NEIGHBORHOOD FACTORS AFFECTING APARTMENT VACANCY RATES IN LOS ANGELES

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ABSTRACT

This paper examines the factors that affect apartment vacancy rates in Los Angeles, California. Using a unique data set that uses electrical meter information to calculate vacancy rates, the paper finds that there are substantial differences in vacancy rates across neighborhoods in Los Angeles and that these differences are associated with poverty, race/ethnicity and the percentage of multiple family units.

INTRODUCTION

In the rapidly growing cities of the western United States, the availability and affordability of housing is a key issue. One of the significant factors in the analysis of housing markets is the apartment vacancy rate. Knowledge about vacancy rates can be important to city planners as it provides information about the availability of housing. This knowledge can also affect practical real estate decisions as apartment turnover and vacancy rates are key items affecting the pricing and profitability of an apartment building.

This paper examines the neighborhood factors that affect apartment vacancy rates in the City of Los Angeles. Los Angeles provides a particularly useful place to study this issue. The city is divided into 35 "Community Planning Areas" and it provides a range of socioeconomic data for each. The neighborhoods of Los Angeles vary significantly in terms of income, minority populations and the importance of multiple family housing, but suffer similar regional level shocks. Because of this, the data set allows the testing of a variety of hypotheses about the effects of neighborhood socioeconomic characteristics on vacancy rates. This focus on neighborhoods within a city contrasts with previous studies that have used more aggregated data, such as citywide averages, to make comparisons across cities (for example, Gabriel and Northaft, 2001).

This paper finds that there are substantial differences in vacancy rates across neighborhoods in Los Angeles and that these differences are associated with several factors. The most pronounced effect is that neighborhoods with a higher percent of residents living in poverty will be associated with higher-than-average vacancy rates. There are also racial/ethnic differences in vacancy rates, although they are not uniform. Neighborhoods with larger populations of Hispanic and Asian households are associated with somewhat lower vacancy rates, while neighborhoods with larger populations of Black households are associated with slightly higher vacancy rates. This illustrates the importance of distinguishing between ethnic groups when doing empirical research and shows the value of using data from Los Angeles. The city has

a highly diverse population allowing one to test for separate ethnic effects. The paper also finds that neighborhoods characterized by a large number of multiple family units, relative to single- family units, will tend to have lower vacancy rates. This is support for the hypothesis that the more atypical rental housing is, the longer the length of time there will be between rental spells, and so the higher the average vacancy rate. A nice feature of the data used in this paper is that the neighborhood characteristics examined, such as income and race, are generally observable across a city, making it possible to apply the results in other cities.

REVIEW OF THE LITERATURE

Vacancy rates are a result of a choice of rent levels that reflects a tradeoff between the opportunity cost of leaving an apartment unrented and the potential gain of waiting and finding a renter willing to pay higher rent. It is natural to think about this behavior in a search context, where the owner of the property sets a reservation rent to maximize discounted lifetime profits given the search behavior of potential renters. Hendershott and Harin (1988) provide an overview of this approach while detailed modeling of the search decision is given by Read (1991,1998a,1998b).

A number of economic factors should influence the search decisions of renters and owners and therefore affect the equilibrium vacancy rate. Belsky and Goodman (1996), in their discussion of apartment rents and vacancies in the 1980s, offer a list of potential factors: the age and family structure of the population, industrial and occupational composition, the rate of new construction (since new buildings start mostly vacant), rent control laws, the cost and quality of information in the apartment market, the size and heterogeneity of the market, the match of unit type and demand, concentration of ownership, income levels (higher income increases the opportunity cost of search), professional management (lowers search costs), increased population mobility, and geographic mismatch due to shifts in population. They argue that a number of these factors have affected current apartment vacancy rates but do not provide statistical evidence.

One factor that has been examined in detail is atypicality. Haruin (1988) argues that the more an apartment differs from other apartments in the area, the higher the variance of potential renters, and this implies that apartment owners should be willing to wait longer for a person willing to pay a higher rent. He finds support for this hypothesis from data on re-sale houses. Using apartment data from North Carolina, Judd and Frew (1990) also find supporting evidence that atypicality will be associated with a higher average vacancy rate.

One approach to determining the factors affecting vacancy rates is to look at the "natural" vacancy rate. Drawing an analogy with the natural rate of unemployment, the natural vacancy rate can be thought of as the vacancy rate determined by the demographic and market characteristics of an area when the apartment market has had sufficient time to adjust to supply or demand shocks. Changes in rents are then thought to be dependent on the difference between the actual vacancy rate and the natural vacancy rate, so that if the actual vacancy rate is below the natural vacancy rate then rents will be increasing. If this is true, then the natural rate can be backed out from time series on vacancy rates and rents by defining the natural rate as the vacancy rate such that rents are not increasing, indicating that

supply and demand are balanced. A number of papers have done this, using city-level data, and then have examined the factors that affect the natural rate.

Rosen and Smith (1983) use a pooled data set of citywide vacancy rates for 17 cities to estimate natural vacancy rates. In the first step, they regress changes in rent on vacancy rates. Given the basic theory of rent changes, one can back out natural vacancy rates from the estimated intercepts of these regressions. They then regress this estimate of natural vacancy rates on rent, rent dispersion, changes in housing stock, the change in population and the percentage minority, to determine the factors that affect the natural rate. The change in housing stock and the average rent level were found significant (positive and negative respectively) but percent minority and change in population were not found to be significant. Gabriel and Northaft (1988) use a similar procedure looking at pooled data for 16 cities. They find that changes in the number of renter-occupied housing units, median gross rent, proportion minority population and change in population all positively affect the natural vacancy rate.

Gabriel and Northaft (2001) extend this literature by splitting the rental housing vacancy rate into its components: the incidence and duration of vacancies. Taking advantage of data from the Bureau of Labor statistics (used for the Construction CPI), they construct measures of incidence and duration for large metropolitan areas in the US. Using a pooled time-series cross-sectional regression, they estimate the effect of several socioeconomic variables on duration and incidence. They find that duration is a positive function of the percentage of new units, a positive function of the percent in tall buildings, and a negative function of the percent Black and Hispanic.   Incidence is a positive function of percent elderly, and a negative function of percent public housing and population growth.

A difficulty in interpreting these studies is that they do not include the same set of regressors, and they may include endogenous variables, such as the level of rent. The use of race/ethnicity variables is common across the studies, although here the results are not consistent.

DATA USED

This paper looks at apartment vacancy rates using data available for the City of Los Angeles. Data were collected from several sources. The Planning Department of the City of Los Angeles divides the city into 35 Community Planning Areas (CPAs) for purposes of planning and statistical analysis (a list of the CPAs is given in the Appendix). Los Angeles is a fairly large city so that the planning areas themselves are large (average population in 2000 was 105,000) but they also vary dramatically in the characteristics of the population (a summary of variables used in this paper is given in Table 1). The CPAs are based on a "natural" split of the city and so should reflect actual differences in characteristics (and so are less homogenous than a random split of the city).

Much, though by no means all, data for Los Angeles is provided by CPA. The data central to this study are vacancy rates. Data on vacancy rates are provided by the Los Angeles Housing Department (LAHD) based on data collected by the Department of Water and Power. The DWP calculates vacancy rates for multi-family individually metered housing units. Vacancy rates are based on the fraction of idle meters on the monthly measurement date. The data is only reported for buildings

where individual units are metered and not for buildings with a common meter for all units. This data is a novel source of information on vacancy rates as it is collected citywide, is now available each month, and is reported at a disaggregated (CPA) level (although provided with a lag). This paper uses the average of the monthly vacancy rates for the year 2001 as the vacancy rate measure.

TABLE 1.
SUMMARY OF VARIABLES.

Variable	Mean[a]	Min	Max
Vacancy Rate	3.5	1.4	8.0
Population in 2000	105,498	20,254	292,101
Population Growth Rate	7.0	-8.3	24.6
Multiple Family Units	23,002	810	101,150
Fraction MFUs	0.57	0.09	0.98
Growth rate of MFUs	3.7	0.2	10.8
Percent Black	8.6	0.6	52.3
Percent Hispanic	40.7	4.1	94.5
Percent Asian	10.6	0.4	35.5
Renters	56.3	12	95
Income	51,877	21,627	194,898
Poverty	16.5	4.5	39.5
Elderly	14.2	9	23
No High School	30.5	4.6	73.5
College	25.7	2.9	62.5
Foreign	41.6	18.9	85.3

[a]Mean is average of 35 observations (not citywide average).

The other main source of data is the 2000 and 1990 censuses. The Los Angeles Department of City Planning (LADCP) provides race/ethnicity and population data for each CPA shortly following the census. The data provide information on the percent White, percent Black, percent Hispanic and percent Asian and along with the population for each CPA. The LADCP also provides other demographic information by CPA, but only with a substantial lag after the census. For example, in 1995, the LADCP provided detailed information on each CPA based

on the 1990 census. Variables included in this report were: the age distribution of the population, the percent foreign born, and the percent renters. This paper will use these values as estimates, or proxies, for the current values. For slowly changing demographic or housing variables the quality of the proxy should be good. For other variables, such as income and poverty, there were certainly changes in the absolute level across the city over this time. But for this study, the neighborhood-to-neighborhood variation in these variables matters more than the absolute level, and that has changed much less. Rich neighborhoods are still rich, and poor neighborhoods are still poor. The key data that are not available, at least by CPAs, are rents, which rules out taking the natural vacancy rate approach to apartment vacancy rates. Rather, this is a study of the effect of neighborhood variables on average neighborhood apartment vacancy rates at a point in time.

CHOICE OF VARIABLES FOR THE REGRESSION ANALYSIS

The analytical method used in this study was to regress vacancy rates of the CPAs against socioeconomic variables that are relevant for housing behavior. The choice of data to use was dictated by theory regarding factors that matter for apartment vacancy rates, data availability, and the statistical independence of the data. The data sources described in the previous section generally cover what are publicly available by CPA. The emphasis is on income, population, race/ethnicity and housing data, all variables that previous work has suggested might be significant. However, there are a number of series that measure similar characteristics and so choosing between the series must take into account issues of multicolinearity.

Data from the census, as reported by the LADCP, provide two income measures: average household income (Income) and fraction of the population living in poverty (Poverty). While these variables are obviously connected, the correlation, -0.61, was not so high to rule out including both in the regression. However, Poverty was found to be highly significant in an initial regression, with or without the inclusion of Income, while Income was not significant, with or without Poverty. Because of this, Income was not included in the final specification.

The LADCP (1995) also provides data on education levels, including the fraction of adults without a high school education (NoHighSchool) and the fraction with a college education (College). Table 2 shows the correlation between the fraction of individuals in a planning area of a certain race/ethnicity and these two education measures. As can be seen, the Hispanic variable is very highly correlated with both NoHighSchool (positively) and College (negatively). When both the Hispanic variable and either of the education variables were included this eliminated the significance of both. In the final regressions, the education variables were dropped in favor of the Hispanic variable. While education might well have some affect on renters' moving patterns, and so vacancy rates, the focus in the literature has been on cultural factors, such as those associated with ethnic groups. It is likely that cultural factors would affect information and search patterns towards housing, and also landlord attitudes and opportunities for location.

The planning report also includes the distribution of adults by age. It might be that older populations in general would be less mobile and so, to the extent that they are renters, would be associated with lower vacancy rates; although Gabrial and Northaft (2001) found that they were associated with higher incidence. An older

population would also imply a lower fraction of renters, although this should not directly affect vacancy rates. A variable was constructed that measured the percentage of adults 60 years or older (Elderly), but again it was found to be highly (negatively) correlated with Hispanic, and so could not be used.

TABLE 2.
CORRELATION BETWEEN SELECTED VARIABLES
WITHIN PLANNING AREAS.

	No High School	College	Foreign Born	Elderly
Hispanic	0.89	-0.86	0.81	-0.83
Black	0.28	-0.37	-0.05	-0.14
Asian	-0.05	0.10	0.14	0.05

The Los Angeles Housing Department also provides data on the number of single-family units and multiple family units (MFUs). Presumably the growth in the number of units, or the number of people looking for housing in an area will affect the current vacancy rate, though not the natural rate. Of course, one cannot treat the growth in number of units as supply and the growth in people as demand, as both represent an *outcome* of changes in supply or demand. Because of this, they will be positively correlated; planning areas with an increasing number of rental units will show an increase in the number of renters, increasing population. When the growth rate of population was added to the regression, in addition to the growth of MFUs, it was not significant, and so was left out.

Atypicality is how common housing of a particular type is for a particular region. For this study, the CPAs serve as the regions. Each region was constructed to encompass an area that has similar characteristics and so we would expect that housing in one area is not a perfect substitute for housing in another area. Given the data set, there are two possible measures of atypicality. The number of MFUs in a particular CPA indicates how rare MFUs are with those neighborhood characteristics relative to the entire city. However, this measures two factors, how rare MFUs are, and the size of the particular neighborhood. A better measure of atypicality is how rare MFUs are in a neighborhood compared with other kinds of housing in the same area; in effect, the predominance of rental housing in an area (Fraction MFUs). One would expect that the relatively more rental housing there is in an area, the more option renters who want to live in that area will have, and so the lower the vacancy rates should be.

The LADCP provides a separate measure of the predominance of rental housing, the number of households that are renters or owners (LADCP 1995 – data reported in integers). These numbers are not exact substitutes for Fraction MFUs as there are MFUs that are owned and single-family units that are rented; however, the two numbers are so highly correlated (correlation = 0.93) that this is not a substantial concern and only one of the variables - Fraction MFUs - could be included. It is worth noting that MFUs are not synonymous with apartments, as condominiums are

MFUs but not rented. However, the fraction of MFUs in a CPA is very highly correlated with the fraction of renters, so this should not be a great concern.

REGRESSION RESULTS

Table 3 reports the results of the regression. The first result is that faster growth of MFUs is associated with lower vacancy rates. This is surely reflecting shifts in supply; areas with lower vacancy rates are attractive to developers and will result in increased building and a growing population. This variable should pick up some of the effect of short-run changes in the neighborhood in response to disequilibrium vacancy rates. It was also found that the lower the fraction of MFUs, the higher the vacancy rate. This is consistent with the notion that in areas where rental housing is proportionately rare, owners will be willing to wait longer to attract a renter that desires to live in that area.

TABLE 3
DETERMINANTS OF VACANCY RATES.

Variable	Coefficient
Constant	4.32*** (0.52)
Growth of MFUs	-0.211*** (0.061)
Fraction MFUs	-2.54** (0.97)
Hispanic	-0.022** (0.008)
Black	0.030* (0.016)
Asian	-0.054** (0.023)
Poverty	0.158*** (0.028)
$\overline{R}^2$	0.71

Standard errors are in parentheses.
Significance is also indicated at 1%
(***), 5% (**) and 10% (*) levels.

One way of expressing the magnitude of the coefficients is by the difference in vacancy rates from moving from the neighborhood with the minimum value of the characteristic to the neighborhood with the maximum value of the characteristic, holding other factors equal. For example, going from the CPA with the lowest

Fraction MFUs to the CPA with the highest Fraction MFUs, would decrease the vacancy rate by 2.26 percentage points according to the regression. This is compared with an average vacancy rate across the regions of 3.5%.

The coefficients on the race/ethnicity variables are significant, although are of differing signs, which is interesting in itself. Areas with a higher proportion of Blacks have higher vacancy rates than average, while areas with high concentrations of Asians and Hispanics have lower vacancy rates. One potential difference is that Asian and Hispanic communities can often be immigrant communities, although the correlation of Asian and Foreign Born is small. Immigration may be connected to apartment vacancies in a number of ways. It is likely that immigrant communities provide a network of connections that aid in communicating about apartment vacancies. Alternatively, immigrants may see the benefits of, or feel restricted to, living in specific regions. Also, these may be fast growing regions, and to the extent that rents don't adjust, it may affect vacancy rates (although, in this case, the correlation of Foreign Born and Population Growth is small and negative). One of the advantages of using data for Los Angeles is that it is truly a multi-ethnic city and so provides a wide range of variation to study racial/ethnic behavior. Studies that treat minorities as a single group face a danger that they are mixing distinct responses together if economic forces affect different ethnic groups differently.

Going from the CPA with the lowest percentage Black to the highest percentage Black increases the vacancy rate 1.55 percentage points. For Asian, the value is a reduction in the vacancy rate by 1.90 percentage points. For Hispanic, it is a reduction of 1.99 percentage points.

The coefficient on Poverty is positive and highly significant implying that the higher the rate of poverty, the higher the vacancy rate in an area. This effect is separate from any correlation between poverty and race/ethnicity. An argument sometimes given is that higher income is associated with higher opportunity costs of search (lost wages). Apartments appealing to a higher-income population will have lower vacancy rates as a result, as the renters are not willing to spend the time searching across a number of apartments. This result is consistent with that hypothesis. The magnitude of the effect of poverty is very large. Going from the Community Planning Area with the lowest poverty rate to the highest increases the vacancy rate 5.53 percentage points.

CONCLUSION

Los Angeles is one of the most dynamic cities in the world, offering a large and diverse population, which provides an excellent laboratory for study. In terms of data, one of the special features of the city is that it is divided into 35 Community Planning Areas that differ dramatically in the characteristics of their residents. This feature was combined with an unusual data set, vacancy rates calculated from electrical use data, to examine the factors that affect apartment vacancy rates. This paper finds that vacancy rates are positively associated with the percentage in poverty and the percentage Black, and negatively with the percentage of housing units that are MFUs, the percentage Asian and the percentage Hispanic.

APPENDIX: COMMUNITY PLANNING AREAS

The City of Los Angeles is divided into the following 35 Community Planning Areas:

1. Arleta - Pacoima
2. Bel Air - Beverly Crest
3. Boyle Heights
4. Brentwood - Pacific Palisades
5. Canoga Park - West Hills - Winnetka - Woodland Hills
6. Central City
7. Central City North
8. Chatsworth - Porter Ranch
9. Encino - Tarzana
10. Granada Hills - Knollwood
11. Harbor - Gateway
12. Hollywood
13. Mission Hills - North Hills - Panorama City
14. Northeast Los Angeles
15. North Hollywood
16. Northridge
17. Palms - Mar Vista - Del Rey
18. Reseda - West Van Nuys
19. San Pedro
20. Sherman Oaks - Studio City - Toluka Lake
21. Silverlake - Echo Park
22. South Central Los Angeles
23. Southeast Los Angeles
24. Sunland - Tujunga - Lakeview Terrace - Shadow Hills
25. Sun Valley
26. Sylmar
27. Van Nuys - North Sherman Oaks
28. Venice
29. West Adams - Baldwin Hills - Liemert Park
30. Westchester - Playa Del Rey
31. Westlake
32. West Los Angeles - Century City - Rancho Park
33. Westwood
34. Wilmington - Harbor City
35. Wilshire

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