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G

Attribute Demand Equations by Tenure Type

The analysis presented in Chapter 9 is based upon estimates of attribute demand equations for the pooled sample of owner and renter households. There are clear statistical and theoretical advantages from pooling tenure types. The statistical advantages of larger samples and more variations in both the dependent and the independent variables are fairly obvious. On theoretical grounds, it can be argued that tenure choice, although it has independent aspects arising from differences in tax treatment and from the different relative costs of renting and owning, may result from household decisions to consume particular configurations of housing attributes.

The argument in its simplest form is that there is no separate preference or demand for tenure and that tenure choice results from the decision to purchase particular housing attributes. The pooled analysis in Chapter 9 implicitly accepts this view of tenure choice.

On the other hand, there are cogent theoretical and statistical reasons for stratifying households by tenure type in the investigation of the demand for individual housing attributes. In Chapter 6 we indicate that the prices of housing attributes differ in the owner and renter submarkets and that the financial terms on which owner and renter properties are available varies. Thus, if some bundles of housing attributes are more cheaply or conveniently acquired in fee simple and others on a rental basis, the pattern of household demand for attributes determines tenure. But if a preference for tenure exists, or if, as we have discussed in Appendix C, there are monetary advantages and disadvantages to different tenure arrangements, these considerations would affect the quantities of the various attributes consumed. There are, in fact, reasons to believe that differences in the relative costs of various attributes or bundles do exist; for example, the rental provision of high-density small units may be more competitive with ownership than the rental provision of low-density single-family units.

The statistical reasons for stratification are evident from covariance tests which indicate that the renter and owner samples are drawn from different populations. This fact should not be overstressed because acceptance of these tests implies that the individual attribute demand equations are correctly specified, a rather stringent requirement that is unlikely to be satisfied.

Ideally, the determinants of tenure choice and the determinants of other aspects of the demand for housing attributes should be specified and estimated simultaneously as part of a complete model of the demand for housing services. We lack the knowledge and, probably, the necessary data to estimate such a model. Still, we suspect that the true demand relationship includes elements of these two views; the analysis presented in this appendix complements the discussion in Chapter 9 by considering the demand for housing attributes separately for owners and renters. Although both of these attempts to address the multiplicity of residential housing choices facing consumers are incomplete, the additional analysis presented in this appendix is highly consistent with the discussion in Chapter 9 in all respects and provides further support for the conclusions in the main text.

Means and standard deviations of these housing attributes are presented in Table G-1 for the renter and owner subsamples. The means and standard deviations presented for owner-occupied units in Table G-1 differ from those presented in Table 8-1, where the statistics were for single-family detached owner-occupied units only.

It is evident, moreover, from Table G-1 that there are systematic differences between owner- and renter-occupied properties. Owner-occupied dwellings are of higher quality and are located in better structures, are more likely to have hot water and central heating, and are newer than renter-occupied structures. In addition, owner-occupied dwellings are nearly two rooms larger than renter-occupied units. They have more baths on the average, and include nearly seven-thousand square feet of parcel area per dwelling unit as compared to only slightly more than two-thousand for renter-occupied units. Structures adjacent to owner-occupied units are, on the average, of better quality than those adjacent to renter-occupied units, and owner-occupied units are located on better-quality blocks. Moreover, within the central city at least, neighborhood schools serving owner-occupied structures have slightly higher achievement levels than those serving rental units, and there are fewer crimes, on the average, in predominantly owner-occupied neighborhoods. The average rental unit is located in a census tract with a median level of schooling of 7.9 years, whereas the average owner-occupied unit is located in a tract with a median schooling level of 8.1 years. The mean percentage white in census tracts where sample owner-

TABLE G-1
Means and Standard Deviations of Individual Attributes for All Owner- and Renter-Occupied Dwellings

	Rental Units		Owner-Occupied Units	
Attributes	Mean	Standard Deviation	Mean	Standard Deviation
Dwelling-unit quality				
Interior	3.13	.68	4.30	.62
Exterior	2.45	.64	2.85	.87
Newness (year built)	1909	22.30	1920	25.07
Hot water	.90	–	.98	–
Central heating	.68	–	.91	–
Dwelling-unit size				
Rooms	3.81	1.22	5.71	2.45
Baths	1.02	.28	1.24	.62
First-floor area (00's of sq. ft.)	11.51[1]	12.46[1]	10.75	4.14
Parcel area (00's of sq. ft.)	20.65	18.28	67.98	172.76
Neighborhood attributes				
Adjacent units	2.86	.81	3.36	.77
Block face	2.94	.88	3.41	.86
Median schooling	9.06	1.05	9.64	1.36
Percent white	55.89	46.03	75.58	40.73
Miles from CBD	3.49	2.08	5.68	3.56
School quality[2]	7.88	.57	8.11	.62
Crime[2]	113.60	83.00	75.82	74.34
Structure type				
Single detached	.116	–	.719	–
Duplex	.030	–	.018	–
Row house	.078	–	.014	–
Flat	.415	–	.183	–
Apartment	.281	–	.036	–

[1]Single detached rental units only.
[2]City sample only.

occupied units are located is 76 percent, as contrasted to 56 percent for the sample of renter properties. Sample rental properties are located an average of 3.5 miles from the CBD, as contrasted to an average of 5.7 miles for owner-occupied properties. These differences are less pronounced than those between the samples of rental units and owner-occupied single detached units in Table 8-1, but the average characteristics of the two samples are still very different.

The distributions of structure types occupied by renters and owners also differ markedly. Seventy-two percent of owners reside in one-family units, as contrasted with only 12 percent of renters. Most of the remaining owner-occupants, 18 percent, live in flats; this leaves less than 7 percent for the remaining structure types. By comparison, nearly 70 percent of renters live in flats or apartments, 42 percent in the former and 28 percent in the latter. Eight percent live in row houses.

DEMAND FOR DWELLING-UNIT QUALITY FOR OWNERS AND RENTERS

Shown in Table G-2 are ten equations which describe the determinants of demand by renter and owner households for five aspects of dwelling-unit and structure quality. The imputed attribute prices, obtained from the value and rent equations, indicate that all five attributes are generally highly valued by St. Louis households. For example, the additive value equations in Chapter 7 indicate that home buyers pay $833 for an additional unit of interior quality and $72 for an additional unit of exterior quality. Hot water and central heating are not included in the owner equation, but renters must pay $8.60 per month more for a unit with central heating than for one without it, and $2.78 per month more for a unit with hot water than for a unit without it. Owner-occupied structures decline in value by $72 for every additional year of age, and the monthly outlays for rental units decline by thirty-two cents per month for each additional year of age.

The results summarized in Table G-2 are consistent with the interpretation of these variables as measures of dwelling-unit quality. Household consumption of interior quality, exterior quality, hot water, central heating, and newness increases with income, education, and other household characteristics expected to be positively correlated with the consumption of more housing quality.

The coefficients of income and education are positive in all ten dwelling-unit-quality equations included in Table G-2. The estimates indicate that household consumption of dwelling-unit quality depends more on the education of the head of the household than on the household's annual income. The standard deviation of annual income is about $4,000 in the renter sample and about $6,000 in the owner sample. The years-of-schooling variable has a standard deviation of about three years in both samples. Thus, for owners, an increase in income equal to one standard deviation would be expected to increase the consumption of interior quality by about .11 units; in contrast, a one standard deviation increase in education would be expected to increase a household's

TABLE G-2
Least-Squares Estimates of the Demand for Attributes of Dwelling-Unit Quality by Renters and Owners

	Interior Quality		Exterior Quality		Newness (Year Built)		Hot Water		Central Heating	
Variables	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners
Race	−.323[1]	−.392[1]	−.456[1]	−.526[1]	−8.40[1]	−19.64[1]	−.106[1]	−.054[1]	−.070[3]	−.105[1]
Income	.034[1]	.018[1]	.027[1]	.000[1]	1.19[1]	.70[1]	.009[2]	.001	.020[1]	.001
Education	.046[1]	.053[1]	.057[1]	.035[1]	1.94[1]	1.46[1]	.013[1]	.001	.041[1]	.015[1]
Years on current job	.006[3]	.004[4]	.005[3]	.005[2]	.18[3]	.22[2]	.001	−.001	.005[2]	.000
Retired	.230[1]	.085	.093[4]	.130[3]	6.73[2]	2.36	.037	−.038[4]	.050	−.064[4]
None employed	−.041	.027	−.059	.007	1.18	−6.71	−.042	.041	−.010	.005
More than one employed	.001	−.043	−.000	.017	−1.36	−4.02	.000	.006	−.000	.054[3]
Number of persons	−.295[1]	−.146[1]	−.166[1]	−.052[4]	−3.90[3]	−3.41[3]	−.014	−.002	−.055[4]	−.006
Female head < 45 years	.037	.338[4]	−.104[4]	−.043	−1.36	−1.21	.063[4]	.014	−.012	.068
Female head > 45 years	.050	.101	.124	.263[3]	3.73	6.14	.042	.052	.225[2]	.164[4]
Male head > 45 years	.130[4]	.043	.126[4]	.098[3]	4.00[4]	7.41[2]	.039	−.006	.073[4]	.010
Single female < 45 years	−.147	−.120	.110	.073	3.20	−6.88	−.044	.029	.011	−.265[4]
Single female > 45 years	−.080	−.073	.123[4]	.026	3.68	−2.51	.025	.004	−.104[4]	.043
Single male < 45 years	−.313[3]	−.537[1]	−.094	−.441[1]	−2.96	−21.55[1]	−.020	−.096[3]	−.039	−.372[1]
Single male > 45 years	−.387[2]	−.081	−.196[4]	−.083	−5.20[4]	−5.91[4]	−.317[1]	−.080[2]	−.248[2]	−.033
Couple, head < 45 years	−.027	.060	.084	−.112	4.26	8.96[4]	−.013	.003	−.031	.052
Couple, head > 45 years	−.052	−.064	.028	.039	−1.18	−1.43	−.034	.022	−.022	.039
Constant	−2.538[1]	−2.218[1]	1.94[1]	2.43[1]	1886[1]	1905[1]	.768[1]	.982[1]	.210[2]	.759[1]
R^2	.274	.270	.383	.337	.229	.201	.158	.061	.194	.112

NOTE: Table notes indicate significance of t ratios for coefficients (two-tailed test).
[1] > .01. [3] > .10.
[2] > .05. [4] One standard error.

consumption of interior quality by .16 units. Similarly, education has a larger relative impact than income in most of the remaining nine equations.

The race of the occupant has a much larger effect on the consumption of the five attributes of dwelling-unit quality than either income or education. For example, the first two equations in Table G-2 indicate that black renters consume .32 units less of interior quality than similar white renters, and that black owners consume .39 fewer units of interior quality than similar white owners. Even larger differences are obtained for the other eight equations. Racial differences are particularly pronounced for the hot-water and central-heating equations. Few sample dwelling units lack these amenities; for example, only 10 percent of the rental properties lack hot water, but the race coefficient is $-.1$.

Perspective on the magnitude of race coefficients shown in Table G-2 can be achieved by comparing them to the income coefficients in the same equation. The first equation indicates that nearly ten-thousand dollars in annual income is required to offset the lower consumption of interior quality by black renters. The second equation indicates that race has a larger effect on the consumption of interior quality by owners than twenty-thousand dollars of annual income.

Even larger multiples of annual income are required to achieve parity between white and black consumption in several of the remaining attributes. These results provide further support for the view that the most serious consequence of housing-market discrimination may be to limit the types and location of housing available to nonwhite households, and that the lower housing expenditures for black households described in Chapter 7 result from their inability to acquire high-quality housing in good neighborhoods.

The coefficients of the several labor-force-status variables, i.e., years on current job, retired, none employed, and more than one household member employed, are also reasonable. Additional years of continuous employment increase the consumption of housing quality in all but the hot-water equation for owners, and the coefficients are larger than their standard errors in all but three equations. Similarly, the retirement variable is positive in all but the hot-water and central-heating equations for owners. The greater consumption of housing quality by retired households may be due either to a delayed adjustment in housing consumption or to more affluence than the current annual income and education variables reveal. The sign pattern of the unemployment variable is interesting and suggestive. For renters, but not for owners, unemployment is associated with the consumption of less quality than would be expected otherwise. These differences are, of course, consistent with the greater moving costs of owners than renters.

The most interesting results are obtained for the family-size variable. The coefficient of the number of persons has a negative sign in all ten equations and is larger than its standard error in the first six. These results are consistent with the pattern of substitution by larger families hypothesized by Martin David,[1] who suggested that households consume more space and less quality as family size increases. Further, support for this view is provided by the analysis in the next section, which describes household demand for those attributes that are related to the size of the dwelling unit and of the parcel.

The six dummy variables which describe the several types of childless households trace out a complex pattern of consumption of housing quality. Few of the coefficients satisfy conventional tests of statistical significance; therefore, the following observations rely more on general patterns than on any single coefficient. The overall finding obtained for these household types is again quite reasonable. For example, the estimates in Table G-2 indicate that single females consume less interior quality but more of other types of quality than the reference household type, i.e., families with children headed by a male less than 45 years of age. Single males, by comparison, appear to consume less of all kinds of dwelling-unit quality. The results for couples are quite inconsistent and suggest little in the way of generalization. The one rather large and statistically significant (at the .01 level) coefficient indicates that older home-owning couples consume significantly more exterior quality than would be predicted on the basis of their income, education, labor-force attachment, and other characteristics.

DWELLING-UNIT AND PARCEL SIZE

Attribute demand equations are presented in Table G-3 for four variables which measure the size of the dwelling unit and of the parcel: number of rooms, number of baths, first-floor area, and parcel area. First-floor area, however, is presented only for the owners of single detached structures. The estimates in Table G-3, although quite consistent among equations, are very different from those which describe household demand for dwelling-unit and structure quality. For example, the coefficients of the race dummy are highly significant statistically, large, and negative in all of the dwelling-unit-quality equations. In the size equations presented in Table G-3, however, they are generally small, positive, and not statistically different from zero. Indeed, the only

[1]Martin David, *Family Composition and Consumption* (Amsterdam: North-Holland Publishing Co., 1962).

TABLE G-3
Least-Squares Estimates of the Demand for Dwelling-Unit Size by Renters and Owners

	Number of Rooms		Number of Baths		First-Floor Area	Parcel Area	
Variables	Renters	Owners	Renters	Owners	Owners	Renters	Owners
Race	.085	.400[3]	.009	.060	101.1[4]	−.100[2]	−.170
Income	.093[1]	.097[1]	.012[1]	.032[1]	33.94[1]	.038[1]	.020
Education	.029[3]	.081[2]	.008[3]	.013[4]	.826	.012[3]	−.009
Years on current job	−.001	.008	−.001	.001	2.681	.0001	.005
Retired	.095	.520[4]	−.024	.130[4]	6.017	.031	−.316
None employed	−.316[3]	1.026[4]	−.056[4]	.120	224.8	.331[3]	−.063
More than one employed	.270[1]	.106	.017	−.112[2]	−186.7[1]	−.136[4]	−.023[1]
Number of persons	.533[1]	.983[1]	.074[2]	.225[1]	−3.480	.002[4]	−.014[1]
Female head < 45 years	.280[4]	.108	.134[1]	.366[4]	−68.10	−.016	.064
Female head > 45 years	.379[4]	.573	.094[4]	.126	148.6	.236[3]	.295
Male head < 45 years	−.327[3]	−.786[2]	−.064[4]	−.248[1]	−33.31	.087[2]	.159
Single female > 45 years	.142	−.059	.182[2]	−.061	−107.1	−.106[4]	−3.487
Single female < 45 years	.009	.075	.114[2]	.012	334.4[1]	.123[3]	.398[4]
Single male > 45 years	−.751[2]	2.576[1]	.069	.678[1]	559.5[1]	−.104	.013
Single male < 45 years	−.386[4]	.236	.023	.057	71.27	.115[4]	.591[4]
Couple, head < 45 years	−.613[1]	−.429	.010	.164	43.97	.345[4]	−.114[4]
Couple, head > 45 years	.092	−.123	.061[4]	−.040	71.88	.064[4]	.674[2]
Constant	2.706[1]	3.283[1]	.793[1]	.730[1]	834.6[1]	.634[1]	.917[1]
R^2	.279	.201	.078	.202	.121	.353	.292

NOTE: Table notes indicate significance of *t* ratios for coefficients (two-tailed test).
[1] > .01. [3] > .10.
[2] > .05. [4] *t* ratio greater than 1.0.

negative coefficient is obtained for the owners' parcel-area equation. The marked tendency for black owners to occupy smaller lots (parcel area averages nearly eight-hundred square feet less than that occupied by white owners with similar characteristics) results, of course, from their virtual exclusion from suburban properties.

The effects of family size are a second important dissimilarity between the dwelling-unit size and quality equations. The coefficients of number of persons are generally negative and statistically significant in the dwelling-unit-quality equations. In the size regressions in Table G-3, however, they are generally positive and statistically significant. Other regressions, not presented here, which include both the number of school-age children and the logarithm of the number of persons, indicate that the consumption of additional rooms is particularly responsive to increases in the number of school-age children. When age and the logarithm of the number of persons are included in the equation, the coefficient of the number of persons has a value of .16 and is only slightly larger than its standard error, while the coefficient of the number of school-age children is .26 and has a t ratio of more than five. These results provide further support for the hypothesis that larger families make consistent substitutions for residential attributes within their housing budgets.

The first two equations in Table G-3 also indicate that the number of rooms consumed by households rises with increases in both income and education. The income coefficient, which is virtually identical in both the owner and renter equations, indicates that a little more than ten-thousand dollars of additional income is needed to increase household consumption by one room. The education coefficient is only about three-eighths as large in the renter equation as in the owner equation; and relative to income, it has a smaller effect on the consumption of additional rooms than on the consumption of additional quality (Table G-2).

Findings for the number of bathrooms are similar to those for the number of rooms. Black households seem to consume as many, if not more, bathrooms as white households of similar characteristics, and the number of bathrooms increases with increases in income, education, and family size. These effects are especially large in the owner equations.

The parcel-area equations generally have low explanatory power but indicate that parcel area per dwelling unit increases with income; this income effect is especially pronounced for owners. The most surprising result is the rather large negative coefficient of the number-of-persons variable in the owner parcel-area equations. This result may be due to the exclusion of large black families from the suburbs and to an underrepresentation of suburban properties in the sample. In addition, the owner-occupant sample contains a significant number of multifamily

units with rather small parcel areas. The evidence regarding the average characteristics of single detached and other owner-occupied units may indicate that larger families tend to shift to lower-quality housing configurations with less parcel area.

DEMAND FOR NEIGHBORHOOD ATTRIBUTES

Table G-4 presents equations which describe household demand for a rather disparate collection of variables described as neighborhood attributes. The first two variables measure the physical condition of adjacent dwelling units and of the block face. The third, median years of schooling for the census tract in which the sample unit is located, measures the socioeconomic composition of the neighborhood and is interpreted primarily as an indication of neighborhood status or prestige. The fourth variable, the percent of the census-tract population that is white, describes the racial composition of the neighborhood in which the dwelling unit is located. Its importance hardly needs to be stressed. The fifth variable, miles from the central business district, is qualitatively different from the other neighborhood characteristics but has figured prominently in theories of the urban spatial structure. The last two variables, school quality and neighborhood crime, are limited to central-city properties and measure the perceived quality of certain neighborhood services: public schools and public safety.

In general, the neighborhood-quality equations closely resemble those presented in Table G-2 for dwelling-unit and structure quality. For example, race has a strongly negative and statistically significant coefficient in all ten neighborhood-quality equations. It is also strongly negative in the two accessibility equations, indicating that, on the average, black owners and renters live closer to the CBD than white households of similar characteristics. This identifies a source of demand for central locations that is only weakly related to accessibility considerations. As we have discussed in Chapter 3, this entrapped black demand for central locations has maintained housing prices in central areas and has strongly affected the pattern of urban development.

Similarly, the equations in Table G-4 indicate that as income and education increase, both owners and renters choose more prestigious neighborhoods, where adjacent and nearby structures are maintained in better condition. The size of the income and education coefficients in the renter and owner equations are remarkably similar for all three neighborhood-quality measures which are available for the entire sample; i.e., quality of adjacent units, quality of the block face, and median school-

TABLE G-4
Least-Squares Estimates of the Demand for Neighborhood Attributes by Renters and Owners

Variables	Quality of Adjacent Units		Quality of the Block Face		Median Schooling		Percent White	
	Renters	Owners	Renters	Owners	Renters	Owners	Renters	Owners
Race	−.648[1]	−.845[1]	−.742[1]	−.973[1]	−.163[3]	−.554[1]	−84.61[1]	−88.01[1]
Income	.021[2]	.020[1]	.035[1]	.023[1]	.059[1]	.052[1]	.238	−.236
Education	.058[1]	.043[1]	.064[1]	.063[1]	.082[1]	.079[1]	−.241	.320[4]
Years on current job	.005[4]	.004[4]	.006[3]	.006[3]	.004	.011[3]	.149[4]	.078
Retired	.123[4]	.089	.083	.153[4]	.332[2]	.172	3.416[4]	−.777
None employed	.010	.101	.088	.196	.053	−.158	−2.075	−11.06[3]
More than one employed	.059	−.082[4]	.014	.051	.076	−.214[3]	−.435	.253
Families								
Number of persons	−.115[4]	−.065[4]	−.251[1]	−.014	−.310[1]	−.276[1]	−2.582[4]	−1.844[4]
Female head < 45 years	−.101	.276[4]	−.060	.310[4]	.064	.244	.382	−.567
Female head > 45 years	.352[2]	.307[4]	.169	.248[4]	.132	.463[4]	.919	−1.762
Male head > 45 years	.181[4]	.099[4]	.180[4]	.150[4]	.275[3]	.555[1]	2.102	4.062[3]
Household types								
Single female < 45 years	−.126	.312	−.160	.289	.041	−.479	−3.078	−5.741
Single female > 45 years	.098	−.086	−.006	−.057	−.308[3]	.058	−2.585	−2.473
Single male < 45 years	−.041	−.658[1]	−.174	−.717[1]	−.175	−1.121[1]	−9.239[3]	−7.715
Single male > 45 years	−.187[4]	−.169[4]	−.172	−.076	−.568[2]	−.300[4]	−13.27[1]	−2.710
Couple, head < 45 years	.046	.064	−.011	−.052	−.193	.144	1.392	1.286
Couple, head > 45 years	.034	−.025	.084	.042	−.155	−.367[2]	−5.979[3]	−.605
Constant	2.385[1]	2.972[1]	2.495[1]	2.677[1]	8.100[1]	8.613[1]	95.80[1]	94.75[1]
R^2	.295	.358	.375	.411	.180	.227	.853	.834

(Continued)

TABLE G-4 (Concluded)

Variables	Miles from CBD		School Quality[5]		Neighborhood Crime[5]	
	Renters	Owners	Renters	Owners	Renters	Owners
Race	−.336[2]	−2.127[1]	−.713[1]	−.859[1]	104.5[1]	118.2[1]
Income	.152[1]	.111[1]	.015[2]	−.002	−.000	.366
Education	.110[1]	.214[1]	.002	.019[2]	−1.412[4]	−1.414[4]
Years on current job	.006	−.001	.002	.005[3]	−.868[1]	−.112
Retired	.508[3]	−.239	.095[4]	.022	−9.065	10.90[4]
None employed	.120	−1.057	−.011	−.114	−3.001	−2.714
More than one employed	−.047	−.651[2]	−.051[4]	.046	−8.066[4]	1.592
Families						
Number of persons	−.228[4]	−.684[1]	−.157[1]	.016	5.761	.180
Female head < 45 years	.154	.873	.031	.173	6.028[1]	−59.18[2]
Female head > 45 years	.366	.507	.167[4]	.129	−4.564	26.32[4]
Male head > 45 years	.233	1.664[1]	.103[4]	−.011	−2.400	.324
Household types						
Single female < 45 years	−.273	−1.409	−.142[4]	.102	6.795[4]	−29.12
Single female > 45 years	−.229	−.331	−.175[2]	.091	−2.218	4.495
Single male < 45 years	−.498	−3.574[1]	−.208[3]	−.495[1]	29.06[3]	40.84[2]
Single male > 45 years	−1.148[2]	−1.062[4]	−.262[2]	−.159[4]	−10.39[4]	6.668
Couple, head < 45 years	−.212	.287	−.160[3]	−.193	6.702	−22.03
Couple, head > 45 years	−.327	−.734[4]	−.269[1]	.035	12.99[4]	−5.442
Constant	1.817[1]	3.813[1]	8.251[1]	8.100[1]	83.52[1]	49.23[1]
R^2	.150	.284	.451	.431	.470	.549

NOTE: Table notes *1* through *4* indicate significance of *t* ratios of coefficients (two-tailed test).

[1] > .01.
[2] > .05.
[3] > .10.
[4] *t* ratio greater than one.
[5] City sample only.

ing. Moreover, education appears to be more important than income in determining the household's demand for neighborhood quality. This result is similar to that obtained for the quality variables which describe individual properties and different from the results obtained for the size variables. Higher-income and better-educated households choose better neighborhood schools and areas lower in crime than those with less education and income; however, these relationships are much less sharp than those obtained for the remaining neighborhood-quality variables. The weaker relationship for the school-quality and crime equations no doubt results from measurement problems and from the small number of suburban properties with the safest streets and best schools. The sample of central-city rental properties is far more representative of the metropolitan-area rental market than the sample of central-city owner properties is of the metropolitan-area market for owner-occupied properties. The more consistent results obtained for renter than for owner households reflect these sampling problems.

The substitution of size for quality by larger families is also evident from the neighborhood-quality equations, particularly for renters, although the relationships are not as pronounced as for dwelling-unit quality. The coefficients for the number-of-persons variable are negative in nearly all cases, and most are statistically significant.

The equation for the racial compositon of the neighborhood indicates that none of the variables except race are consistently related to the racial composition of the neighborhood. This result is hard to interpret for the pooled race equations; separate black and white equations provide more information on the relationship.

DEMAND FOR STRUCTURE TYPES

All of the dependent variables in Table G-5 are binary variables that assume a value of zero or one. Therefore, as in the ownership and purchase models in Chapter 5, the coefficients may be interpreted as differences or changes in the probabilities of living in each structure type arising from differences or changes in each household characteristic. Regressions are estimated only by ordinary least-squares in this section, however. In interpreting the results, it is well to refer to the mean probabilities of living in each structure type. These are shown in the last row of Table G-5. In particular, these mean probabilities are usually very different for owners and renters. For example, 72 percent of owners, but only 12 percent of renters, live in single detached units.

For the renter single detached equation in Table G-5, the only statistically significant coefficient is the logarithm of family size; it

TABLE G-5
Least-Squares Estimates of the Demand for Structure Types by Renters and Owners

	Single Detached		Duplex		Row House		Flat		Apartment	
Variables	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner	Renter	Owner
Race	−.017	−.167[1]	−.035[2]	.009	.037	.039[1]	−.043	.050[4]	.026	.025[4]
Income	.004	.002	−.000	.000	−.004	.001	−.008[4]	−.003	.012[3]	.000
Education	−.006[4]	.021[1]	−.002	−.005[1]	−.007[3]	−.003[4]	−.016[2]	−.014[2]	.038[1]	−.001
Years on current job	.001	.003[4]	−.000	−.001[4]	−.001	−.000	−.001	−.002	.000	.000
Retired	.031	.109[4]	−.000	−.030[4]	−.036	−.000	−.140[3]	−.058	.085[4]	.002
None employed	−.032	−.160	.018	−.050	.025	−.049[4]	−.163[2]	−.013	.135[2]	.190[1]
More than one employed	−.051[4]	−.046[4]	.003	−.014[4]	.008	−.017[4]	.048	.071[3]	−.006	−.009
Number of persons	.094[1]	−.001	.042[2]	.003	.000	−.006	−.110[2]	.026	−.052[4]	.000
Female head < 45 years	.032	.148	−.041[4]	−.009	.008	.010	.061	−.217[4]	−.035	.113[4]
Female head > 45 years	.013	.130	−.080[3]	−.019	−.132[3]	−.021	−.075	−.152[4]	.114[4]	−.031
Male head > 45 years	−.049	.052	−.048	.000	−.048[4]	−.002	.045	−.063[4]	.142[2]	.006
Single female < 45 years	−.063	.014	.056[4]	−.002	−.051	−.014	−.217[3]	−.232[4]	.228[2]	−.023
Single female > 45 years	−.057	−.166[2]	−.013	.018	.004	.033[4]	−.065	.071[4]	.132[3]	.045[4]
Single male < 45 years	−.017	−.164[4]	−.027	−.011	.036	−.015	−.218[4]	.151[4]	.186[4]	−.022
Single male > 45 years	.045	−.031	−.023	−.008	.198[1]	.024	−.174[4]	.039	−.038	.002
Couple, head < 45 years	−.020	.048	.040[4]	.090[2]	−.027	−.006	−.173[4]	−.076	.129[4]	−.015
Couple, head > 45 years	−.000	−.066[4]	−.016	.026[4]	−.023	.000	−.064	.006	.076	.014
Constant	.127[3]	.518[1]	.059[4]	.078[1]	.185[1]	.036[4]	.779[1]	.338[1]	−.270[1]	.021
R^2	.059	.094	.041	.033	.064	.045	.040	.051	.124	.034
Mean, dependent variable	.116	.719	.030	.018	.078	.014	.415	.183	.28	.036

NOTE: Table notes indicate significance of t ratios of coefficients (two-tailed test).
[1] > .01. [3] > .10.
[2] > .05. [4] t ratio greater than 1.0.

indicates that the probability of living in single family units is 2.7 percentage points larger for families with two children than for families with one child, and an additional 2.1 percentage points larger for families with three children than for families with two children. The race coefficient is smaller than its standard error, but its value, −.017, is negative and is nearly one-sixth of the proportion of renters occupying single detached units.

In contrast to renters, the equation for owner-occupied single detached units has several statistically significant coefficients. Not surprisingly, given the findings of the decision-to-own and purchase analyses in Chapters 5 and 6, the estimates in Table G-5 indicate that black owners are far less likely to live in single detached dwelling units than are white owners of similar characteristics. According to the equation, this difference is 17 percentage points. Examination of the owner equations for the remaining structure types indicates that black owners are more likely to live in all of the remaining structure types than similar white households, with no other single structure type accounting for the difference. Only one other owner equation, that for row houses, has a statistically significant (greater than .01) race coefficient. Its value of .039 is nearly three times the mean proportion of owner-occupants in row houses (Table G-5).

The income coefficient in the single detached equation for owners is positive but small and not statistically significant. The education coefficient, however, differs from zero at the .01 level and indicates that the proportion of owners living in single detached units increases by .02 with each year of additional schooling. The only other statistically significant coefficient in the owners' single detached equation is for older single females; they are 17 percentage points less likely to occupy such units. Examination of the other owner equations indicates that these older single females distribute themselves among the remaining structure types.

The renter duplex equation indicates that black renters are somewhat less likely to reside in duplexes than are similar white renters. The coefficient of the race dummy in the renter duplex equation is only −.04, but the proportion of all renters living in duplexes is only .03. The difference reflects the fact that duplexes, like single detached units, are not plentiful in the ghetto. The renter duplex equation indicates that these units are favored by larger renter families; the coefficient of the logarithm of the number of persons is .042.

Of the remaining six structure-type equations, only three—the flats for both renters and owners and the rented apartments—provide housing for very many households. Flats provide housing for 42 percent of renter households. The sign of the race coefficient in the rented flats equation is negative but it is smaller than its standard error. Income,

education, and years on current job are also negative and of very small magnitude in the same equation.

Retired renters are .14 less likely to live in flats, and unemployed households are .16 less likely to live in flats, than the reference household. Both groups are overrepresented in apartments; and, surprisingly, retired renters show a slight preference for single detached units. Single young females are also less likely to live in flats than the reference family unit, the coefficient being −.22 (.10 level of significance). The probability of living in a flat decreases with increases in family size, with a coefficient of −.11 (.05 significance level). These larger renter families are more likely to choose single detached and duplex units.

Eighteen percent of the sample of owner-occupants live in flats. Only two of the coefficients are statistically significant at the .10 level or better, but the coefficients as a whole trace out a plausible profile of these resident landlords. They are more likely to be black (the coefficient, greater than its standard error, is .05), have somewhat lower incomes and less education (both significant at the .05 level), and have fewer years on their current job. They are less likely to be retired or unemployed, and more likely to have additional members in the labor force (the coefficient is .07, significant at the .10 level).

Apartments are the second most common type of rental accommodation. The probability of living in an apartment increases with income (.10 level of significance) and with education (.01 level of significance). Households with retired heads, or without an employed household member, are more likely to choose apartments, as are all types of single-member households except older males. The coefficient of family size is negative and greater than its standard error.

Tabulation of the number of coefficients in each equation that are significant at the .01 and .05 levels for these stratified attribute demand equations clearly demonstrates the statistical advantages of the pooled models reported in Chapter 9 (Table G-6). For example, in the interior quality equation, the coefficients of 9 explanatory variables are statistically significant at the 1 percent level in the pooled equation, as contrasted with 6 in the renter equations and 6 in the owner equations in Table G-2. A still greater difference is obtained for the newness equation. Only 4 coefficients in the renter equation, and only 5 coefficients in the owner equation, are significantly different from zero at the .01 level; 12 coefficients exceed this level in the pooled equation. Similar results are obtained for the remaining equations.

The regression coefficients for the race dummy variables within tenure types provide additional support for the conclusions of Chapter 9. The consistently negative and highly significant race coefficients in all demand equations for dwelling-unit quality and amenity and for desirable neighborhood attributes in the stratified models indicate that racial

TABLE G-6
Number of Significant Coefficients in Attribute Equations for Renter and Owner-Occupied Dwelling Units and for All Units

Attributes	Number of Significant Coefficients[1]		
	Renter	Owner	All
Dwelling quality and amenity			
Interior	6	6	9
Exterior	5	5	7
Newness (year built)	4	5	12
Hot water	4	2	4
Central heating	2	4	3
Size			
Number of rooms	5	4	7
Number of baths	3	5	4
Parcel area	2	3	6
Neighborhood attributes			
Adjacent units	3	5	5
Block face	5	5	5
Median schooling	4	7	7
Percent white	3	2	2
Miles from CBD	3	7	5
School quality[2]	4	3	3
Crime[2]	4	2	3
Structure type			
Single detached	1	3	8
Duplex	0	2	1
Row house	2	1	3
Flat	1	1	3
Apartment	2	1	5

[1].01 level of significance.
[2]City sample only.

differences in consumption of these attributes are not simply the result of the systematically lower opportunities for home ownership for black households documented in Chapters 5 and 6.

Whether black households choose to own or rent, and even if the home ownership analysis of Chapter 6 were totally wrong, the overwhelming evidence indicates that black households have systematically lower levels of consumption of all of the attributes of residential quality that we have considered than white households of similar income, family structure, and labor-market characteristics.