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Environmental Studies Thesis
5 Page Capstone

Planning Gentrification

Municipal Policy & Price Effects of the Orange Line in Portland, OR

Gentrification has increasingly come to define the contemporary city, reworking its socio-spatial nature. As a process of the class-upgrading of space, gentrification is driven by a host of political, economic, and cultural factors, underlaid by a combination of the post-Fordist "return to the city" by capital and the middle class and the shift in urban governance towards entrepreneurial creation of value (Ley 1997; Smith 1996; Harvey 1989). Drawing on the rebuke of modernist planning and growing cultural, environmental, and economic critiques of suburban sprawl, a new model of growth and urban renewal emerged from the crisis of the 1970s, prioritizing privately-focused reinvestment in the core. Municipalities have been central agents in this process, playing (or attempting to play) a key role in encouraging and abetting the "revitalization" of areas, amending zoning, investing in amenities, and pursuing strategic partnerships to maximize land value with redevelopment (Hackworth 2006). Transit constitutes a central aspect of this municipal accumulation regime, with transit-oriented development plans justifying development as environmentally (and economically and socially) sustainable. Transit can also directly affect land values by providing accessibility to the urban core. In this paper, I will examine price effects of the recent expansion of light rail in Portland. Through regression analysis, I found that the Orange Line has rapidly created a sizable price premium, valorizing areas of "underutilized" land and raising the specter of price-induced displacement. This valorization is not merely an unintended byproduct of transportation investment; rather, it is the result of an active strategy of revitalization.

Portland is commonly identified as an exemplary planning model, with a pleasurably European-feeling downtown, a serious commitment to sustainability, and a uniquely high level of public engagement (c.f. Ozawa 2004; Walton 2004). This reflects both a reality and a very successful branding effort. While all of major elements of Portland livability and planning (light rail and transit-oriented development, bike lanes, an urban growth boundary, community engagement in and public feedback on the planning process, and strong discursive, if not material, support for equity) are by now commonplace in cities, its commitment to these elements of smart growth has a notably long history. Portland can be said to have, in part, generated the contemporary smart growth concept, being at the forefront of the reintroduction of transit and planning as a mode for enhancing reinvestment and creating real estate value. Light rail in Portland acts as a spine on which densification and growth are planned, with the Comprehensive Plan formally regulating the order of the city with regard to rail transit.

The Orange Line extends from downtown Portland into Milwaukie, Oregon, an inner suburb directly south of the city's borders. The corridor has long been prioritized for rail investment, being initially bundled as part of a North-South line from Vancouver, Washington, to Oregon City. After nearly two decades of false starts, the planning of the Orange Line began in earnest in 2008, opening in September 2015. Encouraging development was a major and explicit rationale for light rail as envisioned by Trimet, the regional transit planning and operating agency, who entitled the main report on the line "Growing Places." Trimet's station area planning consisted primarily of assessing existing and potential development opportunities in an area, as well as the public investments which would maximize development potential. The Orange Line was also used as the basis for complementary municipal policy changes. Milwaukie created an urban renewal zone around its downtown. This urban renewal zone apportions additional property taxes from increased land values over the next 29 years, in order to service the debt from investing in the amenities that would increase those land values. Such municipal debt-financing of gentrification is coupled with a vague promise to invest in affordable housing, to advance equity. Meanwhile, Portland, constrained by Metro regulations concerning the supply of industrial lands, focused its planning efforts on densifying and gentrifying employment zoning by raising height limits and redefining "industrial offices" (software, graphic design, etc.) as industrial uses.

To analyze the potential price effects of the introduction of light rail, I conducted a hedonic analysis of home sales within 1.25 miles walking distance of each of the stations that occurred between 2008 and 2016. I examined these sales with respect to both the timing of the sales and by the proximity to individual stations. I use three time periods for the stations—planning, construction, and operation. The beginning of construction on Tilikum Crossing, the new multimodal/car-free bridge, was chosen as the demarcation between planning and construction. The primary data source used for this analysis was the County Assessor's records of property sales, building area, and lot square footage. I calculated the key independent variable for my study—network distance to stations—using the Network Analyst tool in ArcGIS. I chose to measure walking/network distance since the hypothesized price premium of transit is generally considered to be a function of people valuing the accessibility benefits of transit (Higgins and Kanaroglou 2016), which are realized through the extant street network. Given that the Orange Line runs largely in an old freight rail right-of-way, alongside a large golf course, and near the Willamette River, accounting for how geographic barriers increase the actual distance to the station was obviously important. I based the exact corridor boundary on a survey of existing literature—a ~1 mile Euclidean buffer for studies using a continuous-distance variable is typical (c.f Duncan 2008; Yan et al. 2012; Atkinson-Palombo 2010); a 1.25 mile network buffer approximates this distance while accounting for significant geographic barriers.

Given a dataset of 5,433 home sales, I then began an iterative process of model specification. The general hedonic model of housing prices is that prices are a function of their structural, neighborhood, and transportation attributes, with a normally-distributed error term. For measurement of station distance, I ultimately settled on two functional model forms: a continuous level-log model and a distance bands model. Leaving the price variable untransformed was appealing on the theoretic basis of the nature of land premiums resulting from rail and the practical basis of simplifying interpretation of the results. To account for the likely nonlinear diminishment of station premiums, I log-transformed the distance variable, producing a model in which a percentage change in distance will equate to a given dollar change in price. I also measured station distance using a series of quarter mile network distance bands encoded as dummy variables. I log-transformed all locational distance variables, assuming a nonlinear return to proximity. I log-transformed building square footage and lot area, due to the positive skew of their distribution. I also squared age, to account for a general U-shaped function of age and price (new homes are more expensive than 30-40 year-old ones, but 100 year-old homes gain value).

Due to spatial autocorrelation of the residuals, I used a series of neighborhood dummy variables based on the neighborhood association the sales occurred in, as part of a spatial fixed effects model. I refined the model used for the time series analysis by adding variables with hypothesized effects on price, including those shown in the variable list (figure 1), along with some other neighborhood socioeconomic census variables (race and median household income); land use percentage within a quarter mile buffer; distance to water, community centers, grocery stores, and commercial areas; and measures of elevation and slope. These variables were discarded for lack of significance and issues with multicollinearity. The distance band dummy variables for bus and highway proximity were also comparatively insignificant and discarded for time series analysis. All time series models still showed a small, but statistically significant spatial correlation after imputing neighborhood fixed effects, which I accounted for by using the spatial lag and error model in GeoDaSpace, denoted 2SLS (Two-Stage Least Squares) in the regression table (Figure 2), in addition to the Ordinary Least Squares model. This model incorporates two variables, W_ADJ_PRICE and lamda, that allow for the spatial interdependence of the dependent variable and error terms. All OLS results shown use robust standard errors as computed by the White test, as heteroscedasticity was significant.

The independent variables of my analysis in this regression table are lnOLSta and the categorical distance variables. The coefficient for lnOLSta, divided by 100, is the expected change in price from a 1% change in station distance. The categorical distance variable coefficients measure the average station premium/discount of each distance band relative to properties between 1 and 1.25 miles from the station. This time series regression clearly illustrates the emergence of a light rail price premium, with the continuous and distance band variables becoming significant after the opening of the line. During the operation, a ~$56,000 price premium between properties 1.25 miles away and those within 0.1 miles, with either no statistically significant effects or a significant disamenity effect in the preceding periods. The categorical dummies corroborate this finding, pointing to a $56,000 premium up to a quarter mile and a roughly $30,000 premium between a quarter mile and three quarters of a mile.

Of course, these smoothed bid-rent curves for the network as a whole elide significant distinctions. Rail networks are not spatially homogenous—both the utility of stations and the attractiveness of their environments vary widely. To investigate potential spatial heterogeneity and help ground the econometrics in the localities of planning and equity, I conducted an individual station regression analysis. I split the sales data by the nearest station, excluding OMSI/SE Water Ave due to a lack of observations (N=9). I then ran a regression of each of these datasets, using a singular model specification developed on the dataset as a whole. For station areas revealing significant spatial autocorrelation, I ran the spatial lag and error model (figure 3). Accurate estimation of the station-specific price premiums was hampered in large part by the limited sample size available. Given that the time series analysis indicated that Orange Line station locations have only recently been capitalized into land markets, it is perhaps unsurprising that a majority of the results were statistically insignificant. Restricting the analysis to sales within the operation period was not a viable option, given the sample size. Nevertheless, statistically significant effects were found for five stations: a transit-premium for the South Waterfront ($2,900 increase with a 1% decrease in distance), Clinton/SE 12th Ave ($810-$840 increase), and Rhine/SE 17th Ave stations ($440 increase) and a disamenity effect for the SE Tacoma Park & Ride ($1,200-$,1600 decrease per 1% decrease in distance) and the Park Ave Park & Ride and home prices ($450 decrease).

To visualize these spatial patterns, I mapped the derived light rail premium for each sale (Figure 4). I multiplied estimates of station-specific coefficients by the percentage change in the distance to the nearest station from the corridor boundary to that of the observed sale. The results indicate a strong light rail premium near the city center and a discount for properties near a park and ride (though this provides no analysis provides no indication as to whether such a discount applied to the area before pre-light rail). As this analysis uses residential sales, it is admittedly poorly suited to analyzing the effects of two key stations: OMSI and downtown Milwaukie (Lake Road), both of which were spotlighted in the revitalization planning process.

The Orange Line was explicitly about creating better places; in many ways real estate was the vehicle justifying light rail investment. Thus, the results of this regression analysis illustrate success on one level—an indication that market actors collectively value this capital expenditure. Moreover, from a developer's perspective, rising prices and rents make more developments pencil out, expanding opportunities for profit. But, increased home prices will tend to displace the lower income, transit-dependent residents who most benefit from increased transit access. Though there is a growing recognition of the connection between transit and gentrification, both in Portland and at larger scales, the language and policy of transit-oriented revitalization still presumes the achievability of growth-oriented "Triple-Bottom-Line" sustainability, albeit with some modifications to selectively "mitigate" the impacts of gentrification. Light rail and TOD were and are envisioned as a catalyst for meeting the needs not only of private and public profit, but as the model by which the new, amenity-filled, environmentally sustainable, and socially equitable city is created.

The language of planners promoting investment hinges on a rhetorically seamless linkage between the growth, sustainability, and equity. The soaring language of the Plan is diminished only by its emptiness. Underneath the surface goals of achieving equity lie policies designed to present an equitable direction while retaining and fulfilling substantial municipal and private interests in land value maximization. The long-term vision is housing in livable, diverse, multi-modal neighborhoods as a social right; the present reality is amenity provision as a variously intentional and inadvertent strategy of urban renewal, raising land values, spatially isolating an underclass, and attracting the footloose capital and middle class for which the spectacles of gentrification are constructed.

Appendix

Figure 1: Variables List

Variable	Description	Source
ADJ_PRICE	Most recent sale price (US$), inflated to Sept 2016 values using Portland Metro Area S&P/Case-Shiller Index for date of purchase	County Assessor Data accesssed through PortlandMaps
lnAREA	Natural logarithm of the square footage of the lot	County Assessor/PortlandMaps
lnBLDG	Natural logarithm of the building square footage	County Assessor/PortlandMaps
AGE	Age of structure at purchase in years	County Assessor/PortlandMaps
AGE2	Age of structure at purchase squared	County Assessor/PortlandMaps
ATTACHED	Dummy variable indicating if property is attached, calculated using property code descriptions	County Assessor/PortlandMaps
SFRzone	Dummy variable indicating if within a single-family residential zone (R5, R7, R10, and R20 and analogous zones outside Portland)	Metro RLIS
PREWAR	Percentage of structures within a quarter mile buffer that were constructed before 1940	Metro RLIS
PER_BACH	Percentage of residents with a Bachelor's degree or higher	US Census 2010, by census tract
lnOLSta	Natural logarithm of network distance (ft) to nearest Orange Line station	Metro RLIS
lnBUS	Natural log of Euclidean distance (ft) to nearest bus route	Metro RLIS
lnHWY	Natural log of Euclidean distance (ft) to nearest highway or interstate	Metro RLIS
lnDOWNTOWN	Natural log of network distance (ft) to centroid of CBD census tract	Metro RLIS
lnPARK	Natural log of Euclidean distance (ft) to nearest park	Metro RLIS
HWY500	Dummy variable indicating if within 500 ft Euclidean distance of a highway	Metro RLIS
HWY1k	Dummy variable indicating if between 500 ft and 1000 ft Euclidean distance of a highway	Metro RLIS
OL500	Dummy variable indicating if within 500 ft Euclidean distance of Orange Line track	Metro RLIS
OL1k	Dummy variable indicating if between 500 ft and 1000 ft Euclidean distance of Orange Line track	Metro RLIS
BUS500	Dummy variable indicating if within 500 ft Euclidean distance to a bus route	Metro RLIS
BUS1k	Dummy variable indicating if between 500 ft and 1000 ft Euclidean distance to a bus route	Metro RLIS
0-.25mi	Dummy variable indicating if within 0.25 mi of an Orange Line Station	Metro RLIS
.25-.5mi	Dummy variable indicating if between 0.25 and 0.5 mi of an Orange Line Station	Metro RLIS
.5-.75mi	Dummy variable indicating if between 0.5 and 0.75 mi of an Orange Line Station	Metro RLIS
.75-1mi	Dummy variable indicating if between 0.75 and 1 mi of an Orange Line Station	Metro RLIS

Figure 2: Time-Series Regression Table

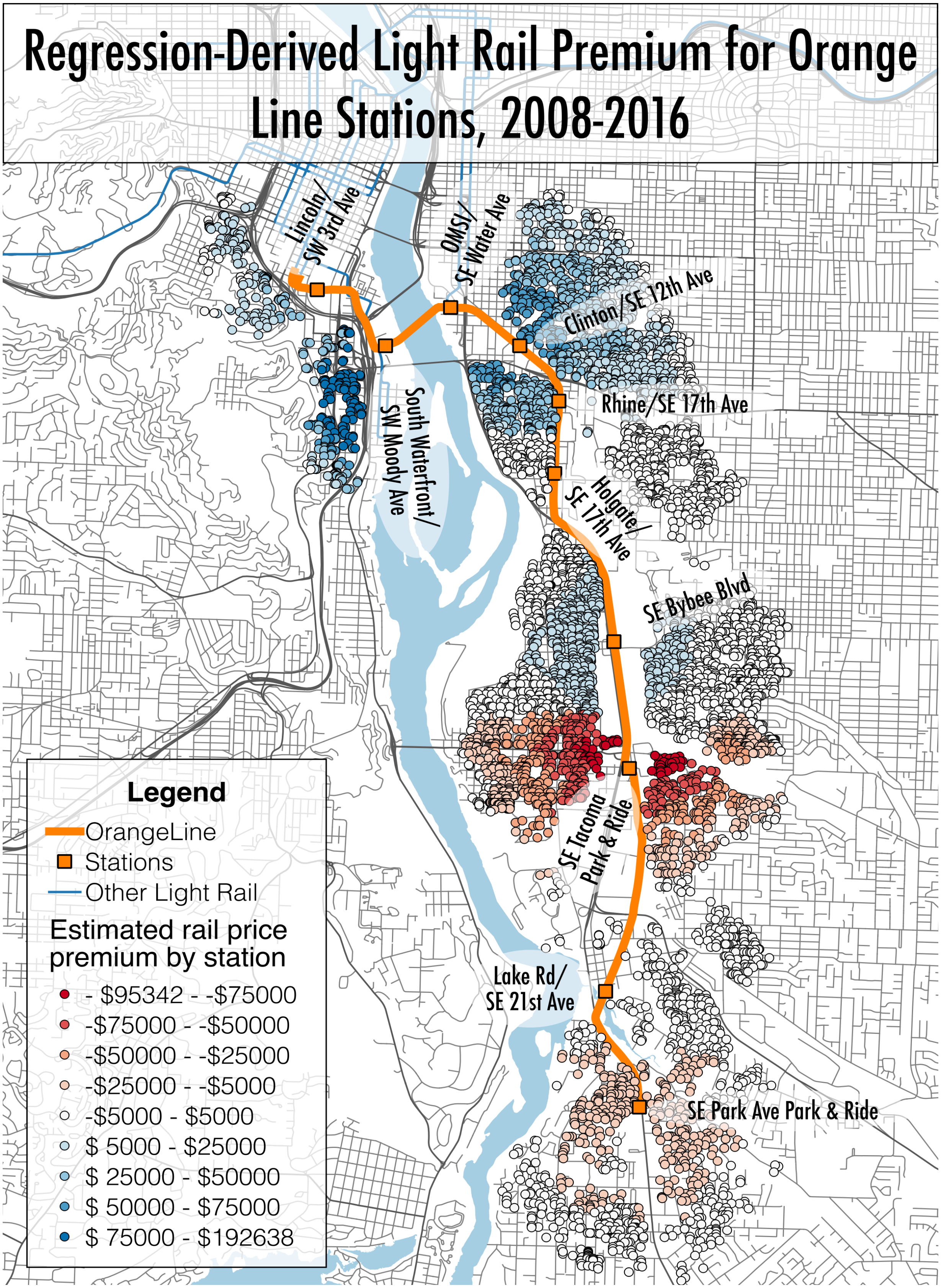
	All Time Periods				Operation			
	ln(Network Distance)		Distance Bands		ln(Network Distance)		Distance Bands	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
(constant)	-1801774.02***	-2451879.49***	-1827631.05***	-2465102.98**	-1395704.69***	-1644613.43***	-1681791.88***	-1981682.8***
	(176738.75)	(223970.92)	(189743.06)	(236019.88)	(393061.58)	(279498.55)	(422582.6)	(291022.55)
Property characteristics								
lnBLDG	246711.47***	230523.05***	246610.18***	230450.14***	203916.78***	188380.22***	204971.26***	188040.81***
	(6269.74)	(5047.22)	(6278.77)	(5047)	(13745.06)	(11005.72)	(13732.59)	(11023.23)
lnAREA	91131.62***	79532.26***	91177.81***	79395.33***	60245.14***	51133.44***	58962.58***	47707.58***
	(7144.85)	(5216.66)	(7165.29)	(5217.71)	(10528.19)	(10215.32)	(10554.19)	(10104.73)
AGE	-3317.15***	-3411.49***	-3308.74***	-3401.81***	-1070.31*	-1190.37**	-1112.48*	-1267.21**
	(242.12)	(221.07)	(242.82)	(221.17)	(490.29)	(453.38)	(488.82)	(448.59)
AGE2	21.1***	23.05***	21.01***	22.97***	5.17	6.43	5.54	7.16*
	(1.93)	(1.79)	(1.93)	(1.79)	(3.86)	(3.48)	(3.85)	(3.44)
ATTACHED	-45129.53***	-32970.96***	-45369.2***	-33038.9***	-47837.96**	-44042.47***	-47241.28**	-43073.76**
	(6315.54)	(6615.06)	(6316.51)	(6616.41)	(15296.85)	(13443.19)	(15312.66)	(13294.75)
SFRzone	18760.68***	12822.95*	18175.01***	12310.34*	10190.59	7200.34	11012.67	8255.6
	(4911.44)	(5410.79)	(4927.33)	(5429.19)	(11459.77)	(9693.03)	(11699.6)	(9590.99)
Neighborhood characteristics (Dummy variables not shown)								
PREWAR	225729.72***	133602.05***	227076.13***	135985.2***	138393.29***	94329.92**	137492.47**	87731.52**
	(19707.92)	(27422.51)	(19678.85)	(27660.82)	(42236.07)	(31935.98)	(42328.19)	(30549.09)
PER_BACH	170189.88***	-16662.72	165604.69***	-24024.74	283642.29***	179909.76**	294980.77***	183085.64**
	(34227.01)	(41722.21)	(34921.7)	(42054.16)	(60722.29)	(57910.87)	(60334.52)	(56259.48)
lnPARK	-5986.27*	-1943.59	-6149.21*	-1843.04	-4468.31	-3914.92	-4666.7	-3846.47
	(2467.78)	(2588.09)	(2478.12)	(2600.64)	(4856.02)	(4211.01)	(4858.7)	(4138.05)
Transportation characteristics								
lnOLSta	-9161.43	-7918.61			-23094.19*	-24192.08*		
	(5706.02)	(8495.41)			(10921.62)	(10135.77)		
0-.25mi			27474.12*	24775.15			60938.75*	56472.46*
			(11597.33)	(16087.25)			(25731.38)	(23044.25)
.25-.5mi			4321.55	5257.31			27008.84	31078.65*
			(7640.04)	(9902.48)			(14934.8)	(12467.12)
.5-.75mi			1605.18	-4808.99			30436.57*	32608.9**
			(6007.94)	(7974.7)			(12490.91)	(10151.42)
.75-1mi			-1716.44	-4309.52			9645.58	12865.96
			(5498.23)	(6266.97)			(12085.72)	(9908.76)
OL500	-46625.14***	-26353.98*	-50437.64***	-30791.11*	-40787.88*	-31791.85	-41601.11*	-27647.24
	(8928.8)	(12694.4)	(9264.73)	(12725.95)	(16704.52)	(17630.92)	(17242.3)	(18478.68)
OL1k	-27143.99***	-10463.78	-28663.8***	-12875.66	-29954.53*	-23648.25	-30735.42*	-21987.18
	(6339.51)	(8397.78)	(6384.07)	(8353.6)	(14503.62)	(13308.07)	(14238.25)	(13033.4)
lnBUS	8878.14***	10441.57***	8710.87***	10200.43***	11126.03*	11486.81*	12009.22*	12334.04**
	(2321.85)	(2755.65)	(2337.48)	(2752.18)	(4921.95)	(4546.36)	(4946.42)	(4402.74)
lnDOWNTOWN	-40937.13*	29761.79	-45975.71**	24442.39	-16398.36	15114.77	-9043.35	27970.16
	(17032.75)	(22633.51)	(17810.8)	23145.88	(40488.62)	(27660.21)	(42255.29)	(27460.91)
W_ADJ_PRICE		0.52***		0.52***		0.3939***		0.4269***
		(0.05)		(0.05)		(0.0619)		(0.0599)
lamda		0.47***		0.48***		-0.2831*		-0.3755**
		(0.06)		(0.06)		(0.1204)		(0.1226)
Model Statistics								
N	5433	5433	5433	5433	998	998	988	988
Adjusted R squared	0.6888	0.6866	0.6888	0.6851	0.6665	0.6818	0.667	0.6837
Moran's I	0.0642***		0.0643***		0.0318***		0.0286***	
Log likelihood	-71500.422	-71422.5	-71498.94	-71429.6	-13039.242	-13035.2	-13036.899	-13033.1
Akaike info criterion	143062.845	142907	143065.88	142927	26140.484	26132.3	26141.797	26134.3

	Construction				Planning			
	ln(Network Distance)		Distance Bands		ln(Network Distance)		Distance Bands	
	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	2SLS
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
(constant)	-1760084.52***	-2133996.91***	-1715520.54***	-2040382.03***	-1940036.69***	-2418861.9***	-1834298.63***	-2381211.12***
	(230304.47)	(307334.39)	(247885.8)	(317029.34)	(362234.56)	(623968.46)	(394080.87)	(317373.56)
Property characteristics								
lnBLDG	261171.17***	249895.75***	260905.98***	249589.79***	254611.88***	247034.49***	254397.35***	245869.58***
	(8085.65)	(6673.79)	(8106.37)	(6672.49)	(12972.25)	(10263.51)	(12946.07)	(8017.49)
lnAREA	93388.72***	84825.18***	93601.6***	84766.28***	98099.27***	86144.06***	98376.53***	77189.08***
	(8573.3)	(6698.97)	(8593.44)	(6692.03)	(18563.91)	(6319.81)	(18631.56)	(8561.97)
AGE	-3451.2***	-3422.95***	-3426.05***	-3401.66***	-3293.22***	-2802.21***	-3261.82***	-2975.09***
	(292.71)	(285.52)	(293.53)	(285.34)	(631.78)	(519.72)	(636.29)	(471.48)
AGE2	21.25***	21.78***	21.04***	21.61***	20.87***	18.73***	20.54***	19.22***
	(2.44)	(2.35)	(2.45)	(2.35)	(4.79)	(4.33)	(4.82)	(3.87)
ATTACHED	-45922.7***	-38453.82***	-46470.82***	-38814.82***	-45085.64***	-32914.45*	-44932.36***	-38521.58**
	(7932.87)	(35361.11)	(7961.77)	(8589.89)	(13665.73)	(15038.1)	(13583.41)	(13545.01)
SFRzone	25848.72***	21501.76**	25166.1***	20996.03**	14275.77	11832.97	13923.61	4633.51
	(5973.07)	(7205.44)	(5977.68)	(7211.21)	(10304.21)	(11506.31)	(10306.13)	(8445.57)
Neighborhood characteristics (Dummy variables not shown)								
PREWAR	228621.45***	138264.95***	231530.93***	144411.13***	280630.96***	220116**	280191.06***	185752.31***
	(25607.47)	(36235.54)	(25742.11)	(36236.69)	(40600.78)	(85332.78)	(40464.39)	(29165.18)
PER_BACH	156318.67**	-11226.08	144907.87**	-27890.78	97699.1	-118390.95	92012.21	5680.98
	(48652.62)	(55819.27)	(49644.28)	(55920.85)	(68310.28)	(97986.09)	(70162.99)	(55431.47)
lnPARK	-4766.79	-2613.16	-5146.23	-2891.63	-7743.25	-4009.11	-6749.71	-4887.87
	(3282.22)	(3326.9)	(3291.4)	(3330.66)	(5323.87)	(5975.22)	(5373.01)	(4136.55)
Transportation characteristics								
lnOLSta	-7621.77	-4059.92			5552.71	36282.08**		
	(7711.67)	(11497.26)			(12041.74)	(12092.89)		
0-.25mi			24322.84	9820.27			-1365.3	15417.67
			(14983.22)	(21112.06)			(22889.8)	(23103.04)
.25-.5mi			-2405.95	-11266.97			-4272.18	6185.83
			(10141.25)	(13100.23)			(16364.35)	(12670.43)
.5-.75mi			-4199.85	-15175.45			-14018.27	-2550.59
			(8172.17)	(10392.71)			(11770.95)	(10068.54)
.75-1mi			-2345.15	-6788.8			-12377.44	-4631.88
			(7009.67)	(8013.24)			(11984.44)	(9399.94)
OL500	-42159.74***	(-23429.08)	-45810.9***	-25777.57	-67564.54***	-34405.63	-74665.15***	-49010.37
	(12340.8)	(16636.14)	(13041.28)	(16525.02)	(16617.01)	(32278.57)	(16588.45)	(19607.55)
OL1k	-25983.29**	-14394.36	-26375.13**	-14230.1	-23298.88*	7665.6	-29338.92*	-14157.88
	(8468.09)	(10938.31)	(8541.38)	(10799.18)	(11157.89)	(20833.99)	(11571.42)	(13821.51)
lnBUS	8480.68**	10518.4**	7864.88*	9515.79**	6360.55	7954.1	5772.08	7206.28
	(3128.74)	(3601.96)	(3137.66)	(3584.17)	(4606.77)	(5612.6)	(4704.17)	(3888.42)
lnDOWNTOWN	-57666.72**	-18852.22	-67681.58**	-30403.51	-52694.29	-39393.89	-58041.15	8763.99
	(22442.87)	(30691.56)	(23463.36)	(30942.04)	(32105.38)	(77044.42)	(33826.17)	(31454.99)
W_ADJ_PRICE		0.3729***		0.4***		0.39***		0.43***
		(0.0623)		(0.062)		(0.12)		0.06
lamda		0.5483***		0.5477***		0.79***		-0.28***
		(0.0871)		(0.0857)		(0.04)		0.08
Model Statistics								
N	3006	3006	3006	3006	1429	1429	1429	1429
Adjusted R squared	0.7232	0.724	0.7232	0.7232	0.6642	0.6434	0.6639	0.6763
Moran's I	0.0593***		0.0596***		0.0366***		0.0368***	
Log likelihood	-39466.049	-39437.2	-39464.733	-39437.4	-18842.371	-18835.9	-18841.368	-18834.7
Akaike info criterion	78994.098	78936.4	78997.466	78942.8	37746.741	37733.7	37750.737	37737.5

Figure 3: Station-Area Regression

Station	Lincoln/SW 3rd Ave		South Waterfront	Clinton/SE 12th Ave		SE Rhine	Holgate/SE 17th Ave		SE Bybee Blvd		Tacoma P&R		Lake Road	Park Ave P&R	
Model	OLS	2SLS	OLS	OLS	2SLS	OLS	OLS	2SLS	OLS	2SLS	OLS	2SLS	OLS	OLS	2SLS
Variable	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
(constant)	-1829566.08	-1631329.6	-6362041.17*	-2452534.79***	-2478809.04***	-4355348.45***	-3279324.29***	-3070533.43***	-4589375.9*	-3632441.62***	4264974.05	2829365.85**	1788162.45	3143209.37*	-245677.34
	(1588591.39)	(1632411.1)	(2746832.11)	(626216.81)	(574588.83)	(1199219.5)	(541094.95)	(500765.49)	(692194.13)	(617344.6)	(1073478.74)	(1016041.63)	(1159532.96)	(1543255.15)	(1500689.5)
Property characteristics															
lnBLDG	299808.76***	295221.19***	269421.9***	331164.8623***	323150.33***	230478.09***	196085.32***	188450.35***	299618.99***	270587.19***	235095.14***	212062.86***	104717.32***	160496.17***	155154.09***
	(56551.16)	(49328.79)	(39183.44)	(15304.31642)	(15213.94)	(21398.91)	(10271.14)	(10360.32)	(14800.15)	(12194.96)	(13229.72)	(10842.81)	(16143.05)	(16242.82)	(11271.61)
lnAREA	163517.93**	157559.14***	31970.24	80225.887***	71848.05***	55131.42***	78037.09***	75526.75***	198025.22***	168658.23***	72344.21***	57817.74***	86663.97***	71714.7***	55377.94***
	(54821.38)	(41942.57)	(21389.26)	(18396.58)	(18454.02)	(16928.83)	(13476.11)	(13032.87)	(20645.39)	(15166.29)	(14511.19)	(10232.5)	(20685.29)	(16190.08)	(8438.1)
AGE	-414.32	-667.52	-635.45	-4564.45***	-4433.65***	-3150.47***	-3299.81***	-3171.84***	-6170.1***	-6188.13***	-3486.28***	-3550.25***	-2908.68***	-2014.88**	-1720.15***
	(2873.46)	(2659.27)	(1654.85)	(746.346)	(738.61)	(624)	(445.38)	(433)	(680.77)	(555.32)	(453.15)	(442.43)	(848.07)	(655.16)	(480.52)
AGE2	-1.93	-0.13	4.87	30.66***	30.37***	22.45***	22.18***	21.47***	44.66***	47.72***	24.3***	24.85***	18.72**	10.1	8.85*
	(19.96)	(18.8)	(11.49)	(6.03)	(5.72)	(4.8)	(3.53)	(3.42)	(5.7)	(4.76)	(4.09)	(3.68)	(6.24)	(5.58)	(4.43)
ATTACHED	10046.09	11177.57	-16251.04	-52546.03***	-46486.59**	-45220.38***	-25043.58*	-19918.75	NA	NA	-51218.74**	-42240.29**	NA	NA	NA
	(45809.23)	(51856.29)	(26916.09)	(17109.24)	(15311.99)	(13058.58)	(11092.37)	(10915.59)			(16020.51)	(13898.73)			
SFRzone	-15871	-15216.06	99397.92	36615.86*	32033.44	-10888.51	-1610.19	-999.27	-8163.88	-6680.01	29658.93**	25464.58*	-93815.03***	-31478.73	-21168.24
	(73020.03)	(74985.81)	(61719.75)	(16127.69)	(16786.3)	(11707.96)	(7664.26)	(7249.77)	(15318.82)	(14057.55)	(10374.67)	(10927.56)	(35886.85)	(21717.27)	(12394)
Neighborhood characteristics															
PREWAR	-356693.69	-176901.2	-252807.82	327110.75*	193488.69	659833.83***	125626.75***	126883.28***	299982.47***	148582.33***	53546.31	13031.79	76515.14	4308	82034.76
	(205638.33)	(261942.78)	(374175.03)	(165863.83)	(166137.44)	(139406.17)	(33764.92)	(31762.66)	(37868.98)	(41164.55)	(56407.49)	(48261.18)	(58767.19)	(137145.54)	(62416.68)
PER_BACH	-83077.09	-90208.53	-476902.74*	-49381.94	-46288.81	62300.03	139040.62	122466.8	720193.6***	321744.05**	314683.73***	193978.91***	-59436.77	-1208394.12*	-556154.67
	(207201.29)	(218800.22)	(240329.74)	(107796.48)	(99847.35)	(93223.01)	(81450.94)	(77006.66)	(122457.85)	(125465.34)	(44215.28)	(44344.15)	(201430.66)	(549866.09)	(356867.11)
lnPARK	95853.65**	82253.58**	-290.2	-299.127	-1418.93	-12293.61	2094.32	1347.13	-12463.38*	-5472.71	-10537.08	-7087.71	-9676.68	-13580.52*	-7386.37
	(29224.49)	(30488.59)	(12123.91)	(7890.90)	(7197.93)	(7752.45)	(4840.04)	(4560.98)	(6216.95)	(5067.08)	(6261.17)	(5225.34)	(5586.28)	(6842.22)	(4996.09)
Transportation characteristics															
lnOLSta	-3835.66	-52575.51	-293901.67*	-81846.53**	-84897.06***	-43945.08*	1319.8	2430.99	4063.06	-10356.1	159609.72***	119374.8***	2619.24	45162.98**	15841.15
	(97105.66)	(123889.66)	(130601.3)	(26442.47)	(24640.93)	(19610.03)	(19723.6)	(18619.72)	(22945.9)	(18755.06)	(43040.03)	(31249.65)	(21733.43)	(16907.97)	(14699.46)
OL500	NA	NA	NA	33221.23	-27921.21	-32175.59	-15470.67	-7840.62	-158713.04***	-109258.04**	-163803.4***	-116367.38**	19321.12	5563.14	-17685.27
				(57511.05)	(49442.36)	(26915.32)	(19048.59)	(18129.21)	(37066.81)	(43148.95)	(35052.82)	(35808.3)	(29262.44)	(29414)	(24260.59)
OL1k	-98291.88	-79919.42	86893.27	-2142.83	-26258.41	6690.62	-30893.73*	-18037.79	-43484.22*	-35147.94	-65045.32***	-27965.09	-8806.59	-485.05	-17102.29
	(61912.34)	(80682.74)	(90331.84)	(29206.10)	(28439.21)	(19955.88)	(14935.81)	(14782.74)	(20332.93)	(21410.3)	(18778.73)	(19872.51)	(19435.74)	(14996.14)	(17373.96)
lnBUS	-59833.63	-57599.27	9571.46	24658.08*	19494.29	15789.84	7695.23	3662.22	1805.49	7350.14	3368.38	-3310.1	11657.45	17163.58*	6872.29
	(42985.59)	(51378.08)	(22003.36)	(11484.41)	(11377.79)	(12605.1)	(7202.74)	(7001.73)	(7650.16)	(7158.38)	(8065.61)	(7765.21)	(10984.88)	(8392.29)	(7904.83)
BUS500	-108342.91	-84784.79	207.06	29700.36	33199.9	-4938.54	-5473.5	-2451.06	-18300.05	-7318.83	-51341.09**	-39696.21*	-4073.6	-4070.29	-15399.79
	(70671.85)	(89981.57)	(75835.48)	(24779.53)	(23907.67)	(22352.39)	(14397.87)	(13844.89)	(18123.69)	(16415.04)	(19616.13)	(16855.92)	(26206.39)	(15684.12)	(17034.59)
BUS1k	-76574.73	-64529.83	-18336.16	-31396.89)	28207.96	-21617.15	13242.21	14588.31	-3297.56	2581.85	-43732.86**	-26412.35*	-11153.71	-9781.15	-11911.46
	(63528.98)	(75014.2)	(73492.9)	(17324.35)	(16698.51)	(14808.84)	(9618.47)	(9170.08)	(11196.12)	(11064.1)	(13807.76)	(11662.67)	(18843.73)	(10201.81)	(10344.78)
lnHWY	83138.12	75764.53	109583.22**	92740.03**	85350.69**	45937.15*	-21492.88	-11712.29	-69271.63***	-37638.29**	-100025.34***	-70281.98***	-25639.22	4039.93	-4048.09
	(59254.04)	(63694.07)	(34323.21)	(33173.97)	(33280.84)	(23539.83)	(15809.4)	(15453.93)	(17305.09)	(14703.09)	(25399.16)	(19127.41)	(16992.95)	(12172.75)	(11416.82)
HWY500	64670.15	75192.12	10268.12	160406.01*	151865.17	94219.89	-87570.31**	-63990.44*	-46830.37	12102.61	-72189.75	-49142.01	-43363.08	27347.71	16471.3
	(86914.47)	(110070.96)	(57619.22)	(81318.03)	(81741.06)	(54520.48)	(30656)	(30381.7)	(30525.91)	(36995.43)	(52428.04)	(59179.86)	(28272.05)	(28274.28)	(25513.81)
HWY1k	11325.37	14702.27	-28682.12	34289.62	25897.12	48302.23	402.16	3990.74	-29981.69	2883.2	-75459.75**	-57283.56	-8500.26	20492.03	15225.9
	(53388.91)	(59937.14)	(40003.93)	(52409.66)	(50805.6)	(35838.27)	(18651.71)	(17701.42)	(16959.81)	(20601.96)	(28240.51)	(34482.35)	(19494.44)	(13499.52)	(14943.1)
lnDOWNTOWN	-112406.53	-97365.04	733286.26*	-78966.14	-40610.6	226826.03	169132.17**	142928.12*	136410.52*	73531.5	-662574.92***	-485580.95***	-264217.86*	-452221.15**	-111154.5
	(154083.41)	(150623.76)	(338035.1)	(68283.47)	(63892.93)	(124381.28)	(62897.01)	(59833.94)	(65345.14)	(58122.73)	(113236.58)	(103742.15)	(116624.97)	(158558.8)	(143861.28)
W_ADJ_PRICE		0.2257			0.2233**			0.2170***		0.3339***		0.3767***			0.4449
		(0.2083)			(0.0808)			(0.0737)		(0.0455)		(.0552)			(0.2453)
lamda		0.1877			-0.0642			-0.0408		-0.0403		0.0847			-0.2596*
		(0.2664)			(0.1265)			(0.1095)		(0.0793)		(0.0819)			(0.1343)
Model Statistics															
N	171	171	170	716	716	438	639	639	1329	1329	978	978	311	672	672
Adjusted R^2	0.6263	0.6628	0.5076	0.5952	0.5949	0.5113	0.565	0.5801	0.6811	0.6929	0.5934	0.616	0.5119	0.4951	0.5152
Moran's I	0.0436*		0.0015	0.0294**		-0.0080	0.0614***		0.0947***		0.2393***		0.0279	0.0512***	
Log likelihood	-2325.767	-2325.77	-2222.436	-9461.339	-9460.5	-5665.516	-8133.425	-8130.55	-17546.929	-17509.7	-12820.511	-12735.8	-3976.782	-8676.071	-8675.64
Akaike info criterion	4689.534	4689.53	4482.871	18962.678	18963	11371.032	16306.85	16303.1	35133.858	35061.3	25681.022	25513.6	7991.563	17390.142	17391.3

Figure 4: Station Area Light Rail Premium Map



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