

The Influence of Canadian Investment on U.S. Residential Property Values

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Abstract. This study is an examination of the impact of foreign investors on an American residential real estate market. Point Roberts, Washington, a real estate market that is dominated by Canadians, is the focus of the analysis. Utilizing a ten-year database of home sales, the empirical analysis suggests that the Canadian/U.S. dollar exchange rate and market conditions in nearby Vancouver, British Columbia, strongly influence Point Roberts residential property price levels. A rising Canadian dollar seems to motivate increased demand for Point Roberts property by Canadian investors, for example. The sensitivity of real estate prices to exchange-rate changes appears to be a three-to-six-month lagged function. In general, it appears that a higher Canadian dollar will increase the Canadian demand for Point Roberts real estate which, in turn, leads to higher transaction prices. In addition, transaction prices in Point Roberts are slightly more volatile than are prices in the Vancouver market.

Introduction

This study investigates the influence of foreign investment on U.S. residential real estate values. The study uses the Point Roberts, Washington, residential housing market as its focal point, because the market is dominated by Canadian investors and, thus, provides a very good “laboratory environment” in which to examine the foreign impact on a U.S. market. Factors that affect residential real estate values in this market include not only the general market supply and demand conditions, but also the exchange rate that is faced by the majority of the buyers and sellers. The findings of this study provide insights relevant to other markets that have many Canadian participants such as the border areas of Michigan and New York and certain markets in Florida. Additionally, the results could have implications for other cross-border markets in the world or any other market where foreigners from a single country or area of the world are a factor.

Previous research on foreign residential investment in the United States was conducted by Miller, Sklarz and Ordway (1988), referred to later as ‘MSO’. These authors investigate Japanese purchases of upscale homes and condominiums in Hawaii following the dramatic appreciation of the yen relative to the U.S. dollar during the mid-1980s.

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Their study concentrates on the upscale Waialae-Kahala neighborhood of Honolulu during the period January 1986 to February 1988. Approximately 400 home sales are examined, of which approximately 30% were purchased by Japanese nationals. The authors conclude that the appreciating yen contributed to the soaring Oahu upscale residential market at that time, and they suggest that Japanese buyers paid more for similar properties than their local counterparts. The paper provides unique insights on Japanese investor behavior. It did not cover a lengthy time period of analysis, however; nor did it examine a period when the yen fell in value relative to the U.S. dollar. The focus is on Japanese buyer behavior only, as the Japanese appear to have been heavy net buyers at that time. In addition, the MSO paper did not include a measure of real estate market conditions as an independent variable in the empirical analysis that regressed Hawaiian real estate prices on the dollar/yen exchange rate. Thus, the impact of exchange rates on real estate values could have been overestimated if exchange rates were correlated with other variables that also affect property values.

This study differs from the MSO study in that more foreign investor behavior variables are examined over a much longer period of time. The time 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% 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 was influenced primarily by foreign buyers, not sellers. Finally, most of the transactors 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. Thus, this paper provides a broader overview of foreign residential investor behavior than did the previous study.

The influence of the Canadian economy on Point Roberts is estimated by examining the impact of both the U.S./Canadian exchange rate and general market conditions on residential property values in Point Roberts. With a large pool of potential Canadian buyers in the area, it is hypothesized that prices in the Point Roberts real estate market are strongly influenced by Canadian demand. More specifically, it is hypothesized that a higher Canadian dollar will increase the Canadian demand for Point Roberts real estate which, in turn, will lead to higher transaction prices. In addition, it is hypothesized that transaction prices in Point Roberts are influenced by general market supply and demand conditions. The empirical findings support both hypotheses. The impact of the exchange rate is most significant when modeled with a lag of about three to six months.

To analyze the impact of Canadian investors on residential real estate prices in Point Roberts, a constant-quality Point Roberts housing price is estimated using the hedonic technique. The estimation employs data obtained from the Whatcom County Assessor's Office on characteristics of single-family residential properties sold in Point Roberts during the period January 1984 through June 1994, plus data gathered in the field by the authors. Specifically, the explicit time-variable approach, common in the housing price-index literature (for example, see Clapp and Giaccotto, 1992), is employed to estimate a price index. The estimated index is used as the dependent variable in a reduced-form model of market price, which is then used to estimate the impact of both the exchange rate and market conditions in the Vancouver, B.C. residential market.

The second section of this paper provides a background to the unique geography, history and commerce of Point Roberts. An overview of the Point Roberts real estate market is presented in the third section along with descriptive information about Canadian participation in the market and recent price trends. In section four the methodology and data for estimation of a Point Roberts price index are discussed, and estimation results are presented. The methodology and results of estimating the impact of the U.S./Canadian exchange rate and market conditions on Point Roberts' real estate prices are reported in section five. A summary and concluding comments are found in section six.

Point Roberts: History, Economy and Geography

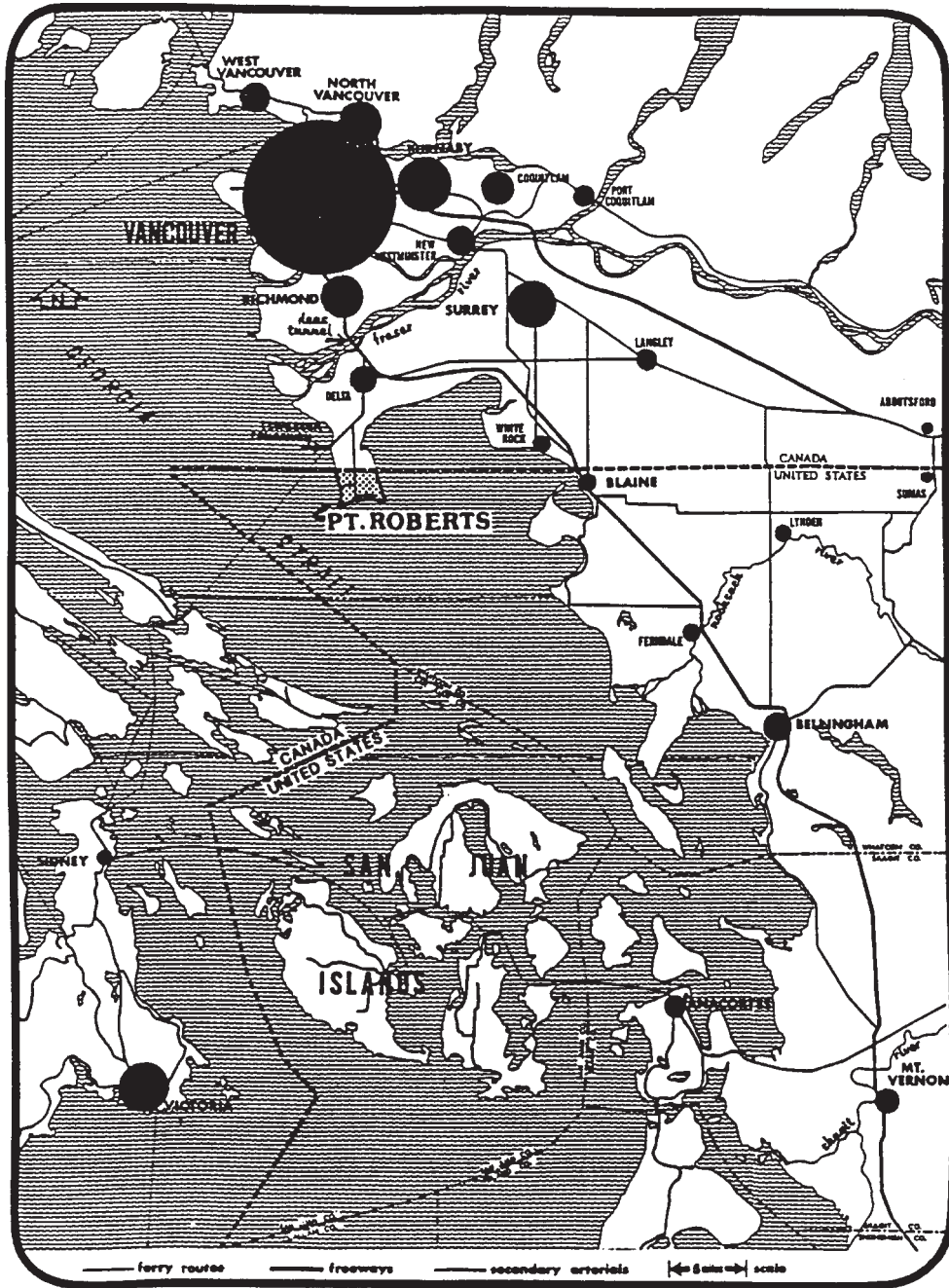
Point Roberts, Washington, is a 4.9-square-mile area located twenty miles directly south of the city of Vancouver, British Columbia. It shares an international border with Tsawwassen, a southern suburb of Vancouver. Located in the northwest corner of the continental United States, it occupies the tip of an otherwise Canadian peninsula (see Exhibit 1). To reach Point Roberts by land from the main body of Washington State requires driving twenty-three miles from Blaine, Washington across southwestern British Columbia. This journey entails the customs formalities of passing through two international borders.

Vancouver is Canada's third largest metropolitan area and its suburbs sprawl eastward and southward from downtown Vancouver, with many areas of greenbelt breaking up urban densities. The city of Tsawwassen, a transportation hub, contains many expensive homes, and it is built right up to the international frontier. Point Roberts, on the southern side of the boundary, is not densely developed despite the availability of both developable land and support infrastructure. Factors limiting development and the economic influence of Vancouver are discussed more fully later.

The geographic isolation of Point Roberts from the rest of the U.S. is the result of a nineteenth century boundary dispute between the United States and Great Britain. The dispute was resolved with the 1846 Treaty of Washington, which established the 49th parallel as the international boundary on the western North American mainland. This border now extends from the western shore of Lake of the Woods, on the Minnesota and Manitoba border to the Strait of Georgia boundary between Washington State and the province of British Columbia.¹ (At this point the 49th parallel boundary stops in the middle of the Strait and the boundary moves southward and then westward to incorporate Vancouver Island into Canada.) At the western end of the 49th parallel boundary, a tip of a peninsula, Point Roberts, is U.S. territory despite being attached to British Columbia and having no land connection with the rest of the United States. The only land access to Point Roberts is through Canada, and no ferry services connect it to the main body of Washington State.

As previously mentioned, Point Roberts is adjacent to the Vancouver, British Columbia, metropolitan area, a densely populated area with a rapidly growing population. The 1993 population of the Vancouver metropolitan area was about 1.7 million (*Canada Yearbook 1994*). This represents a 14% increase over the 1.5 million population level of just five years earlier. In contrast, Whatcom County, Washington, of which Point Roberts is legally a part, had a 1993 population of only 140,900. Whatcom County also

Exhibit 1 Location Map of Point Roberts and the Surrounding Area



Source: Whatcom County Planning Department, 1990

experienced substantial population growth during the late 1980s, however, with the population increasing by 21% during the 1986–93 period (Whatcom County Real Estate Research Committee, 1994). The largest city and the county seat is Bellingham, with a 1993 population of 55,480. Bellingham is located about 45 land miles from Point Roberts. The closest American city to Point Roberts is Blaine, a community with a 1993 population of 2,860. Most American shopping facilities, legal services, medical services, etc. are at least one-hour driving time and two international border crossings from Point Roberts. The geographic isolation of Point Roberts from the rest of the U.S. and its proximity to the Vancouver metropolitan area result in a strong Canadian influence.

Because of this isolation and due to immigration laws and other regulations that discourage permanent Canadian residents, the year-round population of unincorporated Point Roberts is very small. In fact, much of Point Roberts is somewhat rural in character, with a 1993 population of about 900 permanent residents, a population density of approximately 180 residents per square mile, and 409 registered voters (October 1993).² In the summer the population swells by five to six times as seasonal residents, almost exclusively Canadians, move into summer residences. Little commercial development has taken place on the Point Roberts side of the U.S./Canadian border, and residential development has been primarily in the form of low-density, single-family homes and vacation cottages. In contrast, there is relatively high-density development on the Canadian side of the border, with houses and condominiums built right up to the border, and with several large shopping centers located nearby. Given the large areas of developable land in Point Roberts, the level of residential development would be much more intense were it not for U.S. immigration laws and other legal strictures. Without a “green card,” Canadian citizens cannot live in Point Roberts permanently. Also, Canadians must reside in Canada for at least six months of the year to qualify for the government health insurance program. The intensive development in Tsawwassen, B.C., would certainly spill well into the Point if immigration and other related laws were modified.

Point Roberts has not attracted a substantial American population despite its numerous scenic and recreational amenities. Factors that appear to constrain American in-migration include the limited economic base of Point Roberts and the lack of easily accessible medical and educational facilities. School children face two lengthy multinational bus rides per day, for example. Medical and educational infrastructure are nearby in Canada, but are either unavailable or difficult to use. Point Roberts has the potential to be a retirement haven, although the lack of convenient medical facilities is a significant factor limiting the number of American retirees, according to several Point Roberts real estate brokers.

The economy of Point Roberts, which at one time was resource-based with agriculture and fishing the predominant activities, has evolved to a services-based, tourist-oriented economy.³ The community at one time benefited from Canadian blue laws that mandated Sunday tavern closings and limited other commercial activities. These laws have since been abolished. Point Roberts now caters to visitors attracted by its beaches, marine activities, and scenic views of Mount Baker and the San Juan Islands. With water on three sides, a relatively large proportion of Point Roberts property is water frontage or water view, and all properties are within a short drive of the ocean, making the area attractive for those seeking such amenities. The tourist infrastructure is fairly modest and includes a marina, several restaurants and taverns, and numerous other small-scale

commercial establishments. Several golf courses and other visitor-oriented projects are currently in various stages of development.

The Point Roberts Real Estate Market

The majority of transactors of residential properties in the Point Roberts market are Canadian, most of whom utilize their property for recreational purposes. In the late 1960s and 1970s, substantial development of vacation homes occurred in Point Roberts in response to growing Canadian demand. Today there are more than 1,500 single-family homes on the Point and less than one quarter are occupied by year-round residents. Because the Point is used so heavily by a "temporary" recreational population, about half of the dwelling units on the Point are between 500 and 1000 square feet in size and are referred to by residents as "vacation cottages." Canadians are the predominant investors in Point Roberts. As reported by the county, 70% of all Point Roberts property owners list Canadian mailing addresses (Whatcom County Planning Department, 1990). Another 6% of taxpayer mailing addresses are post office boxes, 10% are Point Roberts addresses, and only 13% of taxpayers list U.S. addresses outside of Point Roberts.

To obtain a more detailed picture of Canadian participation in the market, the authors compiled data from the *Whatcom County Digest* on buyer and seller addresses for each property in the Point Roberts sample (described in the next section). As shown in Exhibit 2, the percentage of transactions listing a Canadian address for the period January 1984 through June 1994 is 63.3% for buyers and 63.8% for sellers. Of buyers and sellers listing an address outside of Point Roberts, those reporting a Canadian address account for 90.0% and 84.2% of buyers and sellers, respectively. It is likely that these figures provide a conservative estimate of Canadian participation in the market. For a number of properties, the address listed for the buyer was the Point Roberts address of the property being purchased. Similarly it was the case that the address listed for a number of sellers was the Point Roberts address of the property being sold. It is likely that in at least some of these cases, the buyer or seller was Canadian. Referring to Exhibit 2, the Canadian addresses recorded for transactors are almost exclusively in the vicinity of Vancouver.

Exhibit 2
Point Roberts Buyers and Sellers, 1984–1994

Address	Buyer		Seller	
	Frequency	Percent	Frequency	Percent
Point Roberts	119	29.8	97	24.3
Other Washington State	11	2.8	24	6.0
Other U.S.	17	4.3	24	6.0
Vancouver vicinity	240	60.0	238	59.5
Other B.C.	9	2.3	14	3.5
Other Canada	4	1.0	3	0.8
Total	400	100.0	400	100.0

Source: *Whatcom County Digest*, various issues

Exhibit 3
Single-Family Home Sales: Point Roberts and Whatcom County and the U.S./Canadian Exchange Rate

Year	Point Roberts				Whatcom County				U.S./Can. Exch. Rate
	No. of Sales	Avg. Price	Total \$ Vol.	Price/Sq. Ft.	No. of Sales	Avg. Price	Total \$ Vol.	Price/Sq. Ft.	
1983	21	\$54,476	\$1,144,003	\$49	1,607	\$62,080	\$99,762,296	\$48	.8113
1984	31	45,333	1,405,312	50	1,624	63,068	102,422,599	49	.7721
1985	32	44,045	1,409,430	56	1,769	59,940	106,033,930	46	.7321
1986	27	65,090	1,757,421	51	1,833	62,183	113,981,959	46	.7196
1987	43	45,063	1,937,709	48	1,954	65,081	127,168,731	49	.7541
1988	59	62,906	3,711,454	53	2,663	70,201	186,945,263	51	.8108
1989	84	71,651	6,018,684	70	3,173	82,347	261,287,031	60	.8445
1990	59	109,709	6,472,831	108	2,683	109,351	293,388,733	85	.8569
1991	86	98,507	8,471,602	95	2,431	116,353	282,854,144	85	.8726
1992	45	108,818	4,896,790	110	2,733	124,788	341,045,604	91	.8273
1993	61	100,436	6,126,609	101	2,623	132,104	346,509,345	94	.7751

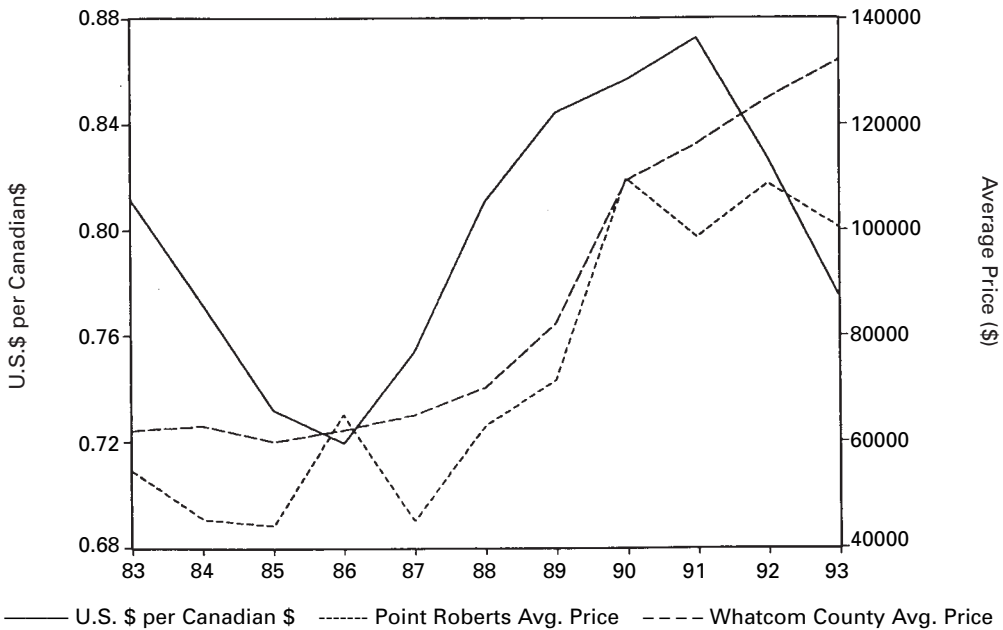
Source: Whatcom County Real Estate Research Reports, 1984–1994

Thus, it appears that the home market for the majority of residential property investors in Point Roberts is the Vancouver, British Columbia, metropolitan area.

As a result of substantial participation by Canadians in the Point Roberts market, trends over time in Point Roberts residential sales activity and average sale price appear to deviate somewhat from the trend in all of Whatcom County. Exhibit 3 contains summary information based on all single-family home sales in Point Roberts and in all of Whatcom County, for the 1983–93 period. It also shows the average annual U.S./Canadian exchange rate for each year. Activity in the Whatcom County market increased dramatically in the late 1980s, with the average sale price increasing by 33% from 1989 to 1990 alone. Factors contributing to the housing boom during this period are generally believed to include a robust Washington State economy propelled by expansion of the Boeing Company, increases in the number of both manufacturing and non-manufacturing jobs in Whatcom County, an increase in migration from California, and a strong Canadian dollar that contributed to increases in cross-border shopping and subsequent expansion of the Whatcom County retail sector. It has been estimated 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). While there is some direct Canadian involvement in Whatcom County residential real estate markets outside of Point Roberts, this impact is relatively small as compared to Point Roberts.⁴

Activity in Point Roberts increased in the late 1980s as well, with the number of real estate transactions increasing by 42% between 1988 and 1989. While real estate activity in all of Whatcom County peaked in 1989, the number of transactions in Point Roberts reached peaks in both 1989 and 1991, the latter year coinciding with the peak of the Canadian dollar. Exhibit 4 illustrates the trend in average annual sales prices for single-family homes sold in Point Roberts and in all of Whatcom County, plotted together with the U.S./Canadian exchange rate. Examining Exhibit 4, there appears to be a positive

Exhibit 4
U.S./Canada Exchange Rate and Average Home Prices, Point Roberts and
Whatcom County, 1983–1993



relationship between the exchange rate, measured in U.S. dollars per Canadian dollar, and prices in Point Roberts. Due to the relatively small number of transactions in the Point Roberts market, however, it is likely that average prices are substantially influenced by year-to-year changes in the mix of homes sold. To control for quality changes, a constant-quality price index is estimated for use in the econometric analysis of the exchange-rate impact.

Price Index Estimation

Methodology

An index of Point Roberts housing prices is estimated using the hedonic technique. More specifically, the explicit time-variable approach common in the literature is used, 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; Gatzlaff and Ling, 1994).⁵ 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 $i=1,\dots,n$, and $t=1,\dots,T$;
 X_{jit} = a vector of variables measuring property characteristic $j=1,\dots,k$ for property i at time t ;
 D_{it} = a vector of time dummy variables equal to 1 if the i th property is sold in time period t , and 0 otherwise.

The coefficients on the time dummy variables yield the logarithm of the cumulative price index.

Data

The sample of Point Roberts 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 672 real estate sales transactions in Point Roberts 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. There is no multiple listing service in Point Roberts, so none of these data are centrally available through any source other than the Assessor's Office.⁶

Before the data could be used, several 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. Therefore, transactions that were discarded include those in which:

- the sale used document types other than warranty deeds, such as those sold through trusts, receiverships and quitclaim deeds;
- transaction prices represented multiple property sales;
- 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;
- the data sets were incomplete or in error;
- 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;
- the transactions appeared to be for raw land; and
- the properties contained more than one dwelling.

After removing these unusable property transactions, the data set is reduced to 397 single-family residential property sales transactions.⁷

In addition to the data provided by the Whatcom County Assessor's Office, the authors collected further data for each of the 397 properties. One of the shortcomings of the assessor's data is that it provided no information on whether the property has a "view," which is hypothesized to be one of the most important determinants of property values in Point Roberts. In July 1994, the authors traveled to Point Roberts and drove by each of the properties in the data set. Through physical inspection, each property was

classified into one of four categories: ocean frontage, ocean view, partial ocean view, or no view.

Discussion of Variables

An explicit time-variable model is used to obtain a cumulative price index. The model to be estimated may be represented as follows:

$$PRICE = F(TIME, OCEANF, OCEANV, OCEANPV, AGE, ACREAGE, QUALITY, CNDTN, POORHEAT, BEDRMS, TOTSF, FBASEMSF, GARSF, CARPSF, DECKSF, PATIOSF, STORGSF, SHOPSF),$$

where

PRICE = natural log of the sales price of an individual piece of residential property in Point Roberts during the period from 1984 to 1994;

TIME = a vector of forty dummy variables (there were forty-one consecutive quarters of property sales in our sample), for which the value is "1" if the property was sold during that time period, and "0" otherwise.

As stated above, the estimated coefficients on each of the time dummy variables is the logarithm of the cumulative price index. The remaining variables in the model are standard in hedonic pricing models and are defined as:

VIEW = a dummy variable defined as:

OCEANF = 1 if the dwelling has an ocean front, otherwise coded as 0;

OCEANV = 1 if the dwelling has an unobstructed ocean view, otherwise 0;

OCEANPV = 1 if the dwelling has a partial ocean view, otherwise 0;

and the omitted category includes properties with no view;

AGE = the natural log of the year of sale minus the year built or the year of sale minus the year remodeled, whichever is less;

ACREAGE = a dummy variable equal to 1 for property sales including five or more acres, otherwise 0;

QUALITY = the natural log of a variable that takes on the value 1, 2, 3, or 4 depending on the quality of construction of the dwelling, with 1 being the lowest quality;

CNDTN = the natural log of a variable that takes on the value 1, 2, 3, 4, 5, or 6 depending on the condition of the dwelling, with 1 being the poorest condition;

POORHEAT = a dummy variable equal to 1 if the dwelling has no permanent heat source or if it has wood heat only;

BEDRMS = the natural log of number of bedrooms in the dwelling;

- TOTSF* =the natural log of total square feet in the dwelling, excluding the basement;
- FBASEMSF* =the natural log of total square feet of finished basement;
- GARSF* =the natural log of total square feet of garage;
- CARPSF* =the natural log of total square feet of carport;
- DECKSF* =the natural log of total square feet of deck;
- PATIOSF* =the natural log of total square feet of patio;
- STORGSF* =the natural log of total square feet of storage-type outbuildings; and
- SHOPSF* =the natural log of total square feet of separate shop space.

Exhibit 5 provides descriptive statistics for all variables. Statistics for variables defined in logs were computed prior to log transformations. As defined above, the age variable was adjusted for remodeling of properties. The average property is approximately twenty-five years old. The mean square footage is 1037, the average number of bedrooms is 2.22, and the mean quality rating is 2.27. For dummy variables, the mean indicates the proportion of properties that have the particular characteristic. About 15% of the properties are not ocean frontage but have an unobstructed ocean view, about 9% are ocean frontage homes, and about 10% of the properties in the sample have a partial ocean view.

Results

Results of ordinary least squares estimation of our hedonic equation are reported in Exhibits 6 and 7. As shown in Exhibit 6, most variables describing property characteristics

Exhibit 5
Means of Variables

Variable	Mean	Std Dev.	Min.	Max.
Age (years)	25.16	17.11	0.50	99.50
Quality (1=best, 4=worst)	2.27	0.59	1.00	4.00
Condition (1=best, 6=worst)	3.23	0.88	1.00	6.00
Number of bedrooms	2.22	0.70	1.00	5.00
Total square feet	1036.71	462.28	384.00	3923.00
Finished basement square feet	4.91	19.99	0.00	100.00
Garage square feet	89.56	181.81	0.00	789.00
Deck square feet	259.58	273.81	0.00	2112.00
Patio square feet	50.25	143.73	0.00	1449.00
Storage square feet	65.46	112.67	0.00	1280.00
Shop square feet	12.90	104.34	0.00	864.00
<i>Dummy Variables:*</i>				
Ocean front	.086			
Ocean view	.149			
Partial ocean view	.103			
Acreage	.005			
Poor heat	.335			

* Dummy variable mean indicates proportion of properties with the characteristic.

Exhibit 6
Regression Results: Property Characteristics

Variable	Coeff.	T-Stat.
Constant	6.774	14.879***
<i>OCEANF</i>	0.905	16.487***
<i>OCEANV</i>	0.278	5.857***
<i>OCEANPV</i>	0.098	1.954*
<i>AGE</i>	0.014	0.711
<i>ACREAGE</i>	0.839	4.121***
<i>QUALITY</i>	0.348	5.139***
<i>CNDTN</i>	0.156	2.659***
<i>POORHEAT</i>	-0.052	-1.404
<i>BEDRMS</i>	0.049	0.823
<i>TOTSF</i>	0.416	6.420***
<i>FBASEMSF</i>	0.059	3.884***
<i>GARSF</i>	0.014	2.223**
<i>CARPSF</i>	0.010	1.591
<i>DECKSF</i>	0.010	1.680*
<i>PATIOSF</i>	0.000	-0.032
<i>STORGSF</i>	0.014	2.164**
<i>SHOPSF</i>	0.065	3.502***
<i>TIME</i>	see Exhibit 7	
<i>R-squared</i>	0.849	
<i>Adj. R-squared</i>	0.824	
<i>S.E. of regr.</i>	0.270	

*significant at .10 level; **significant at .05 level;

***significant at .01 level

are significant, with the expected sign. As hypothesized, the property's view has a large and significant effect on value. Estimated coefficients on these variables indicate that relative to no view, an ocean frontage location adds 147.2% to market price, an ocean view adds 32%, and a partial ocean view adds 10.3%. (Halvorsen and Palmquist, 1980, explain that to estimate the impact of a dummy variable in a semi-log model one must make the following calculation: percent change = $[e^c - 1] \times 100$, where c is the coefficient value.) Therefore, a \$100,000 residential property that has no view would sell for \$240,200 if it were located on ocean frontage, if all other characteristics remain the same.

The coefficient on the age variable is not significant. This can perhaps be explained in large part by incomplete data on remodeling of properties in our sample. Prior to about 1970, remodeling was not recorded by the county. Older properties that were substantially remodeled prior to 1970 are thus assigned an age that is not an accurate reflection of the physical age of all components of the property.

While coefficients for the number of bedrooms and poor heat variables are not significant, the acreage, quality and condition variables are highly significant. The estimated square footage elasticity implies that a 10% increase in total square footage results in a 4.16% increase in value. Of the remaining variables, finished basement square footage, garage square footage, deck square footage, storage-type outbuilding square footage, and shop square footage add significantly to value.

Exhibit 7
Regression Results: Time Dummies and Price Index

Variable(<i>TIME</i>)	Coeff.	T-Stat.	Price Index
84:2	—	—	1.000
84:3	0.071	0.510	1.073
84:4	0.223	1.450	1.250
85:1	0.086	0.552	1.090
85:2	0.126	1.027	1.134
85:3	0.058	0.350	1.060
85:4	0.045	0.322	1.046
86:1	0.106	0.819	1.111
86:2	0.043	0.262	1.044
86:3	0.120	0.828	1.128
86:4	0.204	1.558	1.226
87:1	0.311	1.079	1.365
87:2	0.200	1.618	1.221
87:3	0.283	2.119**	1.327
87:4	0.077	0.359	1.080
88:1	0.208	1.403	1.231
88:2	0.227	1.873*	1.255
88:3	0.370	3.238***	1.448
88:4	0.379	3.050***	1.460
89:1	0.692	4.978***	1.998
89:2	0.688	6.189***	1.990
89:3	0.639	5.615***	1.895
89:4	0.689	5.757***	1.991
90:1	0.764	5.527***	2.147
90:2	0.938	8.332***	2.554
90:3	0.823	6.348***	2.276
90:4	0.940	7.233***	2.560
91:1	0.846	6.464***	2.330
91:2	0.980	8.627***	2.664
91:3	1.010	9.051***	2.746
91:4	1.250	9.920***	3.492
92:1	1.029	7.859***	2.798
92:2	1.067	8.728***	2.907
92:3	0.949	6.585***	2.584
92:4	1.163	9.574***	3.198
93:1	1.202	9.219***	3.326
93:2	1.087	9.082***	2.966
93:3	1.081	8.526***	2.949
93:4	1.052	8.486***	2.863
94:1	1.095	5.949***	2.989
94:2	1.033	7.520***	2.808

*significant at .10 level; **significant at .05 level; ***significant at .01 level

Estimated coefficients for time dummy variables and the resulting price index are shown in Exhibit 7. Time dummies for the second quarter of 1984 through second quarter 1987, and for fourth quarter 1987 and first quarter 1988, are not significant. This indicates no significant change in constant-quality prices in the Point Roberts market for

roughly four years beginning in 1984. Coefficient estimates in all subsequent quarters are positive and significant, and indicate that prices rose about 180% (on a constant quality basis) from 1984 to 1994 for the residential transactions in our sample.

The Impact of the U.S./Canadian Exchange Rate and Canadian Market Conditions

Methodology

The price index estimated above is used as the dependent variable in a reduced-form model of market price that includes the U.S./Canadian exchange rate as an explanatory variable. The model may be written as:

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

where:

PIX_t = the cumulative price index for period t ;

X_{jt} = a vector of variables measuring supply and demand determinants
 $j=1, \dots, k$, for period t ;

$XRATE_t$ = the U.S./Canadian exchange rate for period t , expressed in terms of U.S. dollars per Canadian dollar.

It is hypothesized that the higher the Canadian dollar (i.e., the larger the quantity of U.S. dollars that the Canadian dollar will buy), the higher the Point Roberts 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). Because the majority of buyers and sellers are Canadian, it is possible that the supply and demand factors that affect Point Roberts property values may best be reflected in the values of properties in the Vancouver metropolitan area. Therefore, a Vancouver real estate price index is used to represent market supply and demand conditions. As discussed in the third section, the primary source of demand for Point Roberts properties is from residents of the Vancouver metropolitan area. It is likely that in addition to exchange rates, property values in Point Roberts are influenced by residential property prices in the Vancouver metropolitan area. There are many vacation home areas in Canada near Vancouver that compete with Point Roberts. As Vancouver prices rise, for example, vacation property in Point Roberts becomes more attractive relative to other vacation properties in the Vancouver area, thus stimulating demand for Point Roberts properties and driving up sales prices. This provides a strong rationale for using a Vancouver price index.

For both theoretical and practical reasons it is probable that the impact of the exchange rate will occur with a lag of one or two quarters. This is due in part to the time on market/contract/closing process common in most real estate transactions, and in part to the fact that the exchange rate data used is for the midpoint of the quarter in which the sale took place. 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.

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

$$PTRINDEX=f(XRATE, VANPR),$$

where *PTRINDEX* is the natural log of the quarterly Point Roberts price index calculated in the fourth section and shown in Exhibit 7. Considering the independent variables, *XRATE* is the natural log of the quarterly U.S./Canadian exchange rate, and *VANPR* is the natural log of the mean sales price of Vancouver residential property.⁸ Estimation results for three different specifications of the lag structure on the exchange-rate variable are listed in Exhibit 8. In addition to a one- and two-quarter lag, these include 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.⁹

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

Exhibit 8 Time-Series Regression Results Showing the Exchange Rate Impact

Variable	Reg. 1		Reg. 2		Reg. 3	
	Coeff.	T-Stat.	Coeff.	T-Stat.	Coeff.	T-Stat.
Constant	-12.810	-8.498***	-12.043	-7.643***	-11.964	-7.749***
<i>XRATE</i> (-1)	1.048	2.038**				
<i>XRATE:DL</i>			1.427	2.516**		
<i>XRATE</i> (-2)					1.428	2.704**
<i>VANPR</i>	1.126	9.494***	1.070	8.688***	1.063	8.777***
<i>MA</i> (1)	0.520	4.612***	0.571	5.335***	0.618	5.549***
<i>MA</i> (2)	0.566	4.682***	0.568	5.187***	0.546	5.211***
<i>R</i> -squared		0.954		0.957		0.958
Adj. <i>R</i> -squared		0.949		0.952		0.953
S.E. of regr.		0.096		0.093		0.092
DW statistic		2.140		2.208		2.293

*significant at .10 level; **significant at .05 level; ***significant at .01 level

Source: Author estimates

index for U.S. construction costs did not show either to be a significant determinant of Point Roberts home prices, when controlling for Vancouver prices. 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 moving-average variables, $MA(1)$ and $MA(2)$, are included.¹⁰ All three regressions thus include these two variables.

Estimation Results

As may be seen in Exhibit 8, the log of the Point Roberts housing price index is positively and significantly related to both the mean Vancouver price ($VANPR$) and the log of the exchange rate in all three regressions. In terms of both the magnitude of the coefficients on the exchange rate and Vancouver price variables, results obtained from estimating the model with either a distributed lag specification of the exchange rate or a two-quarter lag specification (Regressions 2 and 3) are very similar. By comparison, the regression that includes a one-quarter lag specification of the exchange rate (Regression 1) produces a smaller coefficient on the exchange-rate variable, and a somewhat larger coefficient on the Vancouver price variable. Judging by both the R -squared and the standard error of the regression, the model improves significantly when either the distributed lag or two-quarter lag specification is used. A slight improvement is also observed when moving from the distributed lag specification of the exchange rate to a pure two-quarter lag specification.

Results suggest that the constant-quality price level in Point Roberts moves very closely with the mean Vancouver price. Since all variables with the exception of the moving-average terms are measured in logs, the estimated coefficients are elasticities. The estimated elasticity with respect to the Vancouver price in Regression 3 is 1.063. This implies that a 10% increase (decrease) in the mean Vancouver price is associated with a 10.63% increase (decrease) in the Point Roberts price level. Thus, it appears that prices in Point Roberts are only slightly more volatile than prices in the Vancouver metro area.

The empirical results also suggest that the exchange-rate impact is fairly large. The estimated exchange-rate elasticity from Regression 3 is 1.428. This elasticity value implies that a 10% rise (decrease) in the exchange rate leads to more than a 14% increase (decrease) in the Point Roberts price index two quarters later. A 10% increase in the exchange rate (for example, from a level of 0.70 to 0.77) could be expected to increase the price of the average single-family home in Point Roberts from \$100,000 to approximately \$114,000 after four to six months.¹¹

Summary and Suggestions for Additional Research

Special historical circumstances have resulted in an American real estate market being dominated by Canadians. At least 70% of real estate transactions in Point Roberts, Washington, involve Canadians as buyers and/or sellers. The heavy Canadian influence provides a unique opportunity to examine the behavior of foreign investors in U.S. residential real estate.

Empirical results suggest that price movements in Point Roberts are closely correlated

to price movements in the nearby Vancouver, British Columbia market as well as the Canadian/U.S. dollar exchange rate. Estimation of an econometric model of the impact of exchange rates lagged by two quarters produces an elasticity of 1.4. This suggests that three to six months after an exchange-rate movement, home prices in Point Roberts will change in value. It appears that fluctuations in both exchange rates and market conditions heavily influence this market. Residential property prices in this U.S. market are driven by Vancouver market conditions and by the Canadian dollar exchange rate.

The growing internationalization of real estate markets presents numerous opportunities for additional research on the topic of foreign investment in residential real estate. Markets of possible interest include mainland Chinese investment in Hong Kong and Macau, Hong Kong investor purchases of Guangzhou residential developments, Northern European investment in Spanish and Portuguese vacation properties, and Argentinean and Brazilian investment in Uruguayan Atlantic coast properties. As investors continue to search for opportunities outside their home countries, they will have an increasing influence on markets, providing additional factors to consider when analyzing the characteristics of a market.

Notes

¹A similar enclave was created by the same treaty at the eastern end of the 49th parallel boundary at the Lake of the Woods. At the end of the 49th parallel boundary (in the Lake) the U.S. boundary abruptly moves north through a piece of land that protrudes out into the lake then swings east back out into the lake and then south through the lake until it touches the southern shore. This peninsula, which is physically attached to Manitoba and Ontario, is primarily composed of the Northwest Angle State Forest. A small community, Angle Inlet, is on the north side of the peninsula. Unlike Point Roberts, the Minnesota parcel is isolated from any areas of significant population or economic activity.

²Point Roberts is an unincorporated community and its land use regulations are primarily a county function. Police, road maintenance and other such services are provided by Whatcom County. The area is part of the Blaine School District. Water is piped into the enclave from Canada. Phone service, which was provided for many years by BC Telephone Co., was awarded in 1988 to Whidbey Telephone, a Washington State-based telephone company (resulting in substantially higher rates).

³Originally called Cheltenham by Native Americans, Point Roberts was given its current name by Captain George Vancouver in 1792 in honor of his friend Captain Henry Roberts. During the latter half of the nineteenth century the Point was settled by European immigrants—in particular several families from Iceland, a fact commemorated by the 1988 visit to Point Roberts by Iceland's President.

⁴There is a Canadian presence in some other Whatcom County markets. In Sudden Valley, a golf course/watersports community near Bellingham, for example, real estate salespersons at Sun-Mark Properties indicate that 10% of recent sales involve Canadian buyers. This level is typical of Whatcom County markets excluding Point Roberts, based upon discussions with numerous real estate brokers and others.

⁵Methodologies for estimation of price indexes are compared by Gatzlaff and Ling (1994), Haurin and Hendershott (1991), Case, Pollakowski and Wachter (1991), Palmquist (1980), and others. While the hedonic method has a number of advantages, a disadvantage of the explicit-time-variable approach is the implicit assumption of constant coefficients with respect to hedonic characteristics over time. The major alternative is a repeat sales methodology. Due to our relatively small sample of repeat sales properties, this approach was not feasible. It should be noted, however, that this approach has disadvantages as well.

⁶Not only is there no Multiple Listing Service (MLS) in Point Roberts, the MLS in Whatcom County does not include Point Roberts. In addition, real estate brokers in Bellingham and the rest of the county do not have offices in Point Roberts, and they very rarely list or sell Point Roberts properties. On the other hand, Point Roberts is featured in ten pages of the 475-page Metro Vancouver edition of the National Catalog of Homes of the National Real Estate Service (a Canadian-owned nationwide real estate franchise) which provides exposure of Point Roberts on a national basis in Canada.

⁷Price indexes are normally estimated with samples such as the one used in this study, which include only those houses that have sold, and not all houses. This creates the possibility of sample selection bias. Jud and Seaks (1994) demonstrate that the bias can be significant in any given year, although over time the cumulative errors will tend to cancel out.

⁸Due to data limitations, the mean Vancouver single-family sales price is used as a proxy for a constant-quality price index. As alternatives to this variable, we experimented with the housing component of the Vancouver CPI, and a price index for new housing (two constant-quality indexes available from Statistics Canada). The performance of all three variables was very similar, leading us to believe that the mean Vancouver price over this time period is a good approximation of a constant-quality index.

⁹A specification that includes both a one-quarter and two-quarter lag was also tried. The coefficient on the one-quarter lag was small in magnitude, and statistically insignificant, while the result for the two-quarter lag was similar to Regression 3. We attribute this to the presence of multicollinearity when both variables are included.

¹⁰For 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 cointegrated relations.

¹¹In contrast, the MSO paper states that a 10% rise in the dollar/yen exchange rate would lead to a 27% increase in property values (i.e., an elasticity coefficient from a double log model of 2.7) even though they report a coefficient of only .27. From the information given in the paper it seems that they did not use a double log model; and, therefore, the reported coefficient should not have been interpreted as an elasticity. Further, the MSO paper did not include any measure of supply and demand conditions as an independent variable where Hawaiian real estate prices were regressed on the dollar/yen exchange rate. Thus, the impact of exchange rates on real estate values was most likely overestimated if exchange rates during the short time period studied were correlated with other variables that also affect property values.

References

- Canada Yearbook 1994*, Ottawa, Canada: Statistics Canada, 1993.
- Case, B., H. O. Pollakowski and S. M. Wachter, On Choosing Among House Price Methodologies, *AREUEA Journal*, 1991, 19, 286–307.
- Center for Economic and Business Research, Whatcom County Econometric Model, 1994, College of Business and Economics, Western Washington University, Bellingham.
- Clapp, J. M. and C. Giaccotto, Estimating Price Trends for Residential Property: A Comparison of Repeat Sales and Assessed Value Methods, *Journal of Real Estate Finance and Economics*, 1992, 5, 357–74.
- Gatzlaff, D. H. and D. C. Ling, Measuring Changes in Local House Prices: An Empirical Investigation of Alternative Methodologies, *Journal of Urban Economics*, 1994, 35, 221–44.
- Halvorsen, R. and R. Palmquist, The Interpretation of Dummy Variables in Semilogarithmic Equations, *American Economic Review*, 1980, 70, 474–75.
- Haurin, D. R. and P. H. Hendershott, House Price Indexes: Issues and Results, *AREUEA Journal*, 1991, 19, 259–69.

- Jud, G. D. and T. G. Seaks, Sample Selection Bias in Estimating Housing Price Sales, *Journal of Real Estate Research*, 1994, 9:3, 289–98.
- Miller, N. G., M. A. Sklarz and N. Ordway, Japanese Purchases, Exchange Rates and Speculation in Residential Real Estate Markets, *Journal of Real Estate Research*, 1988, 3:3, 39–49.
- Palmquist, R. B., Alternative Techniques for Developing Real Estate Price Indexes, *Review of Economics and Statistics*, 1980, 62, 442–80.
- Peek, J. and J. A. Wilcox, The Measurement and Determinants of Single-Family House Prices, *AREUEA Journal*, 1991, 19:3, 353–82.
- Pindyck, R.S. and D. L. Rubinfeld, *Econometric Models and Economic Forecasts*, New York: McGraw Hill, 1991.
- Whatcom County Digest*, Sequim, Wash.: Bridget and Mark Witschger (10 Amber Lane, Sequim, Washington 98382).
- Whatcom County Planning Department, *Point Roberts Subarea*, Bellingham. Wash.: WCPD, 1990.
- Whatcom County Real Estate Research Committee, *Whatcom County Real Estate Research Report*, Vols. 6–16, Bellingham, Wash.: College of Business and Economics, Western Washington University, 1984–1994.
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