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IDENTIFYING PRODUCTIVITY AND AMENITY EFFECTS IN INTERURBAN WAGE DIFFERENTIALS

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Abstract

This study focuses on the relative importance of amenity and productivity differences in determining wage differentials across urban areas. The approach developed takes advantage of the connection between land and labor market clearing conditions required for locational equilibrium of households and firms. Data on recent movers are used to estimate equilibrium wages and rents for a sample of metropolitan areas. This information is then used to identify amenity and productivity components of wages for each city in the sample. Using national estimates of the relative share of land in consumption and production, differences in productivity and amenities are found to be roughly equal sources of wage variation across the sample.

I. Introduction

The persistence of interarea nominal wage differentials in the presence of a high degree of factor mobility suggests that wage differentials should be viewed as an equilibrium phenomenon related to differences in site characteristics across urban areas.[1] Recent work by Roback (1982) stresses the interdependence between the decisions of firms (as demanders of labor) and households (as suppliers of labor) in determining interregional wage differentials. In her model, site characteristics are valued by both households and firms. Thus, one can think of nominal wage differentials as being composed of two components: a supply-shift portion and a demand-shift portion.

However, empirical studies relating site characteristics to wage differentials typically concentrate on either demand or supply, but not both. Demand-side studies, such as Kelly (1977) and Segal (1979), focus on the relationship between site characteristics and the productivity of firms. Consequently, low wages reflect the low productivity value of an area. Supply-side studies, such as Gerking and Weirick (1983), Rosen (1979), and Sahling and Smith (1983), view wage differences as compensation to households for differences in amenities across areas, which in turn affect the supply of labor to each area. According to this view, low wages are an indication of the high value households place on amenities in the area.

Describing both supply and demand as functions of site characteristics complicates the issue of explaining wage differentials. For instance, suppose that a site characteristic is beneficial to both households and firms. In this case, households are willing to accept lower wages, and firms are able to pay higher wages. These two effects may offset one another to the extent that little or no total wage differential is observed between two regions. The same offsetting effects could occur when a site characteristic is detrimental to both households and firms. In both cases, the site characteristic appears to have no effect on wages when, in fact, it affected the decisions of both households and firms.

The purpose of this paper is to examine the relative importance of labor supply and demand in explaining nominal wage differentials. We develop a nonparametric method of identifying the contribution of a shift of each curve to the total interarea wage differential, which expands on Roback's (1982) approach of using rent and wage differentials to value amenities. This method is then used to estimate the relative contribution of demand and supply (firms and households) to the total wage differential for a sample of metropolitan areas. This decomposition helps to answer two related questions: what are the causes of regional wage differentials, and which variables (related to supply or demand) are more appropriate to explain them?

The paper is organized in the following way. The theoretical model relating interarea differences in amenities and productivity to interarea wage differentials is reviewed in section II. The method used to identify empirically the amenity and productivity components of wage differentials is developed in section III. The estimation technique and data sources are discussed in section IV, and the empirical results are presented in section V. Section VI contains concluding remarks.

II. A Model of Household and Firm Equilibrium

We adopt Roback's (1982) general equilibrium model of household and firm location. In this model, cities are assumed to have different site characteristics that enter into a household's utility function and a firm's production function. The objective of the model is to identify the price mechanisms that compensate households and firms for interarea differences in site characteristics. Workers are assumed to be identical in tastes and skills and completely mobile across cities. Similarly, capital is assumed to be completely mobile, and production technologies are assumed to be identical across firms. Equilibrium is then characterized by equal utility across workers and equal unit costs across firms. However, wages and land rents may vary in equilibrium due to interarea differences in site characteristics.

Residents with identical tastes and skills consume and produce a composite consumption good X. The price of X is determined by international markets and for convenience is normalized to one. Each worker supplies a single unit of labor independently of the wage rate. Intercity commuting is not considered, and differences in leisure resulting from differences in intracity commuting are treated as a site characteristic.[2]

The problem for the worker is to maximize utility subject to an income constraint. Utility depends upon consumption of the composite commodity (X), residential land (L^c) and the bundle of site characteristics (s). Equivalently, the problem can be stated in terms of an indirect utility function, V, which is a function of wages (w), rents (r), and site characteristics (s). Equilibrium for workers requires that utility is the same at all locations, or

(1) $$V(w,r;s) = V_o.$$

If the bundle of site characteristics in a city has a net positive effect on utility (that is, it is a net amenity), then $V_s > 0$. The migration of workers in response to interarea differences in utility will insure that wages and rents adjust to compensate workers for differences in amenities across areas.

Firms are assumed to employ local residents and land to produce a composite commodity (X), according to a constant-returns-to-scale production technology. Under these assumptions, equilibrium for firms requires that unit costs are equal in all locations and equal to the price of X, assumed to be 1,

(2) $$C(w,r;s) = 1.$$

The unit cost function C(.) is increasing in factor costs, $C_w = N/X > 0$ and $C_r = L^P/X > 0$, where N is the total number of workers in the city and L^P is land used in production.

If a city's site characteristics provide a net productivity advantage to firms, then $C_s < 0$ and some combination of higher wages and rents will be required to make firms indifferent between locations. The movement of firms between cities will insure that wages and rents adjust to compensate firms for differences in site characteristics.

Equilibrium wages and rents are determined by the interaction of the equilibrium conditions for suppliers (workers) and demanders (firms) of labor. Wage and rent differentials between cities with different site characteristics can be determined by totally differentiating these equilibrium conditions (equations 1 and 2), and solving for dw/ds and dr/ds. This procedure yields:

(3) $dw/ds = (1/D)(-V_sC_r + V_rC_s)$ and

(4) $dr/ds = (1/D)(V_wC_s + V_sC_w)$,

where $D=V_wC_r-V_rC_w>0$. As shown in equations 3 and 4, differences in wages and rents across cities are dependent on both the marginal valuation of workers (V_s) and the marginal valuation of firms (C_s) of the bundle of site characteristics in each city.

III. Identifying Amenity and Productivity Components

The equilibrium described above is illustrated in figure 1 (p.25). The workers' equilibrium condition is reflected in the upward sloping 'iso-utility' curves. These curves are combinations of w and r that yield equal utility, given s. Individuals will move to cities with a net amenity advantage until some combination of higher land rents and/or lower wages makes the individual indifferent between locations. Assuming S_1 represents the average city, S_2 then would represent a high-amenity city.

Equilibrium combinations of w and r for firms given s are represented by the downward sloping curves in figure 1. Firms will locate in cities with a net productivity advantage until some combination of higher wages and rents equalizes unit costs across all locations. Again assuming that S_1 represents the average city, S_2 would represent a city in which site characteristics have a net negative effect on productivity ($C_s>0$).

Each city can be characterized by a specific bundle of site characteristics and therefore by a pair of isocost and iso-utility curves, as shown in figure 1. Equilibrium wages and rents in each city are then determined by the intersection of the appropriate pair of isocost and iso-utility curves. In equilibrium, wages and rents in the city represented by S_2 will be w_2 and r_2, and wage and rent differentials relative to the average city (S_1) will be (w_2-w_1) and (r_2-r_1).

As shown in figure 1, the magnitude of the differential depends on the size and direction of the shifts of each curve and the slopes of the curves. By definition, the net wage differential (w_2-w_1) is made up of two components: the productivity component ($[dw/ds]^C$) related to the shift in the iso-cost curve; and the amenity component ($[dw/ds]^V$) related to the shift in the iso-utility curve. Assuming linear isocost and iso-utility curves about the neighborhood of inquiry, we have:

$$(5) \qquad (dr/ds)^C/(dw/ds)^C = 1/L^c \quad \text{and}$$

$$(6) \qquad (dr/ds)^V/(dw/ds)^V = -N/L^p.$$

The right-hand side of equation 5 is the slope of the iso-utility curve ($-V_w/V_r$), and the right-hand side of equation 6 is the slope of the isocost curve ($-C_w/C_r$).

Solving these equations for the productivity and amenity components of the wage differential and summing up the components of dw/ds yields:

$$(7) \quad dw/ds = (dw/ds)^V + (dw/ds)^C = L^c\,(dr/ds)^C - (L^p/N)(dr/ds)^V.$$

Since $(dr/ds)^C = dr/ds - (dr/ds)^V$,

(8) $dw/ds = L^c\ (dr/ds) - (L^c+L^p/N)\ (dr/ds)^V$, or in logs

(9) $d\log w/ds = k_l(d\log r/ds) - (k_l + R_r/R_w)(d\log r/ds)^V$,

where k_l is the share of land in households' budgets and R_i is the cost share of the ith factor.

Substituting the resulting value into the log form of equation 5 yields the amenity component of the wage differential:

(10) $(d\log w/ds)^v = -(R_r/R_w)[(Nw/Lr)(k_l d\log r/ds - d\log w/ds)]$,

where L is total land used in housing and production and $k_l + r_r/R_w = Lr/Nw$.[3] Substracting equation 10 from the total wage differential (dlogw/ds) yields the productivity component of the wage differential:

(11) $(d\log w/ds)^c = [1-(R_r/R_w)(Nw/Lr)]d\log w/ds + (R_r/R_w)(Nw/Lr)k_l d\log r/ds$.

Calculating the ratio of the amenity component to the total wage differential illustrates the dependence of the relative size of the wage components on the estimates of land shares:

(12) $\frac{(d\log w/ds)^v}{(d\log w/ds)} = [(A-k_l)/A][1-k_l(d\log r/ds\ /\ d\log w/ds)]$,

where A is land's share of total income (Lr/Nw). The ratio of the amenity component to the total wage differential is roughly proportional to the firm's share of total land value, $(A-k_l)/A$. This relationship follows because estimates of the share of a household's income spent on land (k_l) tend to be very small and the ratio of the rent and wage differentials is typically around one.

IV. Estimation

The nominal wages and rents required to carry out the wage decomposition must be adjusted for quality differences of workers and houses across metropolitan labor and land markets.[4] To do this, we estimate standard hedonic equations for wages and rents and then subtract the predicted wage and predicted rent from their respective actual values. The quality-adjusted wage, in essence, indicates the wage a worker with typical characteristics could receive in each labor market examined; the quality-adjusted rent records the value of a typical house in each labor market. In both cases, it is assumed that the differences across cities of these quality-adjusted values reflect differences due to site characteristics. In particular, the difference in rent is due primarily to differences in land prices (assuming construction costs do not vary significantly across cities), which reflect the capitalization of the effects of site characteristics on firms and households.

Data

The wage and rent equations are estimated using data drawn from the combined A and B files of the 1 in 1000 samples of the Public Use Microdata Sample (PUMS) of the 1980 Census of Population. Only individuals who lived and worked in the same Standard Metropolitan Statistical Area (SMSA) in 1980 and who changed addresses between 1975 and 1980 are included in the analysis. This subsample of movers was chosen because we felt that these individuals represent more closely the marginal decision maker and, thus, the prices they face more accurately reflect current market conditions.

The rent equation includes both owner occupied and rental units for which positive values of unit or gross rent are reported. The dependent variable in the rent equation is gross monthly housing expenditures. For homeowners, the monthly housing expenditure is based on the value of the dwelling using 7.85 percent as the discount rate.[5] The monthly housing expenditure is the sum of this imputed rent and monthly utility charges. For renters, the monthly expenditure is gross rent (contract rent plus utilities).

Individuals included in the wage sample had to meet the following criteria. Individuals had to be between the ages of 25 and 55; work more than 25 hours per week; not be self-employed; and have positive wage and salary income. The dependent variable in the wage equation is average weekly earnings, which is calculated by dividing annual wage and salary income by the number of weeks worked.

Wage Equation

The first step in constructing the wage indexes is to specify estimable equations that reflect appropriate individual characteristics of workers that could affect wages. Our approach follows the human capital specification of individual wages set forth by Hanoch (1967) and Mincer (1974). Thus, we specify individual wages (expressed in logarithms) as a function of education level (entered as a quadratic), potential experience (age, minus years of education, minus six, also entered as a quadratic), a binary variable indicating part-time employment status (less than 35 hours per week), and 42 binary occupation variables (with one omitted as a constant). Binary variables are also entered to account for gender, race, marital status, union affiliation, and military service.[6] In addition, the gender variable is interacted with other characteristics in order to control for male/female differences in the rate of return to these attributes.

The estimated coefficients of the wage equation are presented in table 1, except for the occupation variables, which are omitted for brevity. The estimated coefficients are as expected. Education and experience are valued positively in the labor market, while part-time, female, and nonwhite workers receive lower wages than their otherwise identical counterparts. We also find that individuals who are married, head of households, and in highly unionized industries earn more than their counterparts. Females receive less return on experience than males.

The predicted wage level for each worker in the sample is obtained by multiplying the estimated coefficients by each worker's characteristics. The predicted wage can be interpreted as the compensation a worker could expect to receive, given his or her characteristics, regardless of geographic location. Subtracting the predicted wage from the actual wage nets out the portion of the actual wage that is related to the individual worker's characteristics. The skill-adjusted metropolitan wage differentials are then obtained by averaging the wage residuals (actual, minus predicted, wage) for all workers in a particular metropolitan area.

Average wage differentials are calculated for each of 35 cities. The 35 metropolitan areas are chosen by including only those SMSAs for which 100 or more individuals in the sample were recorded as movers between 1975 and 1980. The quality-adjusted wage differentials are displayed in table 3.

Rent Equation

The method used to calculate quality-adjusted rent differentials is similar to the one used to calculate quality-adjusted wage differentials. The log of the reported house value is regressed against housing attributes. These characteristics include the number of rooms, number of bedrooms, number of bathrooms, and separate binary variables indicating location of the dwelling in the central city, and whether or not the dwelling is a single structure, has central air conditioning and/or heating, is connected to a city sewer system, and has well water. The year the dwelling was built is entered to proxy the vintage. Dwelling characteristics are interacted with rental status in order to account for differences in the valuation of these attributes between rented and owner-occupied dwellings.

Coefficient estimates are reported in table 2. The results are as expected. Larger, newer dwellings with central air and heating and located outside the central city have higher market value than otherwise identical homes. In general, attributes of rentals are valued less than otherwise identical owner-occupied dwellings. The predicted rent is calculated by multiplying the estimated coefficients by the housing characteristics of each household. The quality-adjusted rent differentials presented in table 3 are the differences between the actual and predicted house values.

By including a number of housing characteristics in the rent equation, the difference between actual and predicted house values can be interpreted to reflect primarily land values in specific geographical locations. Thus, quality-adjusted rent differentials relative to the national average reflect differences in city land values, which are due primarily to the capitalized effects of differences in site characteristics.

V. Amenity and Productivity Components

The relative size of the amenity and productivity components of the total wage differential is derived from equations 10 and 11. Use of these equations requires estimates of land income and derived estimates of land's share of household budgets. Unfortunately, accurate data concerning land use and income in alternative uses are difficult to obtain. We follow Roback's approach of using national estimates, even though we recognize that these shares may vary across areas. The budget share of land is calculated by multiplying the fraction of income spent on housing (27.0 percent in our sample) by the ratio of land value to the total value of the house (estimated to be 19.6 percent).[7] From these estimates, land's share of household income (k_1) is 5.3 percent. The ratio R_r/R_w is calculated by subtracting our estimate of k_1 from the ratio of the total income to land (6.4 percent of national income) relative to total labor income (73 percent of national income).[8] The ratio of these income shares is 8.8 and the estimate of R_r/R_w is 3.5.

Estimates of the wage decomposition are displayed in table 4. Several features of these estimates should be noted. For our sample, the amenity component averages 40 percent of the total wage differential, while the productivity component averages 60 percent.[9] The relative contributions of productivity and amenity effects vary considerably across cities. However, the productivity effect is the primary source of the wage differential for all but two cities: Atlanta and San Diego. In both cases, the productivity component accounts for 38 percent of the total wage differential. For the other cities, the contribution of the productivity component ranges from 51 percent for Indianapolis and St. Louis to over 70 percent for Los Angeles.

Some of the variation across SMSAs could be due to differences in the land shares. As mentioned earlier, estimates of land shares are not available for individual metropolitan areas. To get some idea of the sensitivity of the relative magnitudes of the wage components to estimates of land shares, we computed values of k_l associated with selected magnitudes of these wage components. As shown in table 5, the values of each component range from contributing nothing to the total wage differential to accounting for all of it. Using as a benchmark our estimates of 60 percent for the productivity component and 40 percent for the amenity component, the simulation shows that the magnitude of the two wage components would converge to be equal if k_l decreases 11 percent, from 5.3 percent to 4.6 percent. Furthermore, if k_l falls from 6.0 percent to 3.4 percent, a 43 percent decrease, the amenity component changes from 33 percent of the total wage differential to 67 percent. However, in order for amenity differences to account for the entire wage differential, firms would not employ land in production. Similarly, in order for productivity differences to explain the entire wage differential, households would not own land. Of course, both of these situations are implausible. Thus, it appears that, in general, interarea wage differentials reflect both the compensation to households for differences in amenities, and to firms for differences in productivity.

Finally, it appears that with few exceptions the estimated productivity and amenity effects are reinforcing. The correlation coefficient of the two components is 0.98. Thus, high productivity cities are also low amenity cities, and vice versa. This result follows Rosen's (1979) point that what benefits households may cost firms. This high correlation between the amenity and productivity components indicates the difficulties one would encounter when using parametric estimation to identify the amenity and productivity components of wages.

VI. Conclusion

We have attempted to assess the relative importance of supply (amenity) and demand (productivity) factors in determining intermetropolitan nominal wage differentials. Our estimates of the productivity and amenity components of the wage differential for individual SMSAs indicate that, on average, the productivity component of interarea wage differentials accounts for a larger share of the total differential than the amenity component. However, the relative importance of these factors varies from one city to the next. In some cities, relatively low wages are found to be primarily the result of high amenities, which increase the supply of labor to the city. In other cities, low wages are found to be primarily the result of the low productivity-enhancing site characteristics, which decreases the demand for labor.

These findings underscore the caveat that one should be careful not to interpret interarea wage differentials as reflecting only amenities or productivity differences. Both factors appear to play comparable roles in determining interarea nominal wage differentials.

Footnotes

1. Bellante (1979), Johnson (1983), and Scully (1969) are examples of numerous studies that have examined interregional nominal wage differentials.

2. Roback's model ignores intracity commuting. Hoehn, et. al. (1986) have pointed out that this leads to incorrect estimates of the value of other site characteristics. Since we are not interested in deriving values for specific characteristics but simply valuing the net impact of these characteristics, our model is not subject to this criticism. We simply assume that intracity commuting is another site characteristic that reduces leisure time and therefore is a disamenity for workers.

3. Note that $k_1 = rl^c/w = Nrl^c/Nw$ and $R_r/R_w = rl^p/Nw$. Therefore,

$$k_1 + R_r/R_w = r(Nl^c/wN + l^p/wN) = rL/wN,$$

where L is the total land used in housing and production, and rL/wN is simply the ratio of the total income to land relative to the total income to labor.

4. Recent studies by Farber and Newman (1987) and Jackson (1985) show that regional nominal wage differentials also arise from differences in returns to these characteristics. However, we concentrate on differences in characteristics across regions, since we are primarily concerned with the relative value placed on different bundles of site characteristics.

5. The discount rate is from a study of the user cost of capital by Peiser and Smith (1985).

6. The measure of unionization in the wage equation is the industry unionization rate taken from Kokkelenberg and Sockell (1985).

7. The ratio of land value to total house value was estimated by Roback (1982) using FHA housing data. Unfortunately, the census data used in this study cannot be used to make a new estimate.

8. The estimate of labor compensation is taken from the national income account data reported in Table B-23 of the Economic Report of the President (1987). Unfortunately, the national income accounts do not include land income as a separate category of income. Our estimate of land's share of income is taken from Mills and Hamilton (1984).

9. When the sample was expanded to include SMSAs that received 50 or more movers, the results were identical.

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Table 1: Estimates of Wage Equation

Variables	Mean	Coefficient
Intercept		4.33 (50.19)
Sex (Female=1)	.42	-.083 (-5.00)
Race (Black=1)	.16	-.161 (-11.57)
Education	15.55	.043 (5.16)
Education squared	250.37	.0007 (2.81)
Experience	10.29	.043 (25.12)
Experience squared	192.33	-.0008 (-15.63)
Part time	.04	-.308 (-14.44)
Usual hours worked per week	42.05	.006 (10.84)
Head of household	.64	.111 (10.20)
Veteran	.20	-.017 (-1.53)
Sex x Race	.08	.111 (5.47)
Sex x (Marital status)	.22	-.058 (-3.14)
Sex x Experience	4.10	-.019 (-7.81)
Sex x (Experience Squared)	76.82	.0003 (3.54)
Marital Status	.62	.108 (9.62)
Union member	.25	.434 (14.12)
(42 Occupation Dummies)		
R-square		.34
No. observations		22313
Dependent Variable: log(weekly earnings)	5.50	

Note: Estimates derived from Public Use Microdata Sample. T-statistics in parentheses.

Source: Authors.

Table 2: Estimates of Rent Equation

Variables	Mean	Coefficient
Intercept	-	9.93
		(248.36)
Dwelling rented (=1)	.53	.084
		(1.35)
Central City (=1)	.14	-.05
		(-3.29)
x rental		.021
		(1.70)
Number of floors	1.10	.122
		(5.43)
x rental		-.056
		(-2.62)
Attached dwelling (=1)	.06	.06
		(2.41)
x rental		.027
		(1.17)
Year dwelling built	3.65	-.06
		(-17.98)
x rental		-.018
		(-4.94)
Number of rooms	7.07	.11
		(22.80)
x rental		-.032
		(-5.64)
Number of bedrooms	4.25	.10
		(9.96)
x rental		.011
		(1.03)
Well water (=1)	.14	.06
		(3.70)
x rental		-.027
		(-.83)
Central air conditioning (=1)	.52	.12
		(9.13)
x rental		.038
		(2.82)
Central heating (=1)	.91	.12
		(6.35)
x rental		-.058
		(-4.14)

Table 2 (continued)

Dwelling other than condominium (=1)	.96	-.046
		(1.62)
Number of units at address	2.92	-.003
		(-.65)
x rental		.007
		(1.41)
Number of bathrooms	2.72	.179
		(32.03)
x rental		-.056
		(-6.73)
City Sewer Connection (=1)	.87	.053
		(4.27)
x rental		.004
		(.18)
Lot size less than one acre (=1)	.92	-.130
		(8.72)
x rental		.185
		(8.07)
Elevator (=1)	.04	.065
		(2.45)
R-square		.63
No. of observations		16017
Dependent variable: log(house value)	11.07	

Note: Estimates derived from Public Use Microdata Sample. T-statistics in parentheses. The entry "x rental" indicates that the rental dummy variable has been interacted with the variable listed immediately above it.

Source: Authors.

Table 3: Quality-Adjusted Rent and Wage Differentials

Metropolitan Area	Quality-Adjusted Rent	Quality-Adjusted Wage
Anaheim, CA	.281	.078
Atlanta, GA	-.145	.014
Baltimore, MD	-.075	.031
Chicago, IL	.104	.081
Cincinnati, OH	-.082	.064
Cleveland, OH	-.053	.108
Columbus, OH	-.126	-.074
Denver, CO	.036	-.013
Detroit, MI	.013	.149
Ft. Lauderdale, FL	.039	-.029
Houston, TX	.023	.142
Indianapolis, IN	-.172	.041
Kansas City, MO	-.155	-.037
Los Angeles, CA	.261	.049
Miami, FL	.076	-.112
Minneapolis, MN	.073	.065
Nassau-Suffolk	.240	.077
New Orleans, LA	-.110	-.079
New York, NY	.145	.036
Newark, NJ	.195	.045
Philadelphia, PA	-.013	.017
Phoenix, AZ	-.029	-.047
Pittsburgh, PA	-.079	.047
Portland, OR	.059	-.027
Riverside-San Bernardino, CA	.016	-.008
Sacramento, CA	-.014	-.047
St. Louis, MO	.085	.019
Salt Lake City, UT	-.099	-.081
San Antonio, TX	-.203	-.105
San Diego, CA	.148	-.014
San Francisco, CA	.308	.073
San Jose, CA	.269	.125
Seattle, WA	.048	.047
Tampa, FL	-.142	-.119
Washington, D.C.	.116	.103

Source: Authors. Quality-adjusted differentials are obtained by subtracting the predicted estimate from the actual value. The reference point for these estimates is the sample average.

Table 4: Decomposition of Interarea Wage Differentials into Amenity and Productivity Components

Metropolitan Area	Wage Components		Share of Total	
	Amenity	Productivity	Amenity	Productivity
Sample Average	.000	.000	.40	.60
Anaheim, CA	.025	.053	.32	.68
Atlanta, GA	.009	.005	.62	.38
Baltimore, MD	.014	.017	.45	.55
Chicago, IL	.030	.051	.37	.63
Cincinnati, OH	.027	.037	.43	.57
Cleveland, OH	.044	.064	.41	.59
Columbus, OH	-.027	-.047	.36	.64
Denver, CO	-.006	-.007	.45	.55
Detroit, MI	.059	.090	.40	.60
Ft. Lauderdale, FL	-.012	-.017	.43	.57
Houston, TX	.056	.086	.39	.61
Indianapolis, IN	.020	.021	.49	.51
Kansas City, MO	-.012	-.026	.31	.69
Los Angeles, CA	.014	.035	.29	.71
Miami, FL	-.046	-.066	.41	.59
Minneapolis, MN	.024	.041	.37	.63
Nassau-Suffolk, NY	.026	.051	.33	.67
New Orleans, LA	-.029	-.050	.37	.63
New York, NY	.011	.025	.31	.69
Newark, NJ	.014	.031	.31	.69
Philadelphia, PA	.007	.010	.41	.59
Phoenix, AZ	-.018	-.029	.39	.61
Pittsburgh, PA	.020	.027	.43	.57
Portland, OR	-.012	-.015	.44	.56
Riverside-San Bernardino, CA	-.004	-.005	.44	.56
Sacramento, CA	-.019	-.029	.39	.61
St. Louis, MO	.009	.010	.49	.51
Salt Lake City, UT	-.030	-.051	.37	.63
San Antonio, TX	-.037	-.067	.36	.64
San Diego, CA	-.009	.005	.62	.38
San Francisco, CA	.023	.050	.31	.69
San Jose, CA	.044	.081	.35	.65
Seattle, WA	.018	.029	.38	.62
Tampa, FL	-.045	-.075	.37	.63
Washington, D.C.	.038	.065	.37	.63

Source: Authors.

Table 5: Sensitivity of the Size of the Wage Components to Values of Household Budget Shares to Land (k_l)

Share of Wage Components of Total Wage Differential: Amenity	Productivity	k_l
0	1	.088
.33	.67	.060
.40	.60	.053
.50	.50	.046
.67	.33	.034
1	0	.000

Note: K_l is derived by solving equations 10 and 11 under various assumptions about the relative magnitudes of the two wage components and assuming that A equals .088. Values of k_l are then derived for each SMSA using observed values of total wage and rent differentials. The sample average of the appropriate values of k_l are reported in the table.

Source: Authors.

FIGURE 1: Determination of Equilibrium Wages and Rents