimates for 1990. Regression 1 provides parameter estimates for the 1990 model before any nonresident buyer or seller variables are added to the model. Regression 2 adds the six variables discussed above.[13] As stated earlier, the coefficients on the buyer/seller dummy variables must be transformed by $100*(e^c - 1)$, where c is the coefficient value, to estimate the percentage impact on sales price. Therefore, the coefficients of 0.0375 and 0.053 for *BWASH* and *BNONWASH* indicate that non-Whatcom County buyers pay approximately 3.82% and 5.44% more, respectively, than a Whatcom County resident pays for a home with similar characteristics.[14] The difference in these coefficients is as expected, with non-state buyers paying relatively more than state residents. The coefficients for BNONWASH is highly significant, while the coefficient for *BWASH* is significant at only the 12% level, using a two-tailed test, and at the 6% level, using a one-tailed test. Buyers who refused to divulge their former place of residence, *BNOTELL*, paid about 17.46% more than a Whatcom County resident!

For sellers of property the coefficients are −0.06 and −0.087 for *SWASH* and *SNONWASH*. Each coefficient is highly significant. The coefficients indicate that, on average, non-Whatcom County, Washington State sellers of Bellingham homes sell their homes for a price that is 5.82% lower than the price of Whatcom county resident, for a Bellingham home with similar characteristics. Non-Washington State residents sell their homes for about 8.33% less than a Bellingham resident. Combining these results with the information in Exhibit 8, it appears that non-Whatcom County residents sell lower-priced homes at prices that are, on average, about 6% to 8% below the selling price of a similar home sold by a Whatcom County resident. One explanation for this strong effect is that sellers who have moved out of Bellingham may be more ''anxious'' to sell their home and may find themselves in a weaker bargaining position than those that are selling but still live in Bellingham. Another explanation may be the difficulty of obtaining current and accurate market information, the further away the seller has moved.

Therefore, the results suggest that both nonresident buyers and sellers are at some disadvantage relative to residents of Whatcom County. The overall impact on Bellingham residential real estate prices of these nonresident buyers and sellers may be negligible. However, if during a given period there is an strong imbalance of either

Exhibit 9
Regression Results: Effect of the Residence of Buyers and Sellers on Home Prices in 1990

	Regression 1		Regression 2	
Selected Variables	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Constant	8.421	36.85	8.431	36.12
BWASH			0.038	1.56
BNONWASH			0.053	2.43
BNOTELL			0.161	2.63
BSAME			0.007	0.29
SWASH			−0.060	−2.10
SNONWASH			−0.087	−2.01
OCNVIEW1	0.548	10.92	0.547	10.64
OCND1	−0.312	−3.72	−0.306	−3.56
OCNVIEW2	0.574	4.10	0.569	4.17
OCND2	−0.411	−3.30	−0.403	−3.27
OCNVIEW3	0.457	7.95	0.432	7.18
OCND3	−0.280	−4.72	−0.259	−4.24
OCNVIEW4	0.336	4.00	0.312	3.59
OCND4	−0.236	−2.32	−0.214	−2.08
LAKEFRNT	0.738	18.76	0.745	18.55
LAKEVIEW	0.110	1.96	0.104	1.90
MTNVIEW	0.277	2.92	0.259	2.72
LNAGE	−0.058	−5.85	−0.055	−5.50
REMODEL	0.129	4.39	0.117	3.89
ACREAGE	0.510	2.51	0.512	2.60
QUAL1	−0.054	−0.42	−0.042	−0.30
QUAL2	−0.164	−7.20	−0.157	−6.88
QUAL4	0.238	4.78	0.229	4.50
QUALM	−0.066	−2.54	−0.067	−2.58
QUALP	0.117	6.25	0.109	5.70
COND1	−0.161	−1.64	−0.175	−1.79
COND2	−0.142	−6.16	−0.142	−6.21
COND4	0.047	2.23	0.044	2.12
COND5	0.052	1.10	0.058	1.21
HEATFA	0.049	2.87	0.052	3.01
HEATHWHP	0.107	3.12	0.107	3.07
ROOFCSSB	0.026	0.29	0.013	0.16
ROOFTILE	−0.025	−0.16	−0.018	−0.12
LNTOTSF	0.417	13.99	0.415	13.77
GARAGE	0.081	5.18	0.083	5.31
FINBASM	0.207	6.69	0.208	6.61
DECK	0.068	3.63	0.073	3.90
TIME26	0.111	4.91	0.111	4.95
TIME27	0.134	5.64	0.132	5.58
TIME28	0.136	5.78	0.136	5.78
R^2	0.802		0.807	
Adj. R^2	0.793		0.796	
Std. Err. of Regr.	0.200		0.199	

Notes: The dependent variable is *LNPRICE*. The number of observations is 745.

nonresident buyers or sellers, it could have some impact on average sales prices. This study suggests there is an impact on individual sales, regardless of whether there is an overall impact.

Conclusion

This study has examined the influence on home prices of factors external to a property's physical and site characteristics. The analysis focuses on Bellingham, Washington, because of the influence of the Canadian economy in the region and a strong in-migration spurred by regional growth, leading to the potential influence of nonresident buyers and sellers in the Bellingham market. The study has examined both the impact of the Canadian/U.S. exchange rate on home prices and the impact of nonresident buyers and sellers.

To analyze the influence of the Canadian/U.S. exchange rate on residential real estate prices in Bellingham, a constant-quality Bellingham housing price index was estimated using hedonic techniques. This estimated price index was then used as the dependent variable in a reduced-form model of market price, which was used to estimate the impact of general market conditions and the exchange rate on the residential Bellingham market. Results suggest that the Bellingham constant-quality price index varies more over time than that for Seattle. The estimated elasticity with respect to the Seattle price index is roughly 2.53.[15] This implies that Bellingham home prices tended to move by 2.53 times the percentage change that occurred in Seattle during the 1984 to 1994 period.

The exchange rate impact on Bellingham home prices is also significantly large. The estimated exchange rate elasticity of 0.77 implies that a 10% rise (fall) in the exchange rate leads to about a 7.7% increase (decrease) in Bellingham home prices. This impact is an indirect impact (occurring through retail sales, regional growth, etc.) because the Canadian buyers and sellers of real estate make up an insignificant part of the Bellingham market. These results may be compared to an earlier study (BHSS, 1997) of Point Roberts, Washington, where the Canadian influence is direct, since Canadian buyers and sellers make up about 70% to 80% of the market. That study found an estimated exchange rate elasticity for Point Roberts of 1.43, nearly twice the size of the indirect impact on Bellingham.

For 1990, the impact of nonresident buyers and sellers was estimated using a hedonic pricing model. Nonresidents appear to buy and sell residential property at less favorable prices than Bellingham residents. The empirical evidence is that in 1990 non-Whatcom County buyers paid about 4% to 6% more than County residents and non-Whatcom County sellers received about 6% to 8% less. This could be the result of informational disadvantage due to the difficulty and cost of obtaining accurate and timely market data, as well as the subsidization of transactions costs by corporations relocating employees, the desire of nonresident buyers to minimize out-of-pocket search costs, and the greater possible anxiety and urgency faced by nonresident transactors.

Appendix

Variable Definitions

VIEW = A vector of seven dummy variables defined as:
OCNVIEW1 = 1 if the dwelling has a full (unobstructed) ocean view, otherwise 0;
OCNVIEW2 = 1 if the dwelling has a superior partial ocean view (some obstruction by buildings, trees, etc.), otherwise 0;
OCNVIEW3 = 1 if the dwelling has a good partial ocean view (significant obstructions), otherwise 0;
OCNVIEW4 = 1 if the dwelling has a poor partial ocean view (some water could be seen), otherwise 0;
LAKEFRNT = 1 if the dwelling has a lake view from lakefront property, otherwise 0;
LAKEVIEW = 1 if the dwelling has a lake view from non-lakefront property, otherwise 0; and
MTNVIEW = 1 if the dwelling has an unobstructed view of snow-covered mountains, otherwise 0; and the omitted category contains properties with no view.

DVIEW = A set of four interactive variables were then formed by multiplying each ocean view variable by the distance of a property from Bellingham Bay, defined as:
OCND1 = Distance of ocean view properties from the bay;
OCND2 = Distance of superior partial ocean view properties from the bay;
OCND3 = Distance of good partial ocean view properties from the bay; and
OCND4 = Distance of poor partial ocean view properties from the bay.

For ocean view properties these variables take a value of the distance from the bay; for properties with no ocean view, they take a value of zero.

AGE = The year of sale minus the year built.

REMODEL = A dummy variable equal to 1 for houses that were remodeled after 1960, otherwise 0.

ACREAGE = A dummy variable equal to 1 if the property includes 1 or more acres, otherwise 0.

QUALITY = A vector of four dummy variables based on the assessor's classification value of 1, 2, 3, 4, 5 or 6 depending on the quality of construction of the dwelling, with 1 being the lowest quality and 3 being average quality; defined as:
QUAL1 = If the basic quality classification is a 1;

QUAL2 = If the basic quality classification is a 2;
QUAL4 = If the basic quality classification is a 4; and
QUAL5 = If the basic quality classification is a 5 or 6; the omitted category includes ''average'' quality coded 3.

QUALPM = A vector of two dummy variables based on the assessor's additional quality classification of a plus or minus to refine the 1 through 6 classification given in *QUALITY* above, defined as:
QUALM = If the additional quality classification is a minus; and
QUALP = If the additional quality classification is a plus; the omitted category includes properties with no plus or minus.

CNDTN = A vector of four dummy variables based on the assessor's classification value of 1, 2, 3, 4, 5 or 6 depending on the condition of the dwelling, with 1 being the lowest condition and 3 being average condition; defined as:
COND1 = If the condition classification is a 1;
COND2 = If the condition classification is a 2;
COND4 = If the condition classification is a 4; and
COND5 = If the condition classification is a 5 or 6; the omitted category includes ''average'' condition coded 3.

ROOF = A vector of two dummy variables defined as:
ROOFCSSB = If the roof is composite, wood shake, wood shingle or build-up; and
ROOFTILE = If the roof is tile; the omitted category is roofs that are roll cover or metal.

HEAT = A vector of two dummy variables defined as:
HEATFA = If the heat is forced air; and
HEATHWHP = If the heat is hot water or heat pump; the omitted category is electric baseboard, wood heat only and ''other.''

TOTSF = Total square feet in the dwelling, excluding the basement.

GARAGE = A dummy variable equal to 1 if garage square footage exceeds 100, otherwise 0.

FINBASM = A dummy variable equal to 1 if finished basement square footage exceeds 50, otherwise 0.

DECK = A dummy variable equal to 1 if deck square footage exceeds 100, otherwise 0.

Notes

[1] Local economic data provided in this section are obtained from the Whatcom County Real Estate Research Committee, *Whatcom County Real Estate Research Report*, 1984–1996.

[2] Methodologies for estimation of price indexes are compared by Palmquist (1980), Case, Pollakowski and Wachter (1991), Haurin and Hendershott (1991), Gatzlaff and Ling (1994) and others. Price indexes are most often estimated using either hedonic regression, the approach used here, or a repeat-sales method.

[3] Transactions that were discarded include those in which:

1. The sale used document types other than warranty deeds, such as those sold through trusts, receiverships and quitclaim deeds.
2. Transaction prices represented multiple property sales.
3. Transaction prices were identified by the assessor as possibly not representing ''market'' prices because the sales were between family members, the sales were through a trust or estate, the sale represented a partial interest or it represented a sheriff's sale.
4. The data sets were incomplete or in error.
5. The property was remodeled after the date of sale, causing the current list of descriptive variables to be different from what they were at the time of sale.
6. The transactions appeared to be for raw land.
7. The properties contained more than one dwelling.

[4] We thank Eugene Hoerauf in the Center for Geography and Environmental Social Sciences at Western Washington University for providing longitude and latitude coordinates and elevation data for the properties in our sample.

[5] The correct interpretation of coefficients on dummy variables when the dependent variable is specified in logs was first pointed out by Halvorsen and Palmquist (1980).

[6] Older homes sell for a lower price, remodeled homes sell for about 5% to 10% more than those not remodeled and acreage adds value. Lower-than-average quality homes sell for less, and higher-than-average quality homes sell for more than average quality homes. The quality minus and plus ratings take away and add value, respectively, as expected. Lower-than-average condition homes sell for less than average condition homes, while higher-than-average condition homes sell for more in only two of the five years shown. A better quality heat source or roof leads to higher value. For example, in 1993, relative to a home that has electric baseboard or wood only as a source of heat, forced air heat is associated with a 4% increase in value, and hot water/heat pumps add about 10%.

Coefficients on these ''quality'' variables may be slightly overestimated because they may reflect variables that are not included in the model. For example, houses with heat pumps may more likely contain amenities such as a swimming pool, hot tub, burglar alarm or a built-in vacuum system. While a large enough number of quality variables have been included in the model so that the overestimation should not be a serious problem, the point is that the coefficient that suggests that the existence of a heat pump adds 10% to value does not mean that a person's property would immediately increase in value by 10% if they converted from wood heat to a heat pump.

The square footage variable is highly significant in all years. The estimated elasticity on total square feet of 0.4526 in 1993 implies that a 10% increase in total square footage results in a 4.53% increase in value, on average, for homes sold that year. A garage, finished basement, and deck all added significant value in all years.

[7] The impact of a view is now measured by a combination of the coefficient on view and the coefficient on the interactive distance variable. The percentage impact of view on sales price now depends on distance from the water. For 1993, the estimated coefficients in Exhibit 4 yield the following percentage impacts for different types of ocean views, at distances of 0.1 mile, 0.5 mile, 1 mile and 2 miles from the water.

Type of Ocean View	0.1 Mile	0.5 Mile	1 Mile	2 Miles
Full view	70.61	57.22	45.73	30.96
Superior partial view	52.06	38.55	27.09	12.54
Good partial view	35.89	31.39	27.34	21.86
Poor partial view	22.02	15.97	10.63	3.51

The percentage impacts for ocean view homes imply that a $200,000 home with no view would sell for $341,220 with an ocean view if located 0.1 miles from the water, $314,440 if located 0.5 miles from the water, $291,460 if located one mile from the water, and $261,920 if located two miles from the water with an ocean view. The above numbers differ somewhat from those reported in Benson, Schwartz and Smersh (1998) because of small differences in sample size.

[8] A price index was also estimated using the repeat-sales method, the major alternative to hedonic regression. Based on a regression using 2,192 repeat sales, the resulting index is highly correlated with the indices estimated using hedonic regressions. For the final quarter in the sample, the value of the price index estimated using the repeat-sales method is 2.263, versus 2.257 and 2.281 for the two hedonic indexes.

[9] For all equations estimated, a Dickey-Fuller test of OLS residuals allowed rejection of the hypothesis of non-stationarity due to a unit root. On that basis, the specifications were accepted as co-integrated relations. To test for serial correlation in all three final regressions, the LM test was used. The LM test may be viewed as superior to the Durbin-Watson statistic, as it tests for more general forms of serial correlation. Based on the calculated *F*-Statistics, the hypothesis of no serial correlation could not be rejected. Thus, it may be concluded that serial correlation is not present.

[10] The specification for the Point Roberts study was slightly different, because the authors used the Vancouver, British Columbia, housing price index as an explanatory variable rather than *SEAHPI* that was used in this study. When *SEAHPI* is used as an explanatory variable in the Point Roberts model, rather than the Vancouver price index, the coefficient for the exchange rate impact rises to 1.80, three times the size of the Bellingham coefficient!

[11] For 216 of the sample transactions, the address of the ''buyer'' was listed as the address of the property being purchased. A category is included for those who listed the same address as the property they were purchasing and who could not be reached by telephone or would not tell us from where they moved if they could be reached by telephone. Those who listed the same address, could be reached by phone and who told us from where they moved, were included in one of the geographic categories.

[12] Part of the reason for nonresidents selling lower value homes is that they typically would own homes that have been lived in. Bellingham residents would typically own the newer homes that are being sold. Therefore, newer home sales would tend to be concentrated in the Bellingham seller data. To the extent that newer homes sell at higher prices, the Bellingham seller price averages would be higher and the nonresident average prices would be lower. An additional explanation for the lower average selling price of nonresident owned homes is that the proportion of these homes that were used as rental properties by their seller appears to be higher than the proportion of homes sold by Bellingham residents. Rental homes usually are at the lower end of the price spectrum in most markets and this appears to be the case here.

[13] Tests for heteroskedasticity indicate that the variances of the independent variables are not constant across all values of *LNPRICE*, the dependent variable. Therefore, the two models shown in Exhibit 9 were estimated using White's correction for heteroskedasticity, to produce consistent standard errors and covariances. The values of the coefficients in Exhibit 9 are not affected by this correction, only the standard errors and the *t*-Statistics associated with the coefficient estimates.

[14] A test of California buyers alone indicates that Californians as a group pay 5.27% more than Whatcom County residents for the same quality home. The regression coefficient was significant at the 10% level.

[15] This is roughly equivalent to a stock that has a beta of 2.53 relative to the S&P 500.

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