Impact of Vancouver Airport on Commercial Property Values

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Abstract: Airports are key assets for metropolitan areas by enabling connectivity to the global economy. While there have been several recent studies on the impacts of airports upon residential housing and land values, there has been relatively little research on the impact of airports on commercial property values. We estimate a model to test for the impacts of investments in airport infrastructure, as well as measures of the airport's size and connectivity, on commercial property values near the Vancouver International Airport (YVR). We find that proximity to the airport, higher airport connectivity, and greater airport infrastructure investments increases commercial property values. We anticipate that our analysis will be helpful to policy makers in the Vancouver, BC, Canada area as well as elsewhere, by estimating the extent to which better and bigger airports can create value for their surrounding communities.

December, 2013

Introduction

Airports are key assets for metropolitan areas by enabling connectivity to the global economy. While there have been several recent studies on the impacts of airports upon residential housing and land values, there has been relatively little research on the impact of airports on commercial property values.

Crowley (1973) studies the effect of airports on land values in an area next to Toronto International Airport (Malton). The analysis looks at residential, commercial, industrial and public land prices for both sales and rent in the years 1955 – 1969.Specifically, the study compares the land value changes of the properties near the airport relative to land prices farther away and evaluates the changes in the mix of land uses (industrial vs. commercial vs. residential). Regressions are used to identify differences in rates of price changes and their significance. The study concludes that residential land values decreased during "shock years" when there were substantial changes but typically rebounded to their initial levels soon thereafter. The author hypothesizes that this initial decrease in price may be caused by a significant population putting their houses up for sale to prematurely to avoid potential noise related issues in the future.

Cohen and Coughlin (2007) study the relationship between distance to the Atlanta airport and housing prices in the surrounding areas. They find that for every ten percent increase in distance to the airport, housing sale prices fall by approximately 1.5 percent, after controlling for several other factors that might affect sale price. Other recent studies of the impacts of proximity on housing prices include McMillen (2004), and Tompkins et al (1998). The former study focuses on Chicago home prices, while the latter examines

Manchester, England. Both of these studies find that proximity to the airports tends to increase the price of housing.

There are also previous studies that examine aviation networks, which imply that there are benefits from improved networks. Oum, Taylor and Zhang (1993) find that alliances develop that enhance global networks. Fu, Oum and Zhang (2010) find that connectivity can be enhanced by deregulation, which also impacts passenger flows. These findings have implications for the benefits of locating near an airport that has fluctuating connectivity with other airports both domestically and internationally.

Other studies focus on transit's impact on property values. Damm (1980) studies the response of property values of single and multiple family houses and retail properties in anticipation of the heavy rail transit system installation in Washington D.C. The structural approach represents buyers' and sellers' behavior. The second econometric model uses house prices as the dependent variable. The study finds that for multi-family properties, the closer the property is to the metro station, the lower the property value but the effect of distance declines rapidly. Retail property is much more sensitive to distance to the metro stations.

Kim and Zhang (2005) assess whether the benefits of the station are the same in other parts of the same metropolitan area, using 731 properties in the metropolitan area of Seoul, South Korea. They assess the question of how and where (in terms of distance) does the transit station impact the land values. One of the paper's conclusions is that the closer the property's location to the station and the denser the surrounding area, the higher the price will be for commercial land values.

Landis et al (1995) examines 5 transit systems in California. The paper compares transit investments, land uses and property values of single family property, commercial property, station area and metropolitan areas. The main research question is whether urban rail transit investments affect nearby property values and land uses. The paper concludes that it does but the effect is small, is not consistent, and not always in ways that were expected.

Finally, Debrezion (2007) measures the impact of railway stations on property values by analyzing several other previously published studies. The paper finds variation in these other studies, in terms of the differences in the impacts on residential and commercial property and the impact's dependence on demographic factors. The analysis concludes that the conclusions drawn by other studies are not uniform and tend to be overestimated.

One interesting aspect of Vancouver International Airport is that a rail rapid transit line (the Canada Line) connecting the cities of Vancouver, BC, Richmond, BC and the airport was opened in 2009. Based on the broad range of findings in the previous literature, it is crucial to control for the transit stations' locations when assessing the impacts of proximity to the airport on property values. Also, based on the past studies we summarize above, it is not clear a priori what sign we should expect for the impact of the Canada Line on commercial property values in Richmond.

Background: MetropolitanVancouver, Vancouver International Airport and Vancouver Airport Authority

Metro Vancouver has a population of 2.5 million and is the third largest metropolitan area in Canada. Between 2006 and 2011, its population grew by 9.3% . It is a multicultural metropolitan area with 40% of population having been immigrants at one time and 36% of the population is of Asian ethnicity. The Metro Vancouver economy has a labour force of 1.3 million of whom 1.1 million are employed in the service sector.

Vancouver hosted the 2010 Olympic Winter Games for which a landmark speed-skating facility, the Richmond Olympic Oval, was built near the airport.

Vancouver's International Airport (YVR) is situated in the City of Richmond, BC one of the constituent municipalities of Metro Vancouver and - is an excellent setting to examine the impacts of the airport on commercial property values because it is Canada's second largest airport, there have been significant investments over the past 15 years, and the Canada Line, a rail rapid-transit line, connects the airport to the rest of the Vancouver metropolitan area. The relevant geography is shown in Figure 5.

In 2012 Vancouver International Airport served 17.6 million enplaned-deplaned passengers of which 9.2 million were domestic passengers and 8.4 million were international passengers. 227,000 tonnes of cargo were enplaned and deplaned at YVR in 2012 By way of comparison, Seattle-Tacoma International Airport served 33.2 million passengers in 2012 of which 3.5 million were international passengers and processed 283,500 tonnes of air cargo. Overall, 49% of global GDP is accessible by daily, non-stop scheduled air service from YVR. The airport also has the most scheduled flights to the China of any airport in North America and considerably more on a per capita basis which reflects Vancouver's and YVR's role as a North American gateway to Asia.

Vancouver Airport Authority is a private, non-share capital corporation that operates YVR on a long-term lease from the Government of Canada. The Canadian airport authority model is a unique one where the federal government transferred the operations of Canada's airports to airport authorities which are accountable to their communities through a Board of Directors selected from representative institutions and local governments. Serving elected officials and civil servants are not eligible to be directors of airport authorities. The Airport Authority has sole jurisdiction over the development and operation of YVR, including land-use planning, zoning and permitting. The Authority pays rent to the federal government, receives no subsidies and funds capital spending entirely from retained earnings and debt.

Proximity to YVR may be particularly valuable for businesses shipping products and documents by air express. Vancouver is geographically the most distant major North American metro area from global air freight hubs such as Louisville, Ky. (UPS) and Memphis, Tn. (Fed Ex) and Vancouver is also two time zones behind them. The upshot is that cargo aircraft have to leave YVR by 1800 hours in order to arrive in time for the 'Big Sort' at these two hubs and, furthermore, Vancouver packages must also clear US Customs. Package pick up from commercial premises in parts of Metro Vancouver distant from the airport must therefore occur in the early to mid-afternoon thereby reducing the time available for production and putting a premium on locations closer to the airport.

Investment in the airport has fluctuated dramatically over the past decade, as can be seen in Figure 1. Specifically, airport investment by both the Authority and tenants peaked at about C$300 million annually in 2007, and then declined to about C$50 million in 2011, but subsequently is on the rebound. Over the period, the Authority accounted for 79.5% of investment and tenants accounted for 20.5% but in recent years, although the Authority is still the dominant investor, the tenant proportion has increased. Of the Authority's investments over the period, 63% was in terminal facilities , 25% in airside facilities and 15% in "other".

Empirical Model and Data

We use least squares regression techniques to estimate a model of the impacts of YVR on the commercial property sale prices in Richmond. To capture potential heterogeneity in different neighborhoods, such as racial or gender demographics, income, and other amenities/disamenities, we include dissemination area fixed effects in our model. One potential alternative to fixed effects is a spatial econometrics approach that controls for unobserved variables that vary across geographic space. However, as described further below, in the present context it is not obvious of how to set up the spatial weights matrix since we have data spanning 2005-2012 with a small number of repeat sales over that period. For this reason, our spatial analysis in this paper is confined to an Exploratory Spatial Data Analysis, described below.

Our dependent variable is the sale price of commercial properties near the airport. We adjust sale prices for "inflation" using the Statistics Canada Consumer Price Index (allowing for 2005=base year) for British Columbia. Our commercial property sales data were obtained from the BC Assessment Authority roll years 2005-2012, for approximately 2,060 "qualified" commercial property transactions in Richmond, BC, the host city of the airport. The definition of "commercial" property is based on BC Assessment's Class 05 and 06 properties. Class 05 is defined as "Light Industry", which includes extracting, processing, manufacturing or transporting, storage of products. Class 06 consists of other "commercial" properties, including restaurants, retail, hotels, offices, and others.

Our independent variables include the annual current and past airport investment, obtained from the Vancouver Airport Authority for the years 2005-2013. Given the average airport service life of approximately 20 years, we assume a constant depreciation rate of 5% annually for the past investment data, so that older investments are less important determinants of sale price at any given point in time. For each individual observation of commercial property, we weight the annual airport investments by the property's distance to airport, so that a property that is further away from the airport has a lower "effective" airport investment variable associated with it. We hypothesize that higher (current and/or past) investment leads to higher sales prices; and since greater distance lowers the effective investment levels for a given property, this greater distance to the airport's effect on net investment leads to lower sales prices.

We also control for the airport's "Connectivity Index", obtained from the Vancouver Airport Authority, which is given by the number of destinations times the weekly frequency times the seats per flight, weighted by the size of the destination airport. We hypothesize that a larger Airport Connectivity Index should lead to higher sales prices of commercial properties. The Airport Connectivity Index for YVR can be seen in Figure 2, and it started out at about 58 in 2006, fluctuated to as high as about 65 in 2008 and 2009, and most recently in 2012 has hovered around 60.

Our other control variables include the assessed value of land on which the property is located; the year of sale and year built; the area of the property (in square feet), with the anticipation that larger properties sell for higher prices.

We also control for proximity to the Canada Line, which opened in 2009. As described above in the literature review section, some past studies have found that proximity to rail lowers property values while other studies have found the opposite. These mixed findings lead us to have no particular prior expectations on the sign of the coefficient on the distance to the Canada Line variable.

Finally, we also use fixed effects estimation to control for the location in each of 52 Census Dissemination Areas of each of the 2,060 commercial property (class 05 and 06) transactions in Richmond, BC. These Census Dissemination Areas are determined by Statistics Canada, with each consisting of approximately 400 to 700 people.

Results

Descriptive statistics of the data are presented in Table 1. The average connectivity index value is 59.7, while the average international connectivity index value is 19.8. The average property was about 6100 feet from the airport, or about 1.2 miles, with the closest property being about 0.5 miles and the furthest Richmond property located about 3 miles from the airport. The average distance from commercial properties that sold to the closest Canada Line station was approximately 0.5 miles, with the minimum distance property located 43 feet away and the furthest property about 2.2 miles from the nearest Canada Line station.

The investment variable is defined as the current period investment (in real terms) plus the (net of depreciation) investment (real) of the prior three years, normalized by the distance from the airport. The average value for a given commercial property sale was approximately $177,000/mile away, with a range of $54,000/mile away to $310,000/mile away. As can be seen in Figure 1, the actual investment levels (annual, nominal, gross of depreciation and not normalized by distance) ranged between $25 million and $300 million over the period 2005 through 2012. The average commercial property sold for $875,000 (in 2005 dollars), with a minimum sale price of $1.00 and a maximum sale price of $85 million (in 2005 dollars). Assessed land values were approximately $605,000 on average (in 2005 dollars). The average property was built in 1992 and sold in 2008, with a mean strata area of 1387 square feet.

Table 2 presents the results for our preferred model. We restrict the included observations to those with positive strata area, which leaves 1780 sales observations over the period 2005-2012. Also, in this model, we allow for a fixed effects specification, to control for any differences across Census dissemination areas, such as variation in demographics, income, proximity to other landmarks (such as the Richmond Olympic Oval), etc. In this model, which includes a White Robust procedure for heteroskedasticity, all parameter estimates presented in Table 2 are statistically significant with P-value ≤ 0.05. The station distance variable is positive and statistically significant, with a parameter estimate of 0.136 implying a 10% increase in the distance from the nearest Canada Line station increases commercial property sales prices by 1.36%, after controlling for all other sale price determinants. While this result may seem counterintuitive, there are several possible explanations for the sign on this variable. First, commercial property in Richmond has historically been auto-oriented which implies that proximity to the Canada Line may not be expected to increase their property values. Second, construction of the Canada Line was very disruptive to commercial premises close-by, for example, traffic congestion, noise, dust, loss of parking and loss of easy access and egress for automobiles. In fact, several merchants sued the Canada Line for business losses as a result of adverse construction impacts. Third, as one moves away from the Canada Line, the landscape becomes more densely residential, implying less space for commercial properties, which should be expected to put upward pressure on these commercial properties that are further from the Canada Line. Finally, there has been a substantial amount of speculative investment in commercial land near the Canada Line by developers who are hoping to convert some of these lots, however, to date these investors have not yet been successful at converting a large portion of the commercial properties into residential property. So while there may have been a spike in commercial property sales initially when the Canada Line construction was announced, there have been relatively few transactions in the neighborhoods near the stations due to land speculators holding onto the land.

The connectivity coefficient in Table 2 is positive, significantly greater than zero, and not significantly different from 1.0. This implies a 1% improvement in connectivity leads to a 1% increase in commercial property sale prices. Similarly, the investment variable is positive and significant with parameter estimate equal to 0.68, implying a 1% increase in investment at YVR leads to a 0.68% increase in commercial property sale prices, after controlling for all other sale price determinants.

The distance to the airport parameter estimate is negative and statistically significant, implying for every 10 percent closer to the airport, commercial property sale prices rise by 7.6%. This is an important result because it implies proximity to the airport is an amenity for businesses that purchase property in Richmond, BC.

Since much of the strategic advantage of YVR's geographic location is in its proximity to overseas markets, we explore another model variation where instead of overall connectivity, we focus on international connectivity, with results in Table 3. In this set of estimates, the international connectivity index parameter estimate (1.59) is much larger than the overall connectivity results from Table 2, and it is statistically significantly greater than 1. Also, including an international connectivity index instead of an overall connectivity index magnifies the investment variable parameter estimate, which is now 1.17 and significantly greater than zero, although not significantly greater than 1. These results imply that international connectivity is more important than local airport investments at YVR. Perhaps this result could have some implications for identifying additional international routes to connect with YVR, as the benefits to the local community appear to be substantial. One other result that is different in Table 3 compared with Table 2 is the coefficient on the distance variable is statistically insignificant here. This implies locating slightly closer to YVR is much less important to businesses (in terms of their willingness to pay for commercial property) than having additional international connections opportunities. Also, the proximity to the nearest Canada Line station appears to have no statistically significant impact on commercial property prices in this model that includes international connectivity.

Table 4 presents results for only Class 05 property sales. Since Class 05 represents "light industrial". Virtually all of the parameter estimates are statistically insignificant in this model, however there are only 88 sales observations for Class 05, implying that perhaps our sample size is too limited to obtain valid inferences. Table 5 presents results for Class 06 properties, which includes retail establishments. In this variation of the model, the distance to the nearest Canada Line station is still positive and insignificant, and also the distance to the airport is negative but statistically insignificant. Given the small sample size of the class 05 properties, as well as there being substantial overlap between Class 05 and Class 06 uses[1], it may be preferable to perform our analysis based on combining both Class 05 and Class 06, as we do in Table 2.

Exploratory Spatial Data Analysis

The geographic nature of our commercial property sales data leads us to consider the possibility of spatial autocorrelation. In other words, there may be some unobservable variables that vary across geographic space, and this can lead to spatial autocorrelation. Spatial autocorrelation can result in inefficient parameter estimates, and in turn, statistically insignificant parameter estimates that really may be statistically significant.

[1] This is a major issue in local planning circles. For instance, light industrial land uses are sometimes actually office and retail functions, and vice-versa.

One challenge in addressing spatial autocorrelation is the fact that our data spans 2005 to 2012. Most spatial econometrics analyses are either done on cross-sectional data, or panel data where the cross-sectional units are repeated in each year. The nature of our data set raises questions such as: how should the spatial weights matrix be structured in a situation where we know a sale in 2012 does not impact sales in 2005? Careful thought will need to be given to how to set up the spatial weights matrix. But, as a preliminary step, we conduct an exploratory spatial data analysis to search for visual (or graphical) evidence of possible spatial autocorrelation.

Figure 3 plots the distances between each i,j pair of sales occurring in our sample on the X-axis, with the squared difference between the residuals for sales i and j on the Y-axis. This type of graph is known as a semivariogram, and the individual points on Figure 3 are pairs of sales in Richmond, BC. Spatial stationarity implies points with similar distances from each other should have similar difference of their residuals squared. Non-stationarity, however, implies that similarly distant points have different squared residuals. Non-stationarity can be a sign of spatial autocorrelation, potentially leading to the problems with statistical inference described above.

The results of our exploratory data analysis can be seen in Figure 3. Since there seems to be a fairly even distribution of the squared residuals for different distances, it appears that there is spatial stationarity in our error terms of our model. Further research may include a formal test for spatial autocorrelation, however careful consideration needs to be given to the spatial weights matrix because of the fact that the property sales in our sample occurred over a several year time period.

Summary and Conclusions

We examine the impacts of Vancouver International Airport on commercial property sales prices in the City of Richmond, BC, Canada, over the period 2005-2012. Our findings include that investments in the airport, as well as connectivity, both have a statistically significant impact on commercial property values. Distance to the airport is an amenity, with closer properties selling for higher prices after controlling for other determinants of sale prices. One puzzling result is that distance to the nearest Canada Line station actually leads to higher commercial sales prices, after controlling for distance to the airport, investments, connectivity, and other factors. One possible explanation for this result may be spatial autocorrelation in the data that might arise due to omitted unobservables (such as neighborhood demographics), however our Exploratory Spatial Data Analysis (Figure 3) provides at least anecdotal evidence that there is spatial stationarity in the error terms of our model. Also, our inclusion of dissemination area fixed effects should control for heterogeneity in different neighborhoods. Nevertheless, one possible area for further research is conducting formal tests for, and if necessary, adjusting the empirical models for potential spatial autocorrelation.

There are major potential policy implications from our analysis. If the commercial property owners in Richmond can expect their property values to rise as the airport expands and improves its connectivity index, this may result in higher assessments of these properties. Depending on how the mill rates are set by Richmond, the higher assessments could lead to greater tax revenues. Regardless of the impacts on local property tax revenues, it is clear that Vancouver International Airport has a significant impact on the businesses in the local community.

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Figure 1 – YVR Airport Investment, 2006-2012

Figure 2 – Airport Network Connectivity Index, YVR, 2006-2012

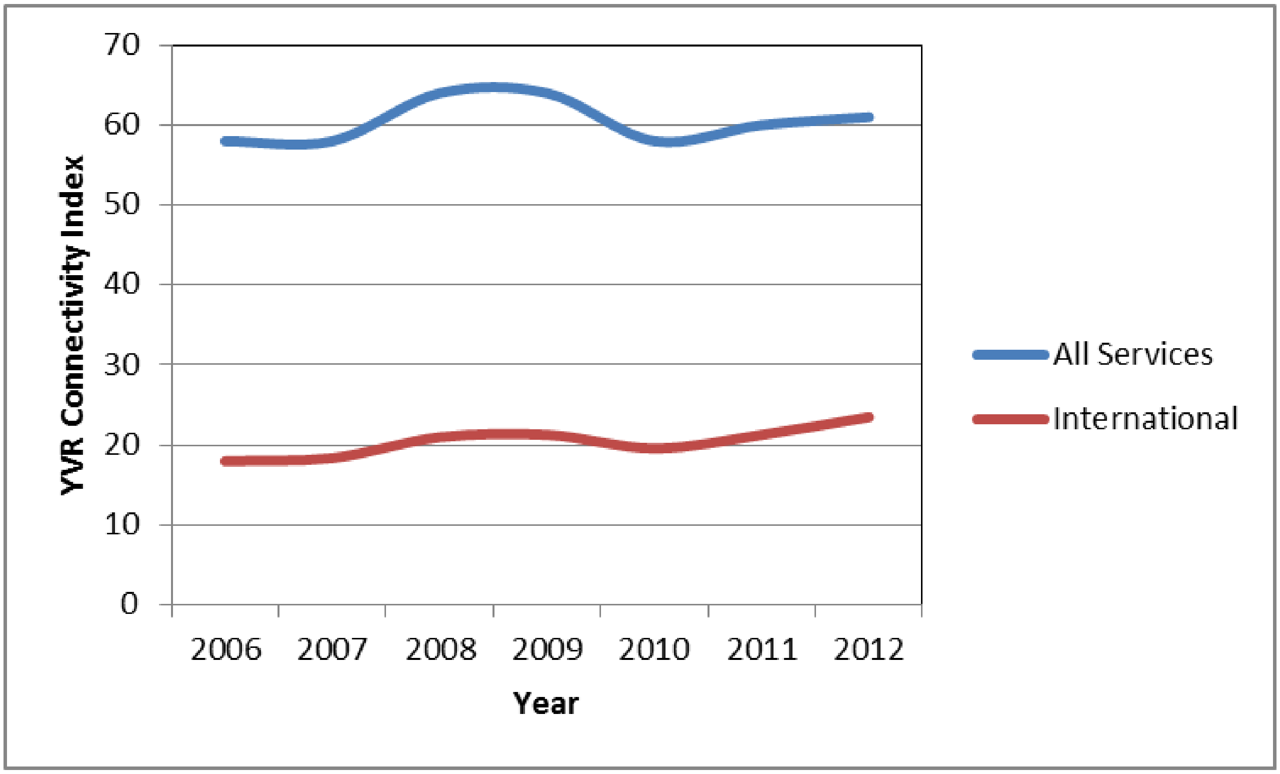

Figure 3: Exploratory Spatial Data Analysis

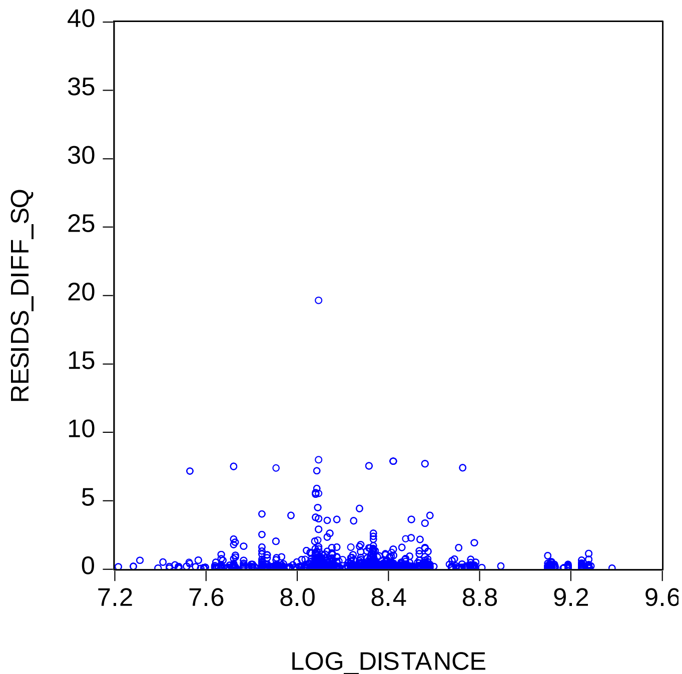

Figure 4: Vancouver International Airport's Location in Richmond, BC Canada

Table 1 – Descriptive Statistics

	CONNECTIVITY	DIST_AIR	INTL_ CONNECTIVITY	INVEST	LAND_ASS_REAL	STA_DIST	STRATA_ARE	SALE_YEAR	YR_BLT	SALE_ PRICE_ REAL
Mean	59.70083	6107.361	19.79917	177346.1	605850.7	2573.961	1387.498	2008.169	1992.373	875350.3
Median	58.00000	5446.739	19.60000	209513.8	189446.8	1701.050	1008.000	2008.000	1997.000	279659.6
Maximum	64.00000	16091.12	23.50000	310015.6	58248000	12353.70	26001.00	2012.000	2012.000	84950000
Minimum	58.00000	2646.479	18.00000	54013.09	0.922541	43.56230	0.000000	2005.000	0.000000	0.938884
Std. Dev.	2.357061	2884.136	1.792755	93932.03	2372133.	2726.159	1486.888	2.298206	62.99118	3013971.
Skewness	0.996279	1.317946	0.616628	0.073395	15.82573	1.484024	3.869130	0.181207	-30.76310	14.28757
Kurtosis	2.365349	4.398399	2.233128	1.484195	350.3513	5.017150	45.29244	1.738137	973.1082	325.8371
Jarque-Bera	375.1729	763.8420	180.9358	198.9691	10436962	1104.843	158588.5	147.8741	81064148	9011584.
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	122924.0	12575057	40766.50	3.65E+08	1.25E+09	5299786.	2856859.	4134821.	4102295.	1.80E+09
Sum Sq. Dev.	11433.71	1.71E+10	6614.349	1.82E+13	1.16E+16	1.53E+10	4.55E+09	10869.84	8165915.	1.87E+16
Observations	2059	2059	2059	2059	2059	2059	2059	2059	2059	2059

Table 2 – OLS Regression Results with Fixed Effects, Preferred Model (includes White Robust Heteroskedasticity Adjustment)

Dependent Variable: LOG(SALE_PRICE_REAL)
Method: Least Squares

Sample: 1 2059 IF STRATA_ARE>0
Included observations: 1780
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SALE_YEAR	-0.007378	0.001725	-4.277525	0.0000
LOG(STA_DIST)	0.135685	0.055449	2.447016	0.0145
LOG(STRATA_ARE)	0.257008	0.018522	13.87585	0.0000
YR_BLT	0.008698	0.001406	6.185077	0.0000
LOG(CONNECTIVITY)	1.051250	0.407300	2.581025	0.0099
LOG(INVEST+.95*INVEST_LAG1+.95*.95*INVEST_LAG2+.95*.95*.95*INVEST_LAG3)/LOG(DIST_AIR)	0.680942	0.333438	2.042186	0.0413
LOG(LAND_ASS_REAL)	0.690930	0.024322	28.40797	0.0000
LOG(DIST_AIR)	-0.762315	0.245770	-3.101748	0.0020

R-squared	0.613432	Mean dependent var	12.33696
Adjusted R-squared	0.600868	S.D. dependent var	0.851856
S.E. of regression	0.538176	Akaike info criterion	1.630235
Sum squared resid	499.0377	Schwarz criterion	1.805858
Log likelihood	-1393.909	Durbin-Watson stat	1.872830

(Fixed Effects parameter estimates are omitted from table for ease of exposition)

Table 3: OLS model, with Fixed Effects; includes International Connectivity Index

(includes White Robust Heteroskedasticity Adjustment)

Dependent Variable: LOG(SALE_PRICE_REAL)
Method: Least Squares

Sample: 1 2059 IF STRATA_ARE>0
Included observations: 1780
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SALE_YEAR	-0.013479	0.001677	-8.036505	0.0000
LOG(STA_DIST)	0.075320	0.054305	1.386976	0.1656
LOG(STRATA_ARE)	0.251720	0.017931	14.03841	0.0000
YR_BLT	0.011354	0.001349	8.414402	0.0000
LOG(INTL_CONNECTIVITY)	1.594896	0.149647	10.65771	0.0000
LOG(INVEST+.95*INVEST_LAG1+.95*.95*INVEST_LAG2+.95*.95*.95*INVEST_LAG3)/ LOG(DIST_AIR)	1.175216	0.365283	3.217278	0.0013
LOG(LAND_ASS_REAL)	0.718423	0.023965	29.97790	0.0000
LOG(DIST_AIR)	-0.107446	0.245414	-0.437815	0.6616

R-squared	0.633779	Mean dependent var	12.33696
Adjusted R-squared	0.621877	S.D. dependent var	0.851856
S.E. of regression	0.523821	Akaike info criterion	1.576164
Sum squared resid	472.7710	Schwarz criterion	1.751787
Log likelihood	-1345.786	Durbin-Watson stat	1.896109

(Fixed Effects parameter estimates are omitted from table for ease of exposition)

Table 4: OLS Model with Fixed Effects; Class 5 Properties Only (includes White Robust Heteroskedasticity Adjustment)

Dependent Variable: LOG(SALE_PRICE_REAL)
Method: Least Squares

Sample: 1 2059 IF STRATA_ARE>0 AND CLASS5=1
Included observations: 88
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SALE_YEAR	0.050178	0.038641	1.298552	0.1985
LOG(STA_DIST)	-0.028169	0.539800	-0.052185	0.9585
LOG(STRATA_ARE)	0.019179	0.128022	0.149811	0.8814
YR_BLT	0.023088	0.006293	3.669029	0.0005
LOG(CONNECTIVITY)	-0.684784	2.088434	-0.327894	0.7440
LOG(INVEST+.95*INVEST_LAG1+.95*.95*INVEST_LAG2+.95*.95*.95*INVEST_LAG3)/ LOG(DIST_AIR)	0.200919	2.194858	0.091541	0.9273
LOG(LAND_ASS_REAL)	0.838945	0.184431	4.548838	0.0000
LOG(DIST_AIR)	-0.597552	4.952821	-0.120649	0.9043

R-squared	0.582082	Mean dependent var	12.51179
Adjusted R-squared	0.457331	S.D. dependent var	0.762710
S.E. of regression	0.561859	Akaike info criterion	1.889495
Sum squared resid	21.15090	Schwarz criterion	2.480678
Log likelihood	-62.13780	Durbin-Watson stat	2.307739

(Fixed Effects parameter estimates are omitted from table for ease of exposition)

Table 5: OLS Model with Fixed Effects; Class 6 Properties Only (includes White Robust Heteroskedasticity Adjustment)

Dependent Variable: LOG(SALE_PRICE_REAL)
Method: Least Squares

Sample: 1 2059 IF STRATA_ARE>0 AND CLASS6=1
Included observations: 1704
White Heteroskedasticity-Consistent Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
SALE_YEAR	-0.008928	0.001769	-5.046269	0.0000
LOG(STA_DIST)	0.101319	0.054056	1.874329	0.0611
LOG(STRATA_ARE)	0.254125	0.018534	13.71140	0.0000
YR_BLT	0.007579	0.001552	4.882966	0.0000
LOG(CONNECTIVITY)	1.036124	0.431448	2.401505	0.0164
LOG(INVEST+.95*INVEST_LAG1+.95*.95*INVEST_LAG2+.95*.95*.95*INVEST_LAG3)/LOG(DIST_AIR)	0.747830	0.336845	2.220101	0.0265
LOG(LAND_ASS_REAL)	0.688848	0.024553	28.05509	0.0000
LOG(DIST_AIR)	-0.119305	0.156292	-0.763352	0.4454

R-squared	0.606036	Mean dependent var	12.33165
Adjusted R-squared	0.595831	S.D. dependent var	0.858300
S.E. of regression	0.545658	Akaike info criterion	1.651834
Sum squared resid	494.2531	Schwarz criterion	1.792323
Log likelihood	-1363.363	Durbin-Watson stat	1.876042

(Fixed Effects parameter estimates are omitted from table for ease of exposition)