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Sometimes Close is Good Enough: the Value of Nearby Environmental Amenities

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ABSTRACT

An extensive empirical literature exists showing that variations in region-specific amenities can account for persistent differences in real wages across regions. However, this literature has considered only amenities in the same location as the household. This paper argues that environmental amenities at some distance from but accessible to urban areas may lead to negative compensating wage differentials. We use a general equilibrium framework and data from the 1995 Current Population Survey to calculate implicit amenity prices based on measures of distance to environmental amenities. Our results suggest that amenities outside the metropolitan area do generate compensating wage differentials, as workers are willing to accept lower wages to live in accessible proximity to "nice" places. This implies that these places provide a positive externality to those communities that find them accessible. The estimated effects are quantitatively important, suggesting that these externalities should be taken into account in policy making. (JEL Codes Q51, Q56, R12, R23)

1. INTRODUCTION

Rapid growth in the Pacific Northwest over the 1980s and 1990s has been difficult to explain in the context of traditional economic models of regional growth. The input-output framework used by many economic development organizations predicted that reductions in logging due to environmental policy would have permanent negative effects on the economies of the affected areas. Instead, the region experienced strong economic growth over this time period. It has been suggested that this economic growth might have resulted in part *because* of the protection of natural resources in the area, rather than in spite of it.[1]

This possibility is consistent with a fairly extensive empirical literature showing that variations in region-specific amenities can account for persistent differences in real wages across regions.[2] The presence of an amenity valued by workers generates negative compensating wage differentials, as a higher supply of workers drives down wages in that area. At the same time, the presence of an amenity increases demand for housing in the region, which generates positive rent differentials.[3,4] Such amenities can generate sizeable effects on wages. For example, Blomquist et al. (1988) rank 253 urban counties in 1980 based on the estimated value of their amenities, and find that the difference in amenities between the top-ranked and bottom ranked counties could be valued at over $5,000 per household per year. This value exceeds 28 percent of the median household income in that year.[5]

The empirical literature to date has considered only amenities that are in the same location (usually the county or the metropolitan statistical area) as the household. The argument tested here is that environmental amenities at some distance from but accessible to urban areas may have a value to consumers that can lead to negative compensating differentials in real wages. These wage differentials, in turn, serve as production amenities, attracting industrial and commercial activity and generating economic growth.[6]

Note that this argument suggests that the travel cost approach to valuing amenities, first proposed by Hotelling in the 1930s, may be misspecified. The travel cost approach involves the surveying of visitors to outdoor recreation sites to find how much expenditure was incurred in order to get there. These travel costs become a proxy for the price of visiting recreation areas. Observed visits and the estimated costs are then used to trace out an implicit demand curve for the environmental amenity.[7]

If our argument is correct, residential location itself is not exogenous, and in fact is likely to be strongly influenced by the presence of natural amenities. For example, people who enjoy kayaking are likely to live near rivers where they can do so. Thus, residential location, which is the origin of the recreational travel, is chosen in part as a function of the amenities, causing the travel cost approach to systematically underestimate the value of natural amenities.[8]

In this paper, we assume that individuals choose their residential location based in part on proximity to "nice" places. We use a general equilibrium framework similar to that of Rosen (1979), Roback (1982, 1988), and Beeson (1991) to calculate implicit amenity prices based on measures of distance to environmental amenities. Using data from the Census Bureau's 1995 Current Population Survey, we regress log weekly earnings, adjusted for regional differences in the cost of living, on individual attributes considered to influence wages, including race, marital status, age, education, experience, union membership, industry, and occupation. We also include area-specific attributes of the metropolitan area in which the individual resides. Our paper extends the literature by also including measures of distance to "nice" places.

Our results suggest that natural resource amenities outside the metropolitan area do generate compensating real wage differentials, as workers are willing to accept lower wages to live in accessible proximity to "nice" places. This implies that "nice" places provide a positive externality to those communities that find them accessible. It will therefore generally be very difficult to assure optimal provision of the amenity, either through market or nonmarket means. It is difficult enough to organize local jurisdictions to produce amenities efficiently within their own borders. Here the problem is much more complicated, as the relevant amenities will generally be produced in jurisdictions that are distinct from those in which the affected employers and employees transact their business. The effects that we estimate are quantitatively important, suggesting that these externalities should be taken into account in the making of environmental and natural resource policy.

2. MODEL

Our theoretical approach draws heavily upon the work of Courant and Deardorff (1993) and Courant et al. (1997). We assume that the preferences of a consumer can be represented by the indirect utility function *V*:

(1) $$V_j = V(R_j, w_j, G_j, \Gamma_j)$$

where *j* denotes the location of residence, R_j is rent, w_j is the wage, G_j is consumption of governmentally provided goods and services, and Γ_j represents a vector of environmental amenities *within* the consumer's region of residence.

Imagine a simple economy with two regions, A and B. In this case, locational equilibrium will require that

$$V(R_A, w_A, G_A, \Gamma_A) = V(R_B, w_B, G_B, \Gamma_B) \quad (2)$$

Specifically, if region B is amenity-rich relative to region A, so that $\Gamma_B > \Gamma_A$, then, holding the level of government services constant, equilibrium requires that

$$\frac{w_A}{R_A} - \frac{w_B}{R_B} > 0 \quad (3)$$

The real wage in region A (the nominal wage adjusted for the rents in region A) must adjust upward to compensate for the environmental amenities present in region B. The assumption of equilibrium in the regional markets for wages and rents, if inaccurate, could lead to biased estimates of amenity valuations. However, work by Greenwood et al. (1991) suggests that any biases due to the erroneous assumption of regional equilibrium appear to be both quantitatively and qualitatively minor.

Equations (1-3), as written, implicitly assume that all consumers have identical tastes and ability to earn labor income. More generally, each equation will apply to consumers of a particular type. As long as consumers of a given type choose to locate in more than one region, compensating real wage differentials that take the form of equation (3) should be observed.

In the previous literature, the term Γ_j in equation (2) has generally been limited to include only those environmental amenities within the consumer's region of residence. As such, the typical regression in the empirical literature estimates the real wage as a function of a vector of attributes within a Metropolitan Statistical Area. However, Γ_j could easily be specified to include a set of amenities at a distance from *j* that depend on the location of j. The innovation of this paper is to add measures of accessibility to amenable places that are outside of the MSA. Specifically, we alter the model such that Equation (2) becomes:

$$(4) \qquad V(R_A, w_A, G_A, \Gamma_A, \Theta_A) = V(R_B, w_B, G_B, \Gamma_B, \Theta_B)$$

where Θ_j is a measure of distance to "nice" places.[9]

3. DATA, MODEL SPECIFICATION AND EMPIRICAL RESULTS

We use data from the Current Population Survey (CPS) March Supplement for 1995 (corresponding to calendar year 1994). The CPS is a nationally representative monthly survey of households conducted by the Bureau of the Census for the Bureau of Labor Statistics, and is the primary source of information on the labor force characteristics of the U.S. population. The March supplement provides extensive demographic information on the individuals in the sample. Our sample consists of full-time workers over the age of 18 who resided in one of the 90 biggest metropolitan statistical areas (MSAs) within the contiguous United States, and includes 28,279 observations. A list of the MSAs used in the analysis can be found in Appendix A. The CPS individual-level data on income, job characteristics, and demographics were merged with characteristics of the metropolitan areas. Summary statistics are presented in Table 1. Details on the specific variables and how they were created can be found in Appendix B.

The hypothesis that we wish to test is whether individuals are willing to accept lower wages to live in closer proximity to amenity-rich places. We therefore need to define a set of these amenity-rich, or "nice" places. In this paper, we define "nice" places as those including national parks, lakeshores, seashores, and recreation areas. A full list can be found in Appendix C. Clearly, this hardly constitutes an exhaustive list of "nice" places, so omitted variable bias may be a concern. We discuss the potential implications of this later in the paper.

As a baseline, we first estimate the following model, which allows only those amenities *within* the MSA to generate compensating differentials:

$$LN\_RWAGE_i = \alpha + \beta_1 X_i + \beta_2 \Gamma_j + \varepsilon_i \quad (5)$$

where i indexes the individual, and j indexes the MSA. Our dependent variable, LN_RWAGE, is the natural log of the real average weekly wage of individual i. We use cost of living data from the American Chamber of Commerce Research Association (ACCRA) to adjust for differences in the cost of living across MSAs.[10] Since the theory of urban location is a theory about the real wage, we felt it was preferable to use the real wage as our dependent variable. This is in contrast to many older papers in this literature, which estimate separate equations for wages and rents, and use coefficients from both regressions to generate implicit prices of amenities. To the extent that real wages vary across space for reasons other than differences in land rent, we believe a broader location-based price index to be superior, in that such an index provides a better measure of the real wage. Given the relatively small role that transportation costs play in prices in the U.S., rent differences are in any case likely to account for the bulk of location-based variation in prices, either directly or indirectly, so the difference between the two approaches is likely to be unimportant.[11]

The X_i vector includes individual level characteristics that affect wages, including age, sex, race, marital status, number of children, union membership, education, and veteran status. It also includes indicators for the industry and occupation of the individual. The Γ_j vector contains MSA-level characteristics that have been shown to be associated with compensating wage differentials. These include natural amenities such as climate, surface water area, topographical variation, state recreation acreage, and measures of air quality.[12] Individuals are willing to accept lower wages in order to live in areas with amenities, so the coefficients on amenities are expected to be negative. The error term is represented by ε_i. We calculate robust standard errors that are corrected for within MSA correlation.[13]

As Rosen (1979) points out, when there are unobserved differences in tastes for amenities, the estimated wage differences will generally overstate the amount that residents in the high wage region would accept as a pay cut to move to the low-wage region, and understate the compensation increase that residents in the low-wage region would require to move to the high-wage region. One can imagine a world in which the equilibrium condition in equation (3) never holds, because heterogeneity in tastes, the specific distribution of types of people, and resulting geographic sorting, are such that people with identical tastes and endowments are never observed in different locations. In this case, the observed real wage differences generally understate the value of the amenity difference to any given consumer.

Results from this regression can be found in Table 2. The individual level variables generally have the expected sign and are statistically significant. Individuals who are male, white, married, and union members earn higher wages. Wages rise with age, but at a declining rate. In addition, higher levels of education are significantly associated with higher wages.

Natural amenities within the MSA generally have effects in the direction predicted by theory. The percent of the MSA that is state recreation area and topographical variation (amenities) have a negative effect on wages, and unhealthy air quality days (disamenities) have a positive effect, although the point estimates are not statistically different from zero. One of the natural amenity variables does enter the regression significantly -- the average climate index. The estimated coefficient is -0.067, and is statistically significant at the five-percent level. The magnitude of this coefficient suggests that moving from the mean level of the climate index (a climate similar to that of Charlotte, NC) to a level one standard deviation worse (a climate similar to that of Cleveland, OH) would require a 4.7% increase in wages to compensate the average individual and leave their utility unchanged. However, the set of natural amenity variables is not jointly significantly different from zero, as evidenced by the F-statistic at the bottom of Column 1.

If individuals decide on their location in part due to the proximity of "nice" places, we would expect those metropolitan areas further from their closest "nice" place to require a positive compensating wage differential. To test this, we rewrite equation (5) as:

(6) $$LN\_RWAGE_i = \alpha + \beta_1 X_i + \beta_2 \Gamma_j + \beta_3 \Theta_j + \varepsilon_i$$

where Θ_j is a measure of driving distance in miles to the nearest "nice" place.[14, 15] One potential concern with this type of cross-sectional analysis is the possibility of endogenous location of "nice" places. If those areas that were less productive ended up with "nice" places, while more productive places built over "nice" places, then there would be a correlation between wages and proximity to nice places that was not due to compensating differentials. The fact that most of the "nice" places in our analysis have been in existence for a long while may mean this potential endogeneity is less important in this case.

The actual driving time for a given distance may vary significantly across MSAs. However, our inclusion of population density and average commuting time in the regressions will help to control for this. The estimate of β_3 is expected to be positive. It is possible that the relationship between distance and log real wages is nonlinear. To check for this possibility, we estimate models that allow for such a nonlinear relationship. Specifically, we run a regression that allows distance to take the form of a quadratic, and a regression that allows distance to take the form of a cubic polynomial. In neither case were the estimated coefficients on the higher order terms significantly different from zero, suggesting that a linear specification is a better fit for the data. These results are available from the authors.

Results from the MSA-level variables from this regression are presented in Column 1 of Table 3. The estimated coefficients on the individual-level variables change very little, so we do not report these in Table 3. The estimated coefficient on our variable of interest, distance to the nearest "nice" place, is 0.00040, and is statistically significant at the one-percent level. This coefficient is of the expected sign, and is sizeable, suggesting that individuals would be willing to take a 4.0 percent pay cut in order to have the closest "nice" place one hundred miles closer. This compensating wage differential is in addition to effects due to environmental amenities within the MSA itself. The magnitude and statistical significance of some amenity variables within the metropolitan area (reported in Table 2) fall slightly when amenities outside the metropolitan area are included. This suggests that the effects of MSA-level amenities previously estimated may in part proxy for “nice” places outside of the metropolitan area boundaries.

This compensating differential is large. However, as mentioned above, national parks, lakeshores, seashores, and national recreation areas are only a subset of “nice” places in the United States, so omitted variable bias may be a concern -- distance to the nearest nice place may be correlated with other things that affect wages. One specific form of omitted variable bias would occur if distance to the nearest “nice” place is correlated with distance to other nearby nice places that are not included in our list, but that also generate a compensating wage differential. In this case, we can think of the nearest “nice” place as a proxy for an area that contains several “nice” places. We think it likely that many of the “nice places” in our sample are near other nice places whose characteristics we cannot measure. As a plausible example, the drive to a national park or seashore might itself have enjoyable views and recreational opportunities. The estimated coefficient shows the direct effect of the measured nice place as well as the effect of those we can’t measure. Since we have controlled for amenities in the metropolitan area of location, these unmeasured amenities that are near but not in the metropolitan area support the main point of the paper -- that “nice” places outside of the MSA generate compensating wage differentials.

In Columns 2 through 4 of Table 3, we test the robustness of our results. Results presented in Column 2 control for publicly-created amenities, such as school quality (proxied for by per pupil spending) and law enforcement (proxied for by the crime rate). These coefficients are of the expected signs, and the coefficient on per-pupil spending is significant at the five-percent level. Our coefficient of interest, β_3, changes little when these variables are included. Results presented in Column 3 add controls for cultural amenities, including library circulation per capita, concert and theater dates per capita, and museums per capita. Again, inclusion of these variables has little effect on our coefficient of interest. Finally, Column 4 presents results from a random effects specification. The effect of the driving distance variable is robust to this alternative specification. [16]

In Table 4, we use the coefficient on distance in the first column of Table 3 to illustrate the effect of proximity to "nice" places on real wages. This table presents the 20 MSAs with the highest and lowest compensating wage differentials due to distance to nearest nice place (i.e., the 20 MSAs closest to and farthest away from their nearest "nice" place). The contribution of distance to wages is calculated by multiplying the coefficient on distance in the first column of Table 3 by the driving distance in miles. For Oxnard-Ventura, the MSA with the closest "nice" place, this value is 0.0042. The contribution of distance to wages for Omaha, NE, the MSA furthest from its nearest "nice" place, is 0.1998. This implies that if Omaha and Oxnard-Ventura were otherwise identical, a 20 percent wage premium would be required for an individual to choose to live in Omaha instead of Oxnard-Ventura. Another way of putting this is that if you moved Oxnard-Ventura to the latitude and longitude of Omaha, retaining all of Oxnard-Ventura's characteristics, residents would on average require a 20 percent compensating differential for making the move.

It is important to remember that these distance effects are in addition to the effects of natural amenities within the MSAs themselves. Table 5 ranks MSAs by their level of natural amenities and disamenities (climate, topographical variation, surface water area, percent of MSA that is state recreation land, and air quality), weighted by the implicit price for these amenities resulting from the regression in Column 1 of Table 3. The first column shows the rankings without including distance to the nearest "nice" place. Column 2 adds the effect of this variable and shows how the rankings change. Adding distance improves the ranking of Tucson, from 16th to 10th. Denver, which scores 12th based primarily on climate and topography, drops to 17th when the distance variable is added. Tacoma rises in the rankings from 26th to 18th.

However, notwithstanding these cases, the ordering of the top 25 MSAs is remarkably similar both with and without the distance effect. This is probably due to the fact that those MSAs that are near "nice" places are likely to be "nice" places themselves. More striking effects can be seen once we move out of the top 25. Adding distance moves the ranking of Knoxville, Tennessee (close to Great Smoky Mountains National Park) up from 40 to 33, and of Little Rock, Arkansas (close to Hot Springs National Park) up from 55 to 39. Conversely, adding distance significantly reduces the rankings of places like Rochester, NY (from 58 to 81) and Omaha (from 70 to 90).[17]

By restricting our sample to full time workers, we may be missing differences in hours that are correlated with accessibility to "nice" places. Specifically, if access to these places is complementary with leisure, individuals in MSAs that are more accessible may choose to work fewer hours. To test whether this is happening, we regress log hours worked on the same set of independent variables for those individuals in the CPS who report positive hours. We find no significant effect of distance on hours worked.[18]

One concern with the results presented here is that our distance variable only takes into account the closest "nice" place, and does not allow for differences in the quality of the "nice" places. To address this, we create a gravity variable that is:

$$grav_j = \sum_{k=1}^{K} \left(\frac{visitors_k / MSApop_j}{drivdist_{jk}^{\,2}} \right) \tag{7}$$

where *j* indexes the MSA and *k* indexes "nice" places. For a given MSA, we calculate the value of the expression in parentheses for every "nice" place with a driving distance within 400 miles. This expression takes the number of annual visitors to the "nice" place, divides it by the population of the MSA, and divides this by the square of the driving distance between the MSA and the "nice" place. We then sum this over all "nice" places within the 400 mile driving distance. This measure should be larger if there are many nice places nearby, so a compensating differential story would predict a negative coefficient.

Results using this variable are presented in Column 1 of Table 6. The estimated coefficient is negative and statistically significant at the five-percent level, suggesting that this weighted measure of all nearby "nice" places generates a negative compensating differential. We check the robustness of this variable in the subsequent columns of Table 6. In Columns 2 and 3, we add the publicly created and cultural amenities, respectively. In Column 4 we add a similarly created gravity measure of industrial mix, where instead of visitors/population, we use the percent of total employment that is in the manufacturing industry and the percent of total employment that is in the trade industry. In Column 5, we estimate a random effects specification. The estimated coefficient changes little in magnitude across these specifications, and is statistically significant in all but the random effects specification (where it is close to statistical significance, with a p-value of 0.105).

5. CONCLUSION

The results presented above provide evidence that individuals are willing to accept lower wages to live in close proximity to "nice" places. Our results have two broad sets of implications, one for the literature on residential location and the valuation of amenities, the other for public policy.

The main implication for the literature on residential location is that the attributes of any location include its proximities with respect to other places. When the other sites are places of work or of trade, standard theory generates patterns of wages and rents that depend on location. The logic of location theory can and should be extended to situations where the proximal sites provide recreational or other natural resource amenities. People who like rafting trips, but whose economic opportunities are much greater in urban areas than near canyons, will have a willingness to pay to live in urban areas that are in closer proximity to good rafting water. This paper is a first step in showing that such effects may be quantitatively important. Given this importance, the travel cost method of valuing access to recreational sites, which takes residential location as given, will generally underestimate the value of such proximity. We are confident that in a well-specified location model, consumers' residential locations will not be random with respect to distant (but not too distant) recreational opportunities.

The results in this paper suggest that natural resource amenities (and amenities in general) that are at some remove from metropolitan areas can be converted into production amenities via reductions in the real wage in the affected metropolitan area. Depending on the organization of markets and the distribution of tastes, the benefits from such amenities will accrue in part to consumers, in part to landlords, and in part to the customers and stockholders of firms that produce in the affected urban areas. There may also be consequences for local and regional economic growth. The important point is that real economic benefits may be realized at considerable economic remove from the location of the amenities themselves. Local development agencies may be able to enact policies that internalize the effects of amenities within their jurisdiction. However, it is unlikely that these agencies or the citizens they represent can do so for those "nice" places which are not within their jurisdiction.

Federal policies towards the national parks and national seashores that we use to measure "nice" places in this paper may indeed take into account the effects on metropolitan areas within a few hours drive. But as a general matter, neither governmental nor private structures will exist that allow the firms and residents of metropolitan areas to articulate their willingness to pay for amenities in "nice" places that are at some remove. We hope that further work on this set of issues will allow us, and policymakers, to calibrate the relevant willingness to pay, and to identify the value of natural resource amenities to the economic activity and welfare realized in nearby urban areas.

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TABLE 1: Summary Statistics

Variable Name	
Individual Level Variables	
Log real weekly wage	6.038 (0.735)
Male	0.567
Age	39.061 (11.387)
White	0.808
Married	0.602
Household head	0.818
Veteran	0.120
Union member	0.039
High school graduate	0.305
Some college	0.268
College graduate	0.311
Children under 18	0.419
MSA Level Variables	
Surface water index	0.749 (0.790)
Percent state recreation area	0.019 (0.027)
Days with unhealthy air quality index	22.948 (35.255)
Maximum topography index	0.493 (1.003)
Average climate index	0.214 (0.697)
Commuting time (in minutes)	32.250 (45.593)
Percent of population below poverty	18.687 (6.138)
Health care index	78.094 (23.235)
Crime index	30.678 (27.220)
Cost-adjusted per-pupil spending	5852.22 (1209.97)
Library circulation (in books)	1.85×10^{7} (1.42×10^{7})

Concert and theater dates	1354.84
	(1644.79)
Museums	7.629
	(6.854)
Driving distance to nearest "nice" place (in miles)	123.952
	(85.423)
Number of observations	28,279

Source: See Data Appendix. Sample restricted to full-time workers over the age of 18. Standard deviations are in parentheses.

TABLE 2: Effects of MSA-level Amenities on Log Real Wages

Male	0.275	***
	(0.011)	
Age	0.061	***
	(0.002)	
Age squared	-0.0006	***
	(0.00003)	
White	0.133	***
	(0.011)	
Married	0.068	***
	(0.009)	
Household head	0.203	***
	(0.011)	
Veteran	0.039	***
	(0.012)	
Union member	0.083	***
	(0.018)	
High school graduate	0.282	***
	(0.017)	
Some college	0.387	***
	(0.019)	
College graduate	0.637	***
	(0.019)	
Children under 18	0.013	
	(0.008)	
Surface water area	0.0007	
	(0.022)	
Percent state recreation area	-1.462	
	(1.029)	
Days with unhealthy air quality index	0.0003	
	(0.0005)	
Maximum topography index	-0.015	
	(0.017)	
Average climate index	-0.067	**
	(0.033)	
Population density	-0.00007	***
	(0.00001)	
Commuting time	0.00002	
	(0.0003)	
Percent of population below poverty	0.005	
	(0.004)	
Health care index	-0.002	***
	(0.0008)	
F-statistic for joint significance of natural amenity variables (5, 89)	1.46	

Notes: Also included in regressions are individual-level indicators for industry and occupation, as well as indicator variables for the region of residence (Northeast, West, and South, with Midwest as omitted category), and city size. Robust standard errors clustered at the MSA-level are in parentheses. Levels of statistical significance: *** denotes significant at the one-percent level, ** at the five-percent level, and * at the ten-percent level.

TABLE 3: Effects of Nearby "Nice" Places on Log Real Wages

	Main Specification		*With publicly Created Amenities*		*With Cultural Amenities*		*Random Effects*	
Driving distance	0.00040	***	0.00039	**	0.00042	**	0.00036	**
	(0.00015)		(0.00017)		(0.00017)		(0.00017)	
Surface water area	0.00084		-0.00170		0.00081		0.00221	
	(0.02190)		(0.02058)		(0.02172)		(0.01995)	
Percent state rec area	-1.48146		-1.54831	*	-1.50490	*	-1.31573	**
	(0.90798)		(0.90283)		(0.90159)		(0.59616)	
Unhealthy air quality days	0.00025		0.00015		0.00021		0.00084	
	(0.00053)		(0.00052)		(0.00055)		(0.00066)	
Maximum topography index	-0.02162		-0.00476		-0.01977		-0.01849	
	(0.01653)		(0.01765)		(0.01571)		(0.01901)	
Average climate index	-0.05032	*	-0.05133		-0.04905		-0.05716	
	(0.02974)		(0.03335)		(0.03229)		(0.04118)	
Population density	-0.00006	***	-0.00006	***	-0.00006	***	-0.00006	***
	(0.00001)		(0.00001)		(0.00001)		(0.00001)	
Commuting time	-0.00004		-0.00019		-0.00007		-0.00031	
	(0.00034)		(0.00034)		(0.00033)		(0.00059)	
Percent of population below poverty	0.00478		0.00578	*	0.00472		0.00482	*
	(0.00365)		(0.00323)		(0.00367)		(0.00252)	
Health care index	-0.00230	***	-0.00201	***	-0.00223	***	-0.00198	***
	(0.00075)		(0.00071)		(0.00082)		(0.00073)	
Crime rate	--		0.00055		--		--	
			(0.00079)					
Per pupil spending	--		-0.00003	**	--		--	
			(0.00001)					
Library circulation					4.70e-09		--	
					(3.33e-09)			
Dates					-0.00004		--	
					(0.00003)			
Museums					0.00093		--	
					(0.00558)			

Notes: These regressions include all of the individual-level characteristics found in Table 2. : Also included in regressions are individual-level indicators for industry and occupation, as well as indicator variables for the region of residence (Northeast, West, and South, with Midwest as omitted category), and city size. Robust standard errors clustered at the MSA-level are in parentheses. Levels of statistical significance: *** denotes significant at the one-percent level, ** at the five-percent level, and * at the ten-percent level.

TABLE 4: Rankings of MSAs by Wage Effects Due to Distance Variables

Ranked by Effect of Distance:			
Top 20	Wage Effect	Bottom 20	Wage Effect
Oxnard-Ventura	0.0042	Birmingham	0.0757
Miami	0.0043	Tulsa	0.0761
San Francisco	0.0047	Syracuse	0.0772
Akron	0.0062	Dayton-Springfield	0.0802
Jersey City	0.0073	Cincinnati	0.0810
Cleveland-Lorain-Elyria	0.0105	Charlotte-Gastonia-Rock Hill	0.0817
Oakland	0.0107	New Orleans	0.0828
Tucson	0.0109	Buffalo-Niagara Falls	0.0828
Bergen-Passaic	0.0122	Albuquerque	0.0842
Las Vegas	0.0133	Charleston	0.0854
Nassau-Suffolk	0.0135	Greensboro-Winston-Salem-High Pt.	0.0878
Middlesex-Somerset	0.0135	Salt Lake City	0.0919
Los Angeles	0.0138	Austin-San Marcos	0.0947
Ft. Lauderdale	0.0150	Houston	0.0965
Atlanta	0.0161	Minneapolis-St Paul	0.0998
Tacoma	0.0173	Baton Rouge	0.1054
Allentown-Bethlehem-Easton	0.0179	Rochester	0.1087
Newark	0.0186	St. Louis	0.1172
Chicago	0.0187	Kansas City	0.1764
Monmouth-Ocean	0.0198	Omaha	0.1998

Notes: The “wage effect” is the compensating wage differential due to distance to nearest nice place. The contribution of distance to wages is calculated by multiplying the coefficient on distance in the first column of Table 3 by the driving distance in miles.

TABLE 5: Rankings of Metropolitan Areas by Natural Amenities

	Sorted by:	
	Natural Amenities	Natural Amenities plus Distance to Nearest "Nice" Place
1	San Diego, CA	San Diego, CA (1)
2	San Jose, CA	San Francisco, CA (3)
3	San Francisco, CA	San Jose, CA (2)
4	Oxnard-Ventura, CA	Oxnard-Ventura, CA (4)
5	El Paso, TX	Oakland, CA (6)
6	Oakland, CA	Los Angeles, CA (7)
7	Los Angeles, CA	Anaheim-Santa Ana, CA (8)
8	Anaheim-Santa Ana, CA	El Paso, TX (5)
9	Sacramento, CA	Las Vegas, NV (11)
10	Salt Lake City, UT	Tucson, AZ (16)
11	Las Vegas, NV	New York, NY (13)
12	Denver, CO	Sacramento, CA (9)
13	New York, NY	Newark, NJ (14)
14	Newark, NJ	Bergen-Passaic, NJ (19)
15	Fresno, CA	Orlando, FL (18)
16	Tucson, AZ	Fresno, CA (15)
17	Phoenix-Mesa, AZ	Denver, CO (12)
18	Orlando, FL	Tacoma, WA (26)
19	Bergen-Passaic, NJ	Seattle-Bellevue-Everett, WA (21)
20	Bakersfield, CA	Phoenix-Mesa, AZ (17)
21	Seattle-Bellevue-Everett, WA	Miami, FL (36)
22	Portland-Vancouver, OR-WA	Riverside-San Bernardino, CA (25)
23	Greenville, SC	Allentown-Bethlehem-Easton, PA (28)
24	Albuquerque, NM	Atlanta, GA (31)
25	Riverside-San Bernardino, CA	Nassau-Suffolk, NY (33)

TABLE 6: Effects of Gravity "Nice" Place Variable on Log Real Wages

	Main Specification		*With Publicly Created Amenities*		*With Cultural Amenities*		*With Industrial Mix Gravity Variable*		*Random Effects*
Nice Place Gravity Variable	-4.0239	**	-3.6524	**	-4.3079	**	-4.0381	***	-3.2580
	(1.6218)		(1.4277)		(1.7684)		(1.0638)		(2.0193)

Notes: These regressions include all of the individual-level characteristics found in Table 2. : Also included in regressions are individual-level indicators for industry and occupation, as well as indicator variables for the region of residence (Northeast, West, and South, with Midwest as omitted category), and city size.

The industrial mix gravity control variables are defined as $indgrav_j = \sum_{k=1}^{K}\left(\frac{shareind_k}{drivdist_{jk}^{\;2}}\right)$, where j indexes the MSA and k indexes all other MSAs within 400 miles of driving distance, $shareind_k$ is the share of MSA k's employment that is in a given industry, and $drivdist_{jk}$ is the driving distance in miles between the two MSAs. Robust standard errors clustered at the MSA-level are in parentheses. Levels of statistical significance: *** denotes significant at the one-percent level, ** at the five-percent level, and * at the ten-percent level.

Appendix A: List of SMSAs Used in Analysis

Akron, OH
Albany-Schenectady-Troy, NY
Albuquerque, NM
Allentown-Bethlehem-Easton, PA
Anaheim-Santa Ana, CA
Atlanta, GA
Austin-San Marcos, TX
Bakersfield, CA
Baltimore, MD
Baton Rouge, LA
Bergen-Passaic, NJ
Birmingham, AL
Boston, MA-NH
Buffalo-Niagara Falls, NY
Charleston-No Charleston, SC
Charlotte-Gastonia-Rock Hill, NC-SC
Chicago, IL
Cincinnati, OH-KY-IN
Cleveland-Lorain-Elyria, OH
Columbus, OH
Dallas, TX
Dayton-Springfield, OH
Denver, CO
Detroit, MI
El Paso, TX
Fort Lauderdale, FL
Fort Worth-Arlington, TX
Fresno, CA
Grand Rapids-Muskegon-Holland, MI
Greensboro-Winston Salem-High Point, NC
Greenville-Spartanburg-Anderson, SC
Harrisburg-Lebanon-Carlisle, PA
Hartford, CT
Houston, TX
Indianapolis, IN
Jacksonville, FL
Jersey City, NJ
Kansas City, MO-KS
Knoxville, TN
Las Vegas, NV-AZ
Little Rock-North Little Rock, AR
Los Angeles-Long Beach, CA
Louisville, KY-IN
Memphis, TN-AR-MS
Miami FL
Middlesex-Somerset-Hunterdon, NJ
Milwaukee-Waukesha, WI
Minneapolis-St Paul, MN-WI
Monmouth-Ocean, NJ
Nashville, TN
Nassau-Suffolk, NY
New Haven-Meriden, CT
New Orleans, LA
New York, NY
Newark, NJ
Norfolk-VA Beach-Newport News, VA-NC
Oakland, CA
Oklahoma City, OK
Omaha, NE-IA
Orlando, FL
Oxnard-Ventura, CA
Philadelphia, PA-NJ
Phoenix-Mesa, AZ
Pittsburgh, PA
Portland-Vancouver, OR-WA
Providence-Fall River-Warwick, RI-MA
Raleigh-Durham-Chapel Hill, NC
Richmond-Petersburg, VA
Riverside-San Bernardino, CA
Rochester, NY
Sacramento, CA
St. Louis, MO-IL
Salt Lake City-Ogden, UT
San Antonio, TX
San Diego, CA
San Francisco, CA
San Jose
Scranton-Wilkes Barre-Hazelton, PA
Seattle-Bellevue-Everett, WA
Springfield, MA
Syracuse, NY
Tacoma, WA
Tampa-St Petersburg-Clearwater, FL
Toledo, OH
Tucson, AZ
Tulsa, OK
Washington, DC-MD-VA-WV
West Palm Beach-Boca Raton, FL
Wilmington-Newark, DE-MD
Youngstown-Warren, OH

Appendix B: Data Sources

Individual level data:

Weekly wages, demographic information, and job characteristics come from the Current Population Survey Annual Demographic Supplement for 1995 (with calendar year data for 1994). We include full-time workers aged 18 and older who reside in the 90 largest Metropolitan Statistical Areas (MSAs), ranked according to 1990 census population estimates. We exclude those with zero earnings and any individuals reporting self-employed income.

MSA level characteristics:

1. Cost of Living Index data for MSAs are generated by the American Chamber of Commerce Researchers Association (ACCRA). Annual values for 1996 were reported by Money Magazine (www.cnnmoney.com). Detailed information about the index can be found at www.coli.org/coli_about.html.

2. Surface water index is calculated using data from the Economic Research Service (ERS) at the US Department of Agriculture. ERS provides county level data on the percentage of surface area covered by water. They then take the natural logarithm of water value to avoid bias from attributing Great Lakes and ocean coastline to coastal counties, and standardize the value relative to the other counties in the United States (see McGranahan (1999) for more information). We average this value across the counties that make up each MSA.

3. Topographical index is calculated using data from the Economic Research Service (ERS) at the US Department of Agriculture. ERS provides county level data on topographical variation that is then standardized (see McGranahan (1999) for more information). We then take assign the MSA the maximum value of its component counties.

4. Climate index is calculated using data from the Econ Economic Research Service (ERS) at the US Department of Agriculture. ERS provides county level data on four measures of climate (average January temperature, average January days of sun, low winter-summer temperature gap, and low average July humidity). They standardize these and average the four for each county (see McGranahan (1999) for more information). We then average this value across the counties that make up each MSA.

5. MSA measures of commuting time (average travel time to work in minutes) and poverty rates come from the County and City Data Book (U.S. Department of Commerce, 1994).

6. State recreation acreage, library circulation, concert and theater dates, and museums are background data collected by and published Savageau and Loftus (1997).

7. Days with unhealthy air quality (e.g. with an air quality index (AQI) above 100) come from the US Environmental Protection Agency (EPA). Available online at http://www.epa.gov/oar/aqtrnd99/aqiall.pdf

8. Health care index comes from Savageau and Loftus (1997). Factors used to calculate this index include number of hospitals and hospital beds, number of hospital services provided, and per capita general/family practitioners, medical specialists, and surgical specialists.

9. Land area, population, and population density are from the 1990 Census, released by the U.S. Census Bureau on March 14, 1996. City size variables are created from population data, where:

XLARGE:	population greater than or equal to 4 million
LARGE	population greater than or equal to 2 million and less than 4million
SMALL	population less than 7 thousand

10. Data on enrollment and per pupil total spending by geographic place come from the School District Data Book from the National Center for Education, and are for 1989-1990. Available online at http://govinfo.library.orst.edu/sddb-stateis.html. These data have been adjusted to take into account regional cost of education differences. The geographic cost of education index is state-specific for 1993-1994 and comes from table III-3 of Chambers, Jay G. "Geographic Variations in Public Schools' Costs." John C. Flanagan Research Center, American Institutes for Research, October 1997.

11. Crime index comes from Savageau and Loftus (1997). Factors used to calculate this index include the violent crime rate (murder, robbery, and aggravated assault) and the property crime rate (burglary, larceny-theft, and motor vehicle theft).

Appendix C: List of "Nice" Places in Continental U.S.

National Parks (NP)

Acadia NP, Maine
Arches NP, Utah
Badlands NP, South Dakota
Big Bend NP, Texas
Biscayne NP, Florida
Black Canyon of the Gunnison NP, Colo.
Bryce Canyon NP, Utah
Canyonlands NP, Utah
Capitol Reef NP, Utah
Carlsbad Caverns NP, New Mexico
Channel Islands NP, California
Crater Lake NP, Oregon
Cuyahoga Valley NP, Ohio
Death Valley NP, California
Dry Tortugas NP, Florida
Everglades NP, Florida
Glacier NP, Montana
Grand Canyon NP, Arizona
Grand Teton NP, Wyoming
Great Basin NP, Nevada
Great Smoky Mountains NP, North Carolina
Guadalupe Mountains NP, Texas
Hot Springs NP, Arkansas
Isle Royale NP, Michigan
Joshua Tree NP, California
Lassen Volcanic NP, California
Mammoth Cave NP, Kentucky
Mesa Verde NP, Colorado
Mount Rainier NP, Washington
North Cascades NP, Washington
Olympic NP, Washington
Petrified Forest NP, Arizona
Redwood NP, California
Rocky Mountain NP, Colorado
Saguaro NP, Arizona
Sequoia and Kings Canyon NP, California
Shenandoah NP, Virginia
Theodore Roosevelt NP, North Dakota
Voyageurs NP, Minnesota
Wind Cave NP, South Dakota
Yellowstone NP, Wyoming
Yosemite NP, California
Zion NP, Utah

National Seashores (NS) & Lakeshores (NL)

Apostle Island NL, Wisconsin
Assateague NS, Maryland
Canaveral NS, Florida
Cape Cod NS, Massachusetts
Cape Hatteras NS, North Carolina
Cape Lookout NS, North Carolina
Cumberland Island NS, Georgia
Fire Island NS, New York
Gulf Islands NS, Florida-Mississippi
Indiana Dunes NL, Indiana
Padre Island NS, Texas
Pictured Rocks NL, Michigan
Point Reyes NS, California
Sleeping Bear NL, Michigan

National Recreation Areas (NRA)

Bighorn Canyon NRA, Montana-Wyoming
Chattahoochee River NRA, Georgia
Chickasaw River NRA, Oklahoma
Delaware Water Gap NRA, Penn-New Jersey
Gateway NRA, New York
Gauley River NRA, West Virginia
Glen Canyon NRA, Arizona-Utah
Golden Gate NRA, California
Lake Chelan NRA, Washington
Lake Mead NRA, Arizona-Nevada
Lake Meredith NRA, Texas
Lake Roosevelt NRA, Washington
Ross Lake NRA, Washington
Santa Monica Mountains NRA, California
Whiskeytown NRA, California

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[1] For example, see Courant et al. (1997), Lerner and Poole (1999), Niemi et al. (1999), Power (1996), and Rudzitis and Johnson (2000).

[2] See Gyourko et al. (1999) for a recent summary.

[3] These arguments are generally made for local natural resource amenities such as clean air or miles of coastline, but can also apply to publicly provided amenities including excellent school systems and low crime rates. See Smith and Huang (1995) and Gyourko and Tracy (1991).

[4] Heal (2001) argues that since local environmental amenities add value to nearby properties, price-discriminating monopolistic developers may choose to protect these amenities even if developing them is an option.

[5] Median household income in 1980 was $17,710.

[6] In their discussion of the growing concentration of U.S. economic activity along the coasts, Rappaport and Sachs (2003) find that transport-related productivity plays a larger

role than quality of life concerns. However, their findings suggest that the contribution of quality of life is increasing over time.

[7] For an example see Bowes and Krutilla (1989). Fletcher et al. (1990) provide a review of this methodology.

[8] One can imagine writing down a richer model, in which residential locations are explicitly chosen simultaneously with recreational trips, but that is beyond the scope of the current analysis.

[9] This proximity effect clearly depends on transportation costs. As the price of air travel changes, or as gas prices change over time, we would expect the proximity effect to vary.

[10] These data are used in a number of papers (e.g. Glaeser (1998), Berger and Blomquist (2000), and Lakdawalla and Philipson (2002)) to account for cross-sectional price differences across cities. Berger and Blomquist (2002) write that "the most widely used source of data for cross-sectional price differences is the American Chamber of Commerce Research Association (ACCRA) cost of living index for selected cities and rural areas."

[11] In the ACCRA index, while housing costs are not the component with the highest weight (they receive a weight of 0.29, while miscellaneous goods/services receive 0.35,), they are the component that varies the most across metropolitan areas. The U.S. average for each component is 100, and the standard deviation for the housing component is 60.5 (standard deviations from other components range from 8.7 to 17.1). Since housing price differentials account for the bulk of location-based variation in prices, either directly or indirectly, so the difference between the two approaches is likely to be unimportant.

[12] See Roback (1982) and Blomquist, et al. (1988).

[13] Moulton (1986) shows that when the unit of observation is the individual but the independent variables of interest vary only across regions, uncorrected standard errors from Ordinary Least Squares (OLS) can be severely understated, leading to misleading interpretations of the significance of coefficients.

[14] Driving distances in miles are generated from Mapquest (www.mapquest.com).

[15] Unadjusted summary statistics show that this driving distance measure appears to have a small but significant association with migration. Those MSAs with the shortest driving distances (25th percentile or less) experienced average population growth between 1985 and 1995 of 16.01%, while those with the longest driving distances (75th percentile or higher) experienced average population growth of 15.43%, and these are statistically different at the one-percent level.

[16] The random effects specification implemented here requires that the group effect u_j is uncorrelated with the other regressors. If this is the case, Hausman (1978) showed that the estimated coefficients should not differ systematically between the fixed effect and random effect specifications. The Hausman test statistic for this null hypothesis (that the difference in the coefficients is not systematic) has a value of 24.62. When compared with the 1% critical value for χ^2 with 23 degrees of freedom, we are unable to reject the null hypothesis of the coefficients being the same, justifying our random effects specification.

[17] These MSAs are not reported in Table 5. A full set of rankings is available from the authors.

[18] Results available from the authors.