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COAL TRAINS AND HOME VALUES:
THE EFFECT OF THE GATEWAY PACIFIC TERMINAL PROJECT ON HOUSING PRICES IN BELLINGHAM, WASHINGTON

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ABSTRACT

The proposal to build the Gateway Pacific Terminal generated much controversy in Bellingham, Washington. As a deep-water port slated to export large quantities of coal and other commodities, the Gateway Pacific Terminal (GPT) threatened to increase the amount of rail traffic passing through the region. The following study uses a hedonic price model to test whether proximity to the railroad affected the sales price of houses in Bellingham after the announcement of the GPT environmental review process. Little previous research focuses on the effect of rail traffic on housing prices in the Pacific Northwest and no empirical studies have examined the effects of increased traffic due to proposed export terminals. This study attempts to fill the gap in the existing literature. Using data for roughly 1,900 houses sold between 2010 and 2016, I tested my hypothesis using six separate model specifications that featured different inflation control methods as well as different methods of measuring distance between houses and the railroad. Ultimately, across the six specifications, I found no evidence to support my hypothesis. Neither the announcement of the GPT project or proximity to the railroad significantly affected the sales price of houses in Bellingham. As of the time of publication, the GPT project remains undeveloped. Shifting political and economic conditions, however, could lead to renewed interest in an export facility at the GPT site. If that occurs, this research can serve as a reference for researchers and community members.

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I INTRODUCTION

The proposal to build a marine terminal to export fossil fuels and other commodities from Cherry Point, Washington, created controversy among residents in nearby Bellingham, WA. The proposed port – the Gateway Pacific Terminal (GPT) – was slated to export up to 54 million dry metric tons of commodities annually. Forty-eight of the 54 million tons of exported commodities were planned to be coal. To transport that quantity of materials to the site by rail, BNSF Railway Inc. proposed an additional project: the Custer Spur. The spur was intended to be an expansion of the railway facilities and tracks near GPT to accommodate more railcars. The development of GPT and the Custer Spur would happen simultaneously.

The size of the two projects triggered federal- and state-level environmental review processes under the National Environmental Policy Act and the State Environmental Policy Act. Major assessment topics during the first stage of the Environmental Impact Statement (EIS) process were increased rail traffic and corresponding noise, vibration, safety, and hazard concerns. Local media and environmental groups heavily broadcasted these concerns after the developers submitted permit application for the GPT project in 2011 and as other proposals sprang up throughout the Pacific Northwest.

Currently, however, the permitting process for the GPT project has stopped. The Army Corps of Engineers, the federal agency responsible for issuing the permits necessary for the development of an export terminal, determined that it could not permit the project in May 2016. The Corps decided that permitting the project would be violation of treaty rights between the United States and the Lummi Nation (Department of Ecology, 2016). A month after the Army Corps announcement, all progress on the environmental review of the GPT project stopped at the developer's request. The EIS process has been suspended until further notice (Department of Ecology, 2016). In September 2016, the Whatcom County Council upheld a 6-month moratorium on "the acceptance and processing of applications and permits for new or expanded facilities in the Cherry Point Urban Growth Area, the primary purpose of which would be the shipment of unrefined fossil fuels not to be processed at Cherry Point" (Whatcom County Council). Thus, the development of the GPT site or any related export facility near Cherry Point is unlikely in the immediate future.

However, since the EIS process stopped, little research about the potential effects of increased rail traffic in the region has been made publically accessible. A primary goal of this research is to expand the literature about the effects of train traffic related to export facilities, particularly in the Pacific Northwest. In this study, I build on the extensive amount of existing rail-related literature. Previous studies have measured the effects of distance between homes and environmental disamenities or monetized railway noise using hedonic pricing methodologies. Utilizing similar methods, I examine data for about 1,900 homes in Bellingham, WA, to determine if being located near the railroad significantly affects the sales price of a home, especially before and after the announcement of the GPT environmental review process in 2012.

II STATEMENT OF HYPOTHESIS

Trains frequently travel along the railroad bordering Bellingham Bay. The rail traffic as well as its corresponding noise can be a detriment to nearby homeowners. As discussed previously, increased rail traffic was expected with the development of the Gateway Pacific Terminal (GPT) project at Cherry Point and most of the new traffic would be railcars filled with coal. Many Bellingham residents were displeased by the GPT announcement and were fearful of coal-bearing trains passing through the city. Therefore, I hypothesize that being near the railroad will have a significantly negative effect on the sales price of Bellingham houses and there will be an additional significantly negative effect of proximity to the railroad after 2012.

Two variables are important to test this hypothesis: a variable that measures distance to the railroad and a variable that captures the effect of the EIS announcement. My model specifications use two different distance to railroad variables. If my hypothesis is correct, the model's distance variable will indicate that sales price decreases as the distance between the house and the railroad shrinks. Additionally, if my hypothesis is correct, the coefficient of "Rail Effect" variable will be negative and significant.

III LITERATURE REVIEW

A dataset similar to the Bellingham dataset used in this study has already been used in two previously published papers. Hansen et al. (2006) use housing data from Whatcom County - where Bellingham is located - to investigate the effect of an environmental disamentiy on housing prices. The research team used 3,765 observations to estimate marginal willingness to pay for distance from the Olympic natural gas pipeline in Bellingham, WA, before and after the pipeline's 1999 explosion. Hansen et al. found that the effect of distance from the pipeline on home prices was insignificant before the accident and significant afterward. Hansen et al. also interestingly found that, after the accident occurred, the negative effect of "closeness" to the pipeline decayed as distance to the pipeline increased. This means the drop in a home's sales price was highly localized around the pipeline.

Hansen and Benson (2013) also use Bellingham data. Hansen and Benson investigate the value a "view" adds to residential property prices in Whatcom County. Using over 20,000 transactions from a 25-year period, Hansen and Benson determine that lakefront and ocean views have a significant influence on the sales price of a house, and that the real prices of water views are tied to fluctuations in the housing cycle. Both the findings from Hansen et al. (2006) and Hansen and Benson (2013) have important implications for my model specification.

In addition to literature about Bellingham's housing market, economic literature about the impact of distance to railroads on housing prices also influenced this research. Using data from 1996-1999, Simons and Jaouhari (2004) uses a hedonic price model to estimate the reduction in sales price of houses near freight railroad tracks in Ohio. Simons and Jaouhari used distance dummy variables to indicate whether a home is within 250, 500, or 750 feet from the railroad tracks and then further categorized their data by house size. From the results of their model, Simons and Jaouhari found that there is a significant negative relationship between sales price proximity to the railroad for small houses (under 1,250 square feet) at all three distances from the railroad, with an average loss in value between $3,800 and $5,800.

Similarly, Futch (2011) analyzes how an increase in freight rail traffic along the Alameda Corridor in California affected home prices and how the effect persisted over distance. Futch's results suggest a marginal increase in rail traffic led to a 0.3 reduction in the sales price of a home that is within 1/3 to 2/3 of a mile from the railroad and the negative effect on sales price disappears for homes located between 2/3 and one mile from the railroad.

Literature documenting the negative effects of railway noise also helped shape my hypothesis. Clark (2006) and Andersson et al. (2009) investigated the relationship between railway noise and property prices. Clark found that proximity to rail lines has a negative effect on home prices; Andersson et al. found the noise from railroads significantly reduces property prices. Clark and Andersson et al.'s results agree with results typically found in literature about traffic noise, and both studies can serve as a point of comparison for my results.

Additionally, non-rail related literature also guided this research. Bennett and Loomis (2015) examined how home prices fluctuate as distance from hydraulically fractured oil wells varies in Weld County, Colorado. Although unrelated to railroad literature, Bennett and Loomis' work also relates to this study because their work estimates the impact of an environmental disammentiy on housing prices. Bennett and Loomis' explanation of hedonic pricing models aided my model specification and helped explain some of econometric techniques necessary during the research process. Altogether, the listed literature helped me develop my hypothesis as well as a theoretically sound model specification.

IV MODEL SPECIFICATION

Hedonic price analysis is a form of indirect evaluation used commonly in economic housing literature. Hedonic housing models explain the price of a house as a function of its characteristics, such as size, age, and location. The values of house characteristics are not observed directly but instead are inferred from market transactions. The model used in this study estimates the value of many common house characteristics (such as bedrooms, bathrooms, and square footage). More importantly, the study also estimates the effect of proximity to the railroad and the effect proximity has before and after the announcement of Gateway Pacific Terminal environmental review process in 2012.

To estimate the value of these characteristics, I first had to decide the functional form of my model. The existing empirical literature on estimating house prices using hedonic price methodology typically uses the logarithm of price as the dependent variable (Clark, 2006; Futch, 2011; Hansen et al., 2006; Hansen and Benson, 2013). I used a Box-Cox test to select the appropriate transformation, and I found that transforming sales price into the natural logarithm was appropriate. Bennett and Loomis (2015) used a Box-Cox test to select functional form and similarly found that the semi-log functional form, with a log price dependent variable, was best.

In the hedonic housing literature, it is also common to use the logarithm of distance or the inverse of distance to account for the decay of noise over distance and my estimated models use both of these transformations. In studies that use data covering a number of years, the most common method used to control for inflation is to deflate current prices by a median home price index. Introducing year fixed-effects is another less common method to control for inflation. Bennett and Loomis (2015) use year fixed-effects and, using a Box-Cox test, determine that functional form is favorable over other forms. In this study, I use both methods to control for the effect of inflation[1]. A third method is also used. In this study, I introduce a novel and intuitive method to control for the effect of inflation: a time trend variable.

Ultimately, the general form of my study's hedonic price model is as follows:

$$P_{House} = f\ (R_1; RD_1; D_1 \ldots D_d; H_1 \ldots H_h; F_1 \ldots F_f; V_1 \ldots V_v; N_1 \ldots N_n; T1 \ldots T_t)$$

Where:

P = natural logarithm of sales price
R = rail effect or the effect of the GPT project on house price
RD = distance to the railroad
D = a vector of other distance variables
H = a vector of continuous house characteristic variables
F = a vector of dummy variables about house features
V = a vector of view variables
N = a vector of neighborhood variables
T = added time variables to control for inflation

More specifically, the model I estimate is:

$$P = \alpha_0 + \beta_1 R_1 + \beta_2 RD_2 + \sum_{i=1}^{d} \beta_i \mathrm{D}_i + \sum_{j=1}^{h} \beta_j H_j + \sum_{k=1}^{f} \beta_k F_k + \sum_{l=1}^{v} \beta_l V_l + \sum_{m=1}^{n} \beta_m N_m + \sum_{n=1}^{t} \beta_n T_n$$

Altogether, six separate specifications of this model are estimated. Differences in the six model specifications are summarized below:

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[1] Zillow's estimate of the median sales price for a 98225 home was used to create the median home price deflator.

[2] The distance to railroad variables are correlated to variables for the distance to Bellingham Bay and distance to I-5

Model	Dependent Variable	Distance Variable	Time Variable(s)
(1)	lnrp	log_dist_rail	
(2)	lnp	log_dist_rail	y1, y2, y3, y4, y5, y6
(3)	lnp	log_dist_rail	t
(4)	lnrp	in_dist_rail	
(5)	lnp	in_dist_rail	y1, y2, y3, y4, y5, y6
(6)	lnp	in_dist_rail	t

Results for each specification are shown in tables found in the appendix[2].

V DATA DESCRIPTION

The Bellingham data used in this study is a subset of a larger dataset containing information about 7,512 residential properties in Whatcom County, available from the Whatcom County Assessor's Office[3]. The dataset includes information about each house's sale date and sales price as well as additional information about the house's features. Some of the given characteristics are the number of bedrooms, bathrooms, fixtures, square footage, and extra features like a fireplace, bonus room, or carport. Locational variables are also given for each home, such as zip code and neighborhood. Unique to this dataset, view variables for each house are also provided.

Distance variables that were critically important in this study were also recorded in the dataset. The multiple distance variables describe how far each house is from the railroad, Interstate 5 (I-5), Bellingham International Airport, and Bellingham Bay[4]. In the original dataset, the four distance variables are measured in feet but were transformed into log and inverse forms before being used in each regression model. The original distances were used to generate log distance variables and inverse distance variables, and it is these two forms that appear in this study's regression models.

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[2] The distance to railroad variables are correlated to variables for the distance to Bellingham Bay and distance to I-5 variables. Additional regressions were that did not include the distance to I-5 variables, as well as regressions without variables the distance to Bellingham Bay. The coefficients on raileffect and distance to the railroad were relatively similar and R^2 shrank. Therefore the distance to Bellingham Bay and I-5 variables were kept in final regressions.

[3] However, I received the dataset in a file from Dr. Sharon Shewmake, an Assistant Professor of Economics at Western Washington University (WWU).

[4] The calculated distance variables are the work of Hannah Plummer, a Geography student at WWU. Plummer also created the map of the 98225 zip code that is found in the appendix.

Both variables capture the decaying effect of train noise. Distance from the railroad (as well as distance from train noise) will not have a linear effect on sales price because houses close to the railroad experience more noise than homes further from the railroad. The log distance and inverse distance variables each reflect this decay-over-distance effect differently. The inverse rail distance variables are similar to those used in Hansen et al. (2006) and measure proximity or "closeness" to the railroad. Higher inverse distance values mean the house is closer to the railroad than a house with a lower inverse distance value. Conversely, the log distance to rail variables are more straightforward. A house with a higher value for log distance from the railroad is located further from the railroad than a house with a lower log distance value.

Before I generated other variables, I modified the dataset in two ways. First, I dropped the observations that contained an entry of "0" bedrooms or "0" bathrooms in order to delete observations that were not houses. Second, I further narrowed the data by zip code. The Whatcom County dataset originally contained data for properties across all 13 of the county's zip codes. I limited the data to only contain the zip code 98225, where most of Bellingham's residents reside[5]. Bellingham's primary zip code is an appropriate target area for this study because other zip codes are located further from the railroad and a majority of the homeowners impacted by potential increased rail traffic live within the 98225 boundaries.

The remaining 1,904 observations describe houses that were sold in the roughly six-year period between January 2010 and May 2016. After refining the dataset, I created three sets of dummy variables to control for neighborhood, number of fixtures, and whether the house has been remodeled since 1960. To control for the effect of different neighborhoods influencing the sales price of a house, I generated separate dummy variables for each of the 12 neighborhoods. Similarly, I created dummy variables to control for differing numbers of fixtures included with each house as well as a dummy variable indicating whether the house had been remodeled in the past 50 years[6]. For consistency with Hansen et al (2006), the remodel variable created for this study is equivalent to "1" if the house has been remodeled since 1960 and "0" otherwise[7].

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[5] Three observations in the Meridian neighborhood, which is in the 98226 zip code, were included in the 98225 sub-sample from the Whatcom County dataset. The three observations were dropped.

[6] A fixture is a large appliance such as a fridge, washer, or dryer. In this sample for 98225, the number of fixtures sold with a house varied from 3 to 28.

[7] The remodel variable in Hansen et al. (2006) is a dummy variable equal to "1" if the house had been remodeled since 1960.

Additionally, to be consistent with other hedonic pricing methods (Hansen et al., 2006; Hansen and Benson, 2013), I use the natural log of the sales price as my model's dependent variable. It is difficult to be consistent with other hedonic literature on housing prices when choosing a method for controlling for inflation. There is not a common technique used among my surveyed literature. Thus, three different methods and subsequently three different variables were created and used in this study to control for the effect of inflation on sales price. Hansen et al. (2006) control for inflation by deflating sales price using a local housing price index. Using the Zillow median home price index for the 98225 zip code, I created a new deflated sales price variable[8]. Second, I created six fixed-effect variables or one variable for each year of sale dates listed my dataset as a second method of controlling for housing price inflation[9]. A third way of controlling for housing price inflation is including a time trend variable in the regression model. I generated the time trend or "t" variable by subtracting 2010 from the year a house sold, which produced a value ranging from 0 to 6. Descriptions and summary statistics for the variables are presented in Table 1.

VI ESTIMATION RESULTS

The estimation results, presented in Table 2 and Table 3, are calculated using ordinary least squares. I also used the Newey-West procedure to obtain standard errors corrected for potential heteroskadasticity. Estimated coefficients for the each variable are similar across all model specifications. Control variables (such as house characteristic, view, and neighborhood variables) are stable across models and have expected signs similar to signs found in Hansen et al. (2006) and Hansen and Benson (2013). The coefficients for number of bathrooms, square footage, acreage, and airport, I-5, and bay distance variables are all significant. View and neighborhood variables are also significant across all six models, which is expected given Hansen and Benson's (2013) results. Therefore, sales prices are higher for houses featuring a greater number of bathrooms, more space, and larger lawns in addition to views of the mountains or Bellingham Bay.

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[8] Zillow's estimate of the 98225 median home value can be found at: http://files.zillowstatic.com/research/public/Zip/Zip_Zhvi_Summary_AllHomes.csv. Access date: June 3, 2017.

[9] Bennett and Loomis (2015) use similar year fixed-effect dummy variables in their model specification in order to control for systematic trends in the housing market.

Unexpected differences in estimation results arise when examining the distance to railroad and rail effect coefficients. Across most models, the coefficients on the distance to railroad variables are all positive and not significantly different than zero[10]. These results do not support my hypothesis and are not similar to other findings (Andersson et al., 2010; Clark, 2006; Futch, 2011; Simons and Jaouhari, 2004). The coefficient of the rail effect variable is not significantly different from zero all but one of the six specifications. However, the one model specification with a significantly negative coefficient on the rail effect variable uses the time trend variable "t", which is one of the novel features of this study. Only in this specification is there evidence that the EIS announcement had a negative effect on house prices in Bellingham.

Results are reported for the six model specifications because it is difficult to determine which model best estimates the relationship between sales price and the examined rail variables. Model (4) most closely resembles Hansen et al.'s (2006) methodology. However, that model also has the lowest R^2. The model explains 76.5% of the variation in sales price. Fixed-effect models (2) and (5) have relatively higher R^2 (explaining, respectively, 77.9% and 77.5% of the variation in sales price). Based on this reasoning, there is no compelling theoretical reason to choose one model specification over another in this case.

Although the results from model (3) support my hypothesis, I am skeptical that (3) is the most appropriate model to use in this analysis. There is a theoretical and intuitive basis for choosing functional forms that use year fixed-effects or a time trend variable to control for inflation; however, the most relevant literature (Hansen et al., 2006; Hansen and Benson, 2013) use deflated log sales price as a control for inflation. Hansen et al. (2006) also use inverse distance and not log distance variables. Therefore, model (4) is arguably the most appropriate model to analyze this research question.

VII ANALYSIS

Ultimately, I found no evidence to support my hypothesis but there are a few limitations that make this particular research question difficult to study and estimate through a simple hedonic analysis. The relationship between sales price of Bellingham homes and their proximity

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[10] The distance to railroad variable is correlated to the distance to Bellingham Bay and distance to I-5 variables. Additional regressions were that did not include the distance to I-5 variable, as well as regressions without the distance to Bellingham Bay. The coefficients on raileffect and distance to the railroad were relatively similar and R^2 shrank. Therefore, the distance to Bellingham Bay and I-5 variables were kept in final regressions.

to the railroad is challenging to measure because of the geography of the town, the railroad, and Bellingham Bay. The railroad lies on the perimeter of the bay, close to the water. Some of Bellingham's most expensive neighborhoods – Edgemoor, Fairhaven, and a section of Columbia – border the water too. The hypothesized negative relationship between sales price and distance to the railroad is at odds with real relationship between sales price and railroad proximity in these neighborhoods. In my models, I use neighborhood dummy variables to control for neighborhood's influence on sales price. I also used the Newey-West procedure to correct for potential heteroskadasticity issues, but I used zero lags in the procedure, which assumes no temporal autocorrelation. I suspect that spatial autocorrelation exists in the data even after accounting for neighborhood effects.

Second, testing the effect of the EIS announcement in relation to distance from the railroad on sales price is also challenging. The Washington State Department of Ecology and Whatcom County confirmed that the GPT project would have an environmental impact large enough to warrant an EIS in early 2012[11]. Other events could have been used instead of this announcement, such as the beginning of the public comment period during late 2012 to early 2013 or the initial filing of the application to build the export terminal in 2011. The announcement was chosen as an indicator of when the "coal trains" and increased rail traffic issue was at its peak. Other theoretically valid dates, such as 2013 or even 2016, could have been chosen.

VIII SUMMARY AND CONCLUSIONS

Little research documents the effect of proximity to railroads on housing prices in the Pacific Northwest, even though projects like GPT have been proposed and there is a potential for increased rail traffic ("Scope of Analysis", 2016). This study uses housing market data for Bellingham, Washington, to test whether distance to the railroad significantly affects the sales price of a home and whether this effect was influenced by the EIS announcement in 2012. I hypothesized that a house located near the railroad will sell for significantly less than a comparable house farther from the railroad, and additionally that the potential for increased rail traffic due to the GPT project would further reduce the selling price of homes near the railroad.

Using data for roughly 1,900 houses sold between 2010 and 2016, I tested my hypothesis

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[11] For more information, see "Project History" at http://www.ecy.wa.gov/geographic/gatewaypacific/

and found no evidence to support my hypothesis. The hedonic price models used in this study suggest that proximity to the railroad has an insignificant effect of the sales price of houses in Bellingham. When a time trend and inverse distance variables are used, the results of this study suggest a significantly negative relationship between the GPT project's potential increase in rail traffic and the sales price of a house. Most of the regression specifications, however, suggest there is no statistically significant support for my hypothesis.

At the time of publication, it does not appear the GPT project will move forward or there will be an increase in Bellingham's rail traffic in the immediate future. Either way, this study is one of the first empirical analyses of its kind for Pacific Northwest data. The research presented in this paper can be used as a baseline for future study. The methodologies used in this study could also be applied to other datasets for communities impacted by rail traffic and potential export terminals. Shifting political and economic conditions could bring about interest in the GPT again and restart the environmental review process. If that occurs, this study can serve as a reference for researchers, policy makers, and community members.

ACKNOWLEDGEMENTS

Many thanks to Dr. Moheb Ghali for his assistance throughout the entire research process. Dr. Sharon Shewmake and Hannah Plummer also played a vital role in helping me obtain and understand the Bellingham data that made this study possible. Additional thanks to my classmates, Adam Rovang and Brenden Lehman, whose comments, questions, and help greatly improved this research.

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APPENDIX

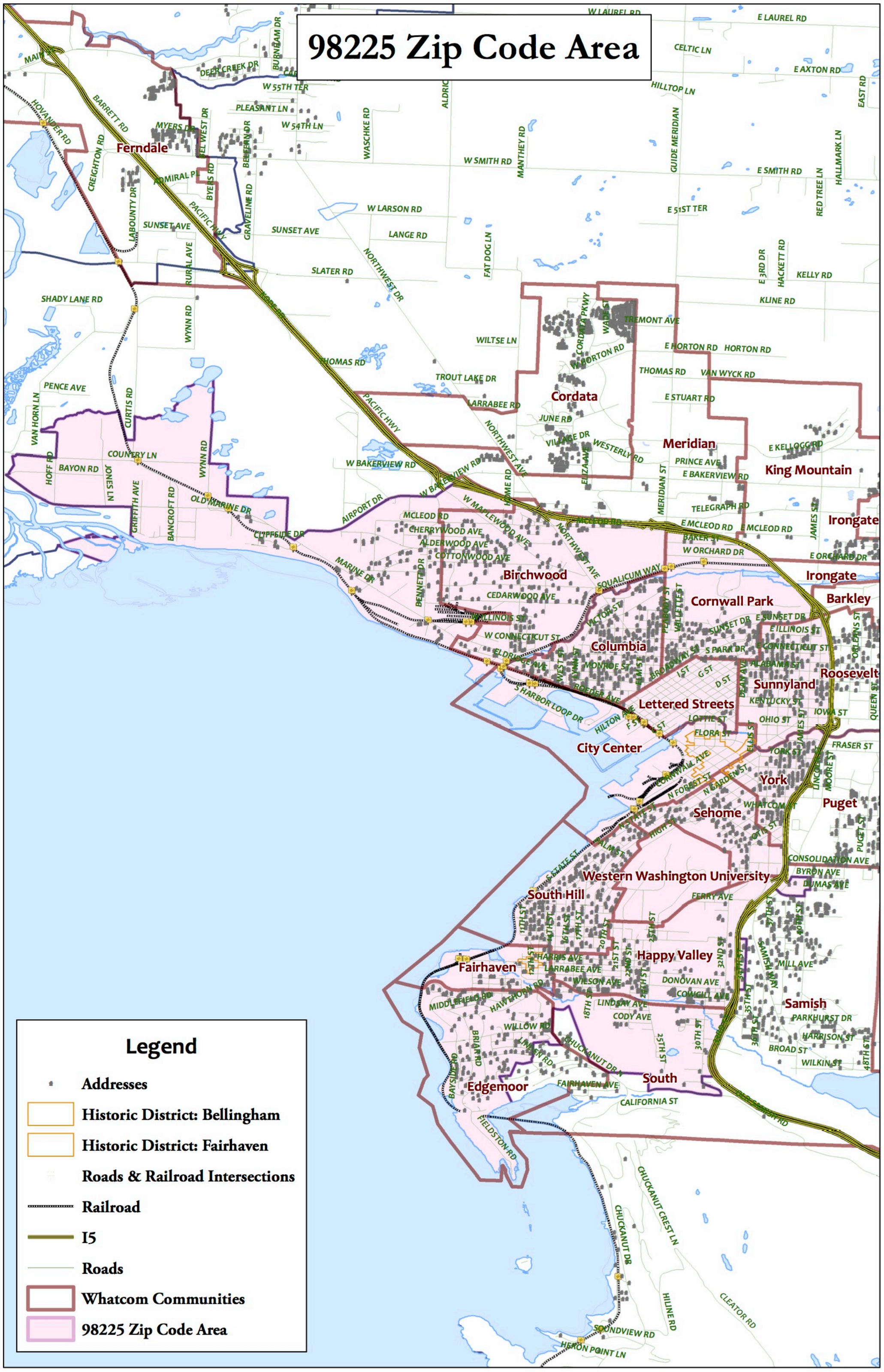

Figure 1: Map of the 98225 zip code displaying the location of each observation

TABLE 1

SUMMARY STATISTICS AND DEFINITIONS

Continuous Variables	Mean	Std. Dev.	Min.	Max.	Definition
logrp	12.5836	0.4307	11.1088	14.6024	Log deflated sales price
logp	12.6184	0.4341	11.1548	14.6264	Log sales price
log_raileffect	5.8226	3.2843	0	9.0010	Interactive variables measuring distance from the railroad and years since 2012
in_raileffect	0.0006	0.0011	0	0.0124	
log_dist_rail	7.5794	0.8714	4.3932	9.0010	Log distance from the railroad
log_dist_a	9.6657	0.5081	7.5346	10.3839	Log distance from Bellingham airport
log_dist_i5	8.0171	0.9460	4.4449	9.2302	Log distance from Interstate 5
log_dist_bbay	8.5107	0.5808	6.4489	9.3987	Log distance from Bellingham Bay
in_dist_rail	0.0008	0.0012	0.0001	0.0124	Inverse distance from the railroad
in_dist_i5	0.0006	0.0012	0.0001	0.0117	Inverse distance from Bellingham airport
in_dist_air	0.0001	0.0001	0.0000	0.0005	Inverse distance from Interstate 5
in_dist_bbay	0.0002	0.0002	0.0001	0.0016	Inverse distance from Bellingham Bay
bedrooms	2.8172	0.9245	1	12	Number of bedrooms
fullbaths	1.5919	0.6892	1	8	Number of full bathrooms
sfla	1496.1010	642.4861	400	6168	Square footage of living area
sflab	1619.8650	777.9809	400	7904	Square footage of living area, incl. basement
age	72.1996	33.7313	2	128	Age since house was built
age_sq	6349.9840	4556.4670	4	16384	Age since house was built, squared
acres	0.1704	0.1633	0	2	House's included acreage
t	3.0583	1.8132			Number of years since 2010

Dummy Variables	Mean	*n*	Definition
carport	0.0572	109	1 if house has a carport; 0 otherwise
fireplace	0.6397	1,218	1 if house has a fireplace; 0 otherwise
remodel	0.4732	901	1 if house has been remodeled in past 40 years; 0 otherwise
bonusroom	0.0116	22	1 if house has a bonus room; 0 otherwise
beachaccess	0.0047	9	1 if house has access to the beach; 0 otherwise
condo	0.0641	122	1 if house is a condo; 0 otherwise
marineview	0.2101	400	1 if house has marine views; 0 otherwise
terrview	0.1187	226	1 if house has a mountain view; 0 otherwise
waterfront	0.0011	2	1 if house has waterfront view; 0 otherwise
birchwood	0.1560	297	1 if house is in Birchwood neighborhood; 0 otherwise
columbia	0.1696	323	1 if house is in Columbia neighborhood; 0 otherwise
cornwall	0.0924	176	1 if house is in Cornwall neighborhood; 0 otherwise
edgemoor	0.0699	133	1 if house is in Edgemoor neighborhood; 0 otherwise
fairhaven	0.0173	33	1 if house is in Fairhaven neighborhood; 0 otherwise
happyvalley	0.0930	177	1 if house is in Happy Valley neighborhood; 0 otherwise
letteredstreets	0.0084	16	1 if house is in Lettered Streets neighborhood; 0 otherwise
sehome	0.0614	117	1 if house is in Sehome neighborhood; 0 otherwise
south	0.0231	44	1 if house is in South neighborhood; 0 otherwise
southhill	0.1224	233	1 if house is in South Hill neighborhood; 0 otherwise
sunnyland	0.1098	209	1 if house is in Sunnyland neighborhood; 0 otherwise
york	0.0751	143	1 if house is in York neighborhood; 0 otherwise
y1	0.1187	226	1 if house sold in 2011; 0 otherwise
y2	0.1539	293	1 if house sold in 2012; 0 otherwise
y3	0.1791	341	1 if house sold in 2013; 0 otherwise
y4	0.1654	315	1 if hosue sold in 2014; 0 otherwise
y5	0.1901	362	1 if house sold in 2015; 0 otherwise
y6	0.0804	153	1 if house sold in 2016; 0 otherwise

Note. Summary statistics and definitions of fixture dummy variables are not shown. Base dummy variables (citycenter, noview, and y0) are also excluded.

TABLE 2

LOG DISTANCE HEDONIC MODELS

Dependent variables vary by model

	(1) lnrp		(2) lnp		(3) lnp	
Variable	Coeff.	t-statistic	Coeff.	t-statistic	Coeff.	t-statistic
Rail Effect	0.0023	1.60	-0.0111	-0.72	-0.0099***	-4.47
Log Distance to Rail	0.0062	0.43	0.0184	1.02	0.0176	1.22
Log Distance to Airport	0.1554***	4.26	0.1546***	4.22	0.1574***	4.27
Log Distance to I5	0.0651***	6.76	0.0672***	7.04	0.0677***	7.07
Log Distance to Bay	-0.0791**	-2.36	-0.0790**	-2.41	-0.0811**	-2.47
Bedrooms	0.0023	0.30	0.0024	0.32	0.0024	0.32
Bathrooms	0.0533***	2.76	0.0501***	2.63	0.0514***	2.72
Square Footage	0.0001***	4.69	0.0001***	4.72	0.0001***	4.72
Sq Footage + Basement	0.0001***	5.67	0.0001***	5.98	0.0001***	6.01
Age	-0.0013	-1.39	-0.0014	-1.51	-0.0012	-1.31
Age (squared)	0.0000	1.60	0.0000*	1.72	0.0000	1.51
Acres	0.3615***	9.15	0.3602***	9.29	0.3557***	9.20
Carport	0.0001	0.00	-0.0018	-0.09	0.0022	0.11
Fireplace	0.0634***	5.57	0.0623***	5.56	0.0644***	5.72
Remodel	0.1056***	9.15	0.1078***	9.46	0.1068***	9.40
Bonus Room	0.0933*	1.66	0.0999*	1.88	0.1047**	2.00
Beach Access	0.0251	0.33	0.0579	0.70	0.0480	0.57
Condo	-0.2090***	-4.41	-0.2133***	-4.38	-0.2061***	-4.33
Marine View	0.1749***	6.82	0.1736***	6.91	0.1739***	6.94
View of Mt Baker	0.0428**	2.13	0.0442**	2.23	0.0446**	2.26
Birchwood	0.3439***	2.66	0.3626**	2.56	0.3619***	2.64
Columbia	0.4499***	3.58	0.4656***	3.38	0.4644***	3.49
Cornwall	0.4881***	3.87	0.5092***	3.68	0.5060***	3.79
Edgemoor	0.4248***	3.29	0.4398***	3.12	0.4324***	3.17
Fairhaven	0.4491***	3.56	0.4699***	3.40	0.4686***	3.51
Happy Valley	0.2856**	2.26	0.3038**	2.20	0.3009**	2.25
Lettered Streets	0.3879***	2.86	0.4020***	2.74	0.3935***	2.76
Sehome	0.2769**	2.18	0.2916**	2.10	0.2852**	2.13
South	0.4384***	3.44	0.4456***	3.20	0.4416***	3.28
South Hill	0.4798***	3.80	0.4952***	3.58	0.4888***	3.66
Sunnyland	0.4577***	3.65	0.4728***	3.44	0.4701***	3.54
York	0.4576***	3.64	0.4736***	3.44	0.4696***	3.53
y1			-0.0377*	-1.90		
y2			0.0594	0.48		
y3			0.1094	0.89		
y4			0.1629	1.31		
y5			0.2300*	1.87		
y6			0.2688**	2.17		
t					0.0508***	12.21
Intercept	10.1200***	22.74	10.0067***	21.34	9.9443***	22.15
n	1,904		1,904		1,904	
R-squared	0.769		0.779		0.776	

Note. *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level. Estimated coefficients for fixture dummy variables are not shown.

TABLE 3

INVERSE DISTANCE HEDONIC MODELS

Dependent variables vary by model

	(4) lnrp		(5) lnp		(6) lnp	
Variable	Coeff.	t-statistic	Coeff.	t-statistic	Coeff.	t-statistic
Rail Effect	14.3092	1.29	10.4242	0.77	-11.1533	-0.89
Inverse Distance to Rail	0.3752	0.03	2.7461	0.22	21.7171*	1.71
Inverse Distance to I5	-28.8454***	-6.05	-29.5050***	-6.21	-30.6260***	-6.31
Inverse Distance to Airport	-402.7870***	-2.43	-397.1081***	-2.37	-398.6608**	-2.35
Inverse Distance to Bay	154.0229*	2.00	160.7175**	2.09	155.9366**	2.03
Bedrooms	0.0019	0.25	0.0019	0.26	0.0024	0.32
Bathrooms	0.0508***	2.62	0.0481**	2.50	0.0500***	2.63
Square Footage	0.0001***	4.63	0.0001***	4.68	0.0001***	4.80
Sq Footage + Basement	0.0001***	5.67	0.0001***	5.93	0.0001***	5.78
Age	-0.00160*	-1.63	-0.0017*	-1.73	-0.0014	-1.46
Age (squared)	0.0000**	2.04	0.0000**	2.15	0.0000*	1.88
Acres	0.3046***	7.71	0.3035***	7.76	0.3018***	7.68
Carport	0.0013	0.06	-0.0001	-0.01	0.0017	0.09
Fireplace	0.0577***	5.04	0.0563***	5.00	0.0579***	5.09
Remodel	0.1083***	9.39	0.1113***	9.68	0.1086***	9.39
Bonus Room	0.0879	1.61	0.0958*	1.85	0.0975*	1.90
Beach Access	0.0365	0.41	0.0561	0.62	0.0198	0.21
Condo	-0.2789***	-6.17	-0.2845***	-6.01	-0.2585***	-5.71
Marine View	0.1797***	6.83	0.1787***	6.95	0.1789***	6.93
View of Mt Baker	0.0447**	2.16	0.0461**	2.26	0.0466**	2.27
Birchwood	0.2396**	2.16	0.2530**	2.03	0.2317*	1.96
Columbia	0.4204***	3.85	0.4311***	3.50	0.4124***	3.54
Cornwall	0.4470***	4.05	0.4639***	3.74	0.4419***	3.76
Edgemoor	0.5527***	4.85	0.5630***	4.43	0.5448***	4.51
Fairhaven	0.5688***	5.12	0.5849***	4.70	0.5740***	4.85
Happy Valley	0.3390***	3.08	0.3540***	2.86	0.3383***	2.88
Lettered Streets	0.3658***	3.07	0.3786***	2.86	0.3586***	2.82
Sehome	0.2886**	2.55	0.2965**	2.35	0.2736**	2.28
South	0.5137***	4.60	0.5175***	4.14	0.5056***	4.26
South Hill	0.5496***	4.87	0.5587***	4.43	0.5417***	4.52
Sunnyland	0.3949***	3.59	0.4049***	3.28	0.3859***	3.30
York	0.4151***	3.74	0.4237***	3.40	0.4045***	3.43
y1			-0.0412**	-2.04		
y2			-0.0356	-1.64		
y3			0.0115	0.56		
y4			0.0689***	3.19		
y5			0.1312***	6.43		
y6			0.1771***	7.15		
t					0.0385***	12.46
Intercept	11.5936***	100.91	11.5792***	89.12	11.4901***	93.98
n	1,904		1,904		1,904	
R-squared	0.765		0.775		0.770	

Note. *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level. Estimated coefficients for fixture dummy variables are not shown.