

# Multimarket Amenity Compensation and the Behavior of the Elderly

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Recent studies have argued that compensation for amenities occurs, in general, in both labor and land markets (see Glenn C. Blomquist, Mark C. Berger, and John P. Hoehn [1988; hereafter BBH] as well as Sherwin Rosen [1979], Donald R. Haurin [1980], and Jennifer Roback [1982, 1988]). If this is true, desirable locations would be characterized, *ceteris paribus*, by some mix of higher rents and lower wages, due to the influx of people demanding the consumption amenities. This seemingly obvious point has important implications. Household valuations of location-fixed amenities are systematically understated by studies that consider only the wage or rent compensation separately. For example, access to the central business district is valued in urban economics through the rent gradient, yet high-access cities will have lower overall wages than low-access cities. Similarly, wage studies valuing such amenities across labor markets understate the value of amenities by ignoring any rent compensation.

Those authoring such "single-market" studies have, at least implicitly, justified the approach with the notion that one first selects a labor market area (finds a job), then at a second stage chooses a location in that labor market (finds a house). Such behavior is only rational under quite restrictive as-

sumptions, since one would not generally select a labor market independently of residence traits and housing costs, and vice versa.<sup>1</sup> The multimarket-amenity-compensation hypothesis, that amenities are priced in both land and labor markets, has been assumed on theoretical grounds by various researchers interested in constructing quality-of-life indexes, notably BBH and Roback (1982). Here we offer a test of the hypothesis relying on much of BBH's county data and results. The test is of considerable interest in its own right, as it yields several implications about the behavior and well-being of the retired. These implications stem directly from the exit of the retired from the labor force.

The data employed and the nature of an appropriate test are discussed in Section I, which also presents the empirical results. These results strongly support the contention that amenities are capitalized in both land and labor markets. Section II concludes the note and presents some policy implications.

## I. Theoretical Considerations, Data, and Empirical Results

In a world with spatially varying amenities that matter to households and firms, general equilibrium should involve some mix of wage and rent compensation across space (see Roback, 1982). If all people had identical tastes, the relative compensation in the

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<sup>1</sup>The assumption of sequential behavior has a long and indistinguished history in empirical economics and in other disciplines (e.g., in the migration literature, the decision to move is often modeled to be independent and prior to the decision of where to move). It seems to us that the primary reason for this approach is computational tractability of the resulting econometric model (e.g., the use of nested logit instead of multinomial probit).

land and labor markets would be immaterial: households would care only about the total payment for the level of amenities available at alternative locations. Should people not be identical, whether utility gains can be obtained by being "different" will depend generally on how many people are different. If the number of people having distinct preferences is small, then these people will receive a utility gain by moving to areas offering the amenities to which they are strongly attracted. They will get the utility gain because they are too few in number to affect the compensation structure generated by the dominant majority. As the group with different preferences gets larger, their demands for specific traits grow, potentially disrupting market compensation patterns.

Now consider the case of the retired. They are clearly different from those in the labor force, in the sense that upon retirement they no longer have to pay for amenity compensation occurring in the labor market. Hence, under the hypothesis of multi-market amenity compensation, with zero moving costs, the retired would be expected to move to areas where amenities are priced largely in wages.<sup>2</sup>

Should retired flows to such areas be large or persist for a sufficiently long time, rents could conceivably be driven up to capture the full value of the amenities present. This is not the case empirically. In fact, the mean value of amenity compensation in land markets is actually smaller, both in counties that experience elderly in-migration and in counties having a larger percentage of elderly than the sample mean.<sup>3</sup>

<sup>2</sup>Depending on complement/substitute relationships between leisure and amenities and also depending on the size of the "price reduction" from the existence of wage compensation, the retired might also demand more amenities, further increasing the likelihood of a move. These arguments apply, with less force, to workers nearing retirement. Since the opportunity costs of moving drop sharply at retirement, the empirical significance of this phenomenon is likely to be limited.

<sup>3</sup>The mean value of the rent-compensation variable in the BBH data is -\$885 with a standard deviation of \$779. The mean value of rent compensation in counties

There are several reasons why one would not expect the elderly to have a great impact on land-market compensation. First, the flows of elderly in-migrants are small relative to overall in-migration.<sup>4</sup> For the 122 counties in the BBH data having both positive net in-migration of all ages and positive net in-migration of the elderly, the ratio of elderly to total net in-migration averaged 0.13, with a standard deviation of 0.34.<sup>5</sup> Second, the cumulative percentage of the elderly is not high in most areas. This should not be surprising: many of the sick elderly return to their origins, and of course, elderly deaths tend to offset in-migration. The stock of the elderly ranges from 4.3 percent to 30 percent in the county data, with a mean of 10.4 percent. The distribution is skewed to the right, so that, in fact, 97 percent of the sample counties have an elderly percentage below 20 percent. In 1980, the U.S. average share of the population was actually somewhat larger (11.3 percent) than the average of the counties under consideration here. This suggests that our sample of larger counties also contains more productive counties, which, in equilibrium, should have higher wages and higher rents than less productive counties. The elderly, no longer receiving the wage compensation in productive counties, would be flowing to less productive counties at retirement and cumulating in greater numbers there. Hence, our results would be stronger if data were available for all counties, making it even less likely that the elderly are affecting the compensation shares in the BBH sample. Finally, our sample contains a number

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with positive net in-migration of the elderly is -\$903, while the mean is -\$891 in counties with above-average elderly population percentages.

<sup>4</sup>Monetary and nonmonetary moving costs are high for the elderly, and the number of periods over which utility gains can be achieved is low; hence, relatively few of the elderly actually move.

<sup>5</sup>For the 207 counties that experienced either positive or negative net in-migration of both the elderly and persons of all ages (some counties had positive in-migration of one group and out-migration of the other), the corresponding ratio is 0.15 with a standard deviation of 0.31.

of quite populous counties that offer considerable wage compensation; it would take a great many elderly to drive all the compensation into rents in so many locations.

Hence, in the empirical work that follows, we assume that the location and relocation behavior of the elderly retired does not affect the compensation structure established by the dominant majority. To the extent that this is only approximately the case, quantitative—but not qualitative—results may change. The major theoretical implication then is as follows: in a world in which compensation for amenities occurs in varying degree in land and labor markets at alternative sites and there are no moving costs, retirement migration will be toward areas in which more of the compensation for amenities is in wages.<sup>6</sup>

To test this proposition requires the estimation of wage and rent hedonic equations. In BBH, hedonic equations were estimated employing microdata from the 1980 census, merged with county-based data on climatic, environmental, and urban conditions. The census data were observations on 34,414 housing units and 46,004 individuals merged with county, standard metropolitan statistical area (SMSA), or industry data from a variety of sources. The large sample led to reliable hedonic information for 253 counties from across the nation. The Census A sample, containing information on 340 of the more than 3,000 counties in the United States, was used. Further reductions were made necessary by the lack of amenity data. The data are discussed fully in BBH.

The amounts of amenities priced in wages (WAGECOMP) and in rents (RENTCOMP) were obtained from BBH. These were calculated from the estimated least-squares coefficients of the amenity variables in the wage and rent hedonic equations,

<sup>6</sup>Some caveats should be noted. It has been implicitly assumed that preferences are identical between workers and retirees; however, variation in the importance of amenities may occur across these cohorts. Also, in multiple-worker households, movement at retirement will be less likely if the two workers are of different ages.

multiplied by the levels of the amenities in the counties.<sup>7</sup>

The retired, as well as the working population, should be indifferent to the rent compensation for amenities, RENTCOMP, since in equilibrium both groups pay for the benefits. However, the retired can receive utility gains by relocating to areas with higher WAGECOMP. Workers, on the other hand, have no expectation of receiving utility gains by moving to such locations. Hence, the dependent variables examined are the migration behaviors of these two population subgroups.<sup>8</sup>

Workers could be defined as those between the ages of 25 and 64, and retirees could be defined as those 65 and older. There are some problems with these definitions, however. First, some workers under 65 are, in fact, retired.<sup>9</sup> This would bias estimates in the worker equation, because these retirees are expected to move to areas with high WAGECOMP. To lessen the severity of this problem in comparing the behavior of workers and nonworkers, we dropped people aged 55 to 64 from the worker sample and considered only people aged 25–54 years old as workers (NT2554). Second, some people aged 65 and over are not retired. This fact does add noise to the dependent variable (NET65UP) in the retiree equation. It does not create any bias,

<sup>7</sup>We are grateful to BBH for making these calculations of estimated wage and rent compensation for the 253 counties available to us.

<sup>8</sup>Alternatively, one could regress the percentage of elderly or the elderly stock on compensation variables. This could be appropriate if relative amenity compensation remains constant over long periods, but this is unlikely, due to the changing importance of both consumption and production amenities. Elderly flows during 1975–1980 are then preferred, since they relate more closely to the 1980 compensation measures of BBH.

<sup>9</sup>While approximately 16 percent of 60-year-old men were retired in 1970, 29 percent had exited from the labor force by 1985. For those at age 55, only 8 percent were retired in 1970, with this figure doubling by 1985. If amenities were superior, or if tastes changed favoring them, this earlier retirement phenomenon would be expected, since earlier moves have the same (or lower) costs but more periods over which to enjoy the benefits.

TABLE 1—DESCRIPTIVE STATISTICS

Variable	Mean	SD	Maximum	Minimum
AMENSUM	171.1	640.1	3,289.0	-1,792.0
GRWTHRTE	16.8	21.2	95.1	-15.6
RENTCOMP	-864.6	792.2	1,374.0	-3,151.0
WAGECOMP	1,036.3	997.3	3,710.0	-2,410.0
NET65UP <sup>a</sup>	46.5	6,681.7	$3.68 \times 10^4$	$-4.40 \times 10^4$
NT2554 <sup>b</sup>	3,084.4	20,235.0	$1.21 \times 10^5$	$-1.216 \times 10^5$

Correlation matrix:

	Variable					
	AMENSUM	GRWTHRTE	RENTCOMP	WAGECOMP	NET65UP	NT2454
AMENSUM	1.000					
GRWTHRTE	0.181	1.000				
RENTCOMP	0.039	-0.202	1.000			
WAGECOMP	0.610	0.277	-0.767	1.000		
NET65UP	0.263	0.473	-0.250	0.367	1.000	
NT2554	0.120	0.534	0.013	0.067	0.593	1.000

<sup>a</sup>NET65UP is net in-migration of those age 65 and over.

<sup>b</sup>NET2554 is net in-migration of those age 25-54.

however, because elderly workers, like the younger worker control group, should be unaffected by WAGECOMP.

The model of household behavior discussed informally here could be estimated on microdata. There are, however, several advantages to the use of aggregate data. First, the available county-level hedonic calculations merge conveniently with census information on internal migration flows, also available by county. Second, aggregate data allow the use of easily implementable least-squares statistical analysis (compared to more complicated discrete-choice models). Finally, related to the first advantage, since our amenity data is at the county level and covers 253 counties, an extremely large microdata set would be required to estimate model parameters accurately. The aggregate measure of migration of the two population subgroups, discussed further below, comes from census data on net flows during the 1975-1980 period (see Bureau of the Census, 1980).

Summary statistics for the variables in the empirical analysis are presented in Table 1. There is considerable variation in WAGECOMP, the principal explanatory variable. Note that the simple correlation between WAGECOMP and RENTCOMP is -0.77.

This supports the observation made above that the large counties in our sample are also relatively productive, implying higher wages (low WAGECOMP) and higher rents (high RENTCOMP).

Table 2 presents regression results for the elderly (panel A) and the working population (panel B). Since the model provides no guidance on the functional form of the dependent variable, two forms were used. The dependent variable in columns 1-4 is the net in-migration of individuals. The dependent variable in columns 5-8 is the net migration rate, defined as net in-migration divided by 1980 destination population. Since both forms of the dependent variable are averages over population groups of quite diverse size, weighted least-squares regressions were employed.<sup>10</sup> The coefficient of WAGECOMP provides the test of the multimarket-amenity-compensation hypothesis. In order to isolate the WAGECOMP effect, it is necessary to hold the total value of the

<sup>10</sup>The regressions with unweighted data rejected the  $\chi^2$  test of the difference between the least-squares covariance matrix and a heteroscedasticity-consistent covariance matrix (see Halbert L. White, 1980). The qualitative conclusions of the text are, in fact, unaffected by weighting.

TABLE 2—ESTIMATED COEFFICIENTS: RETIRED AND WORKER REGRESSIONS  
(*t* RATIOS IN PARENTHESES)

A. Age 65 and Older:								
Variables	Net in-migration				Net in-migration rate			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WAGECOMP	4.49 (6.60)	5.66 (6.01)	3.33 (5.12)	4.19 (4.72)	3.20 (4.77)	2.82 (3.25)	1.34 (2.50)	0.71 (1.03)
AMENSUM	0.93 (0.84)	-1.62 (1.08)	0.39 (0.38)	-0.53 (0.38)	2.00 (1.83)	0.23 (0.17)	1.13 (1.35)	1.79 (1.67)
GRWTHRTE			185.97 (6.67)	232.36 (6.89)			2.98 (3.01)	3.33 (12.72)
Division dummies		XXX <sup>a</sup> (1.57) <sup>b</sup>		XXX (2.09)		XXX (6.63)		XXX (5.88)
<i>R</i> <sup>2</sup> :	0.23	0.27	0.35	0.40	0.18	0.32	0.52	0.60
B. Age 25-54:								
Variable	Net in-migration				Net in-migration rate			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WAGECOMP	1.07 (0.51)	3.67 (1.38)	-3.76 (2.02)	-0.82 (0.33)	-0.21 (0.07)	2.53 (0.63)	-9.73 (4.18)	-6.87 (2.12)
AMENSUM	9.18 (2.68)	0.38 (0.09)	6.94 (2.38)	3.69 (0.96)	5.33 (1.05)	-12.27 (1.92)	0.96 (0.26)	-5.33 (1.05)
GRWTHRTE			7.74 (9.71)	7.08 (7.56)			15.24 (15.28)	14.83 (12.02)
Division dummies		XXX (7.76)		XXX (3.88)		XXX (7.15)		XXX (0.17)
<i>R</i> <sup>2</sup> :	0.05	0.25	0.32	0.40	0.01	0.20	0.49	0.51

<sup>a</sup>“XXX” indicates that the set of divisional dummies is included.

<sup>b</sup>The number below the XXX is the *F* statistic for the test of the null hypothesis that coefficients on the set of regional dummies are equal to zero. The 0.05 and 0.01 tails of the *F* distribution with the appropriate degrees of freedom for this test are approximately at 1.98 and 2.60, respectively.

amenities (AMENSUM, equal to the sum of WAGECOMP and RENTCOMP) constant. Failure to do so would mix the retirement price-reduction effect with an amenity-demand effect. While there may in fact be a change in the demand for total amenities at retirement, the model provides no formal prediction of the sign of any such effect.<sup>11</sup>

<sup>11</sup>The model would provide a rare example of a utility-constant price effect, were it not for the presence of leisure in the utility function. That is, if utility is smoothed over the retirement decision, then the

The empirical results support the theoretical expectation that the elderly are moving toward locations in which amenities are reflected in wage compensation. In the regression of net in-migration of the elderly on WAGECOMP controlling for AMENSUM

transition to retirement represents a pure amenity price reduction (the price of amenities relative to goods), and behavior could be observed in this near-textbook setting. The possibility of substitutability or complementarity of amenities with leisure clouds this clean effect.

(see columns 1 and 5 in Table 2A), the WAGECOMP coefficient is positive and significant. These equations explain a substantial portion of the variation in net immigration and net in-migration rates.<sup>12</sup>

This result by itself might not generate great confidence in the test of the model. Often, empirical results are spurious or are consistent with several competing hypotheses. It might be the case, for example, that WAGECOMP affects the retired through some mechanism unrelated to our model. If this is so, there is every reason to believe that this mechanism should also affect other groups in a similar manner. To explore this possibility, Table 2B presents parallel results for the working population. The model predicts that workers should be indifferent to the WAGECOMP variable. In five of the eight specifications, the WAGECOMP coefficient is not significantly different from zero. In the three specifications in which WAGECOMP is statistically significant, it is estimated with a negative sign. Whatever is the cause of this outcome, that cause is being swamped in the retired equations by effects predicted by the model.<sup>13</sup>

These basic results are robust to the inclusion of a number of additional potential explanatory variables suggested by the literature on migration. In columns 2-4 and 6-8 of Table 2, the impacts of two such variables were explored alone and in combination. First, the nine U.S. Census division dummies were included to determine whether the WAGECOMP effect might be a proxy for a more traditional regional effect; this was found not to be the case, as the coefficient on the WAGECOMP variable remained positive and significant. The regional dummies were collectively significant at the 5-percent confidence level.

The second additional explanatory variable is the growth rate in the destination county (GRWTHRTE). Population growth

rate was measured by the percentage change in population from 1970 to 1980. This variable was included because of a potential difficulty not addressed by the equilibrium model, namely the degree of disequilibrium underlying the compensation data (see Michael J. Greenwood et al., 1990). That is, if there are unobserved factors or if the population has not fully adjusted to observed factors, utility will be higher in some locations than in others; this would provide an additional (disequilibrium) motivation for moving. Should such factors, which will affect the growth rate, be correlated with WAGECOMP, the latter's strong impact might be spurious. The growth rate in the destination county was, not surprisingly, positive and statistically significant. As was the case with the divisional dummies, inclusion of this variable did not affect the conclusion regarding WAGECOMP.

## II. Conclusions

Elderly behavior is found to be consistent with model expectations, namely, migration to locations where amenities are predominantly priced in labor markets.<sup>14</sup> This find-

<sup>14</sup>The results for the elderly would have likely provided even more pronounced support for the model had our data allowed the control of wealth (income) and health. The very wealthy retired will be expected to be differentially attracted to high-amenity locations, since amenities are expected to be normal goods. Many such locations possess amenities, such as ocean access, that are quite location-specific and hence likely to be priced in rents. Similarly, the value of amenities to those elderly who are in ill health is diminished; the presence of relatives and friends in preretirement locations might be expected to dominate the mobility behavior of those constrained to the indoors. Indeed, return migration of the very old is commonly observed (see Graves, 1979). Since the behavior of both these groups is implicitly embedded in our findings, the strength of our results is diluted. Moreover, as noted earlier in the text, the model expectation is that the retired should be moving primarily to less productive counties, counties that are largely omitted from our sample due to data limitations underlying the hedonic equations of BBH. The fact that the percentage of elderly in less populous counties is larger than the percentage of elderly in the counties of our sample supports model conclusions. Exploring these issues is beyond the scope of the present effort and would require microdata on a large sample of households.

<sup>12</sup>Not only is the coefficient on WAGECOMP statistically significant, but both beta coefficients and elasticities are large, reflecting the important impact of this variable on elderly migration.

<sup>13</sup>We thank an anonymous referee for suggesting the possibility of a lot-size effect, an effect that we were unable to control for in our data.

ing should be considered in future work dealing with the migration behavior of the elderly, in light of the empirical importance of wage compensation. Policy implications of the model for the elderly are pronounced. First, the nature of appropriate infrastructure investments (hospitals versus schools, for example) will be affected. Second, potential amenity gains from migration at retirement imply that optimal retirement should occur earlier than if amenities were not in the utility function. This would be expected to show up as cross-sectional differences in retirement timing due to different potential gains from migration, an unexplored implication of the model. Retirement timing, in turn, is critically related to demands on the social security system. Third, the well-being of the elderly has been systematically understated by failing to include the reduced price of amenities and the increased leisure consumed at retirement.

We tested the multimarket-amenity-compensation hypothesis by looking at the implications of that hypothesis for the behavior of the elderly, a group having traits different from the dominant majority. In like manner, firms would be expected to have traits (perhaps being differentially land- or labor-intensive) that would imply systematic relocation along analogous lines. Such an approach would yield insights into the poorly understood firm location decision which is vital to the understanding of the general equilibrium in land and labor markets assumed here.<sup>15</sup> For example, regardless of total amenity level, labor-intensive firms should be particularly attracted to areas with relatively high WAGECOMP (low wages), while land-intensive firms should desire areas with low RENTCOMP (low rents). Urban planners, wishing to attract labor-intensive firms, may find indirect approaches affecting WAGECOMP (e.g., region-wide environmental improvements)

more effective than direct policies that would also influence RENTCOMP (e.g., provision of roads, certain tax breaks).

The theoretical and empirical results indicate that the general multimarket-amenity-compensation model presents a more accurate picture of the spatial equilibrating mechanism than does the competing hypothesis that amenities are priced separately into either the land or the labor market. An immediate implication of this is that a host of attempts to provide household valuations of various amenities, from environmental quality to central-city access, are likely to be flawed.

The findings here provide support for the superiority of quality-of-life rankings based upon multimarket amenity compensation (e.g., that of BBH) to ad hoc alternatives (such as those published by Rand-McNally). That these popular rankings are quite different for the economic approach versus prevailing alternative weighting schemes casts doubt on the latter.

The final conclusion of the results presented here is that cost-of-living considerations in regional policy decisions are, at present, not properly conducted. The principal cause of cost-of-living differences is the local rent and wage structure: land-intensive goods will be expensive in locations with high rents, while labor-intensive goods will be expensive in locations with high wages. However, illustrating with rents, rents can be high because a location has desirable consumer amenities (in which case rents measure benefits of living, not costs!); or, rents may be high because a location is very productive and the competitive bidding in labor markets lures workers there, driving up rents (in which case rents do measure cost-of-living, although there would be compensation in wages). These ideas are not being incorporated into policy decision-making in, for example, spatial variation in social security, welfare, military compensation, and so on.

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<sup>15</sup>Indeed, it is largely the variation in firm amenities that gives rise to the varying compensation shares that underly the present test of the multimarket-amenity-compensation hypothesis.

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