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Mobility Behavior of the Elderly[1]

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Mobility patterns of the elderly provide a particularly interesting theoretical subcase of a more general migration model which interacts individual-specific traits (e.g., health and retirement status) and location-specific traits (e.g., amenities, rents, and wages). The spatially invariant incomes (pensions, dividends, etc.) of the retired are shown to lead to migration toward areas where the wage and rent compensation for amenities (necessary for spatial equilibrium) occurs primarily in the labor market, rather than in the land market. Empirical evidence appears to be consistent with theoretical expectations; more investigation, however, is clearly desirable.

I. INTRODUCTION

More than 60 million people in the United States are 50 years old or older. Greenwood [5] notes that

> retirement migration promises to begin a decline during the 1990's as those born in the 1930's begin exiting the labor force. Then in the early 2000's as the baby boom generation begins reaching retirement, a new and much heavier wave of retirement migration is likely to occur.

However, in spite of its importance, surprisingly few formal analyses exist concerning the mobility of the elderly (see the overview papers of Wiseman and Roseman [10], Rudzitis [9] and the discussion of elderly migration from central cities by Rudzitis [8]). This failure to consider the mobility behavior of the elderly extensively is unfortunate in at least two regards. First, the number of elderly in an area has an important bearing on the appropriate composition of publicly provided goods (e.g., fewer schools and more

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hospitals). Second, as will become clear, the elderly are different from other demographic groups in ways that are interesting from a theoretical perspective.

As demonstrated by Graves [1] and Graves and Regulska [4] for a broader range of amenities, retirement leads to an increase in mobility with movement directed more toward amenities (e.g., pleasant climates) than is the case for workers. The interesting theoretical wrinkle is that the behavior of the rest of the population leads generally to amenity capitalization in both the land and labor markets (with higher rents and lower wages in areas with more amenities, see Graves [2] or Graves and Knapp [3]). However, the retired elderly are no longer competing in the labor markets; they have incomes which are independent of location. This has important, largely unrecognized, implications for where they wish to move—in particular, they prefer locations in which a larger percentage of the value of amenities are capitalized in labor markets relative to land markets.

In Section II we present a formal model of the more general location decision, and then specialize it to address the question of how the traits of the elderly alter results. The closing Section III briefly interprets available empirical evidence and indicates fruitful directions for further work.

II. THE MODEL

As with any individual, mobility behavior of an elderly person depends on traits specific to him or her as well as on traits specific to alternative locations. That is, if all locations were identical in traits (i.e., wages, rents, and all amenities were the same in all locations), there would clearly be no utility gains to be achieved through movement. But in the real world of substantial variation in wages, rents, and amenities, the impact of that variation on mobility depends on traits, and changes in traits, of the population. We shall first develop the general model and then indicate the salient alterations needed for appropriate consideration of the elderly.

Let satisfaction depend on the consumption of two types of ordinary goods, "tradeable" goods, X, and "nontradeable" goods and services, Z, on amenities, A, on lot size (space), S, and on leisure, T. Increases in the level of any of these desirable variables are presumed to increase satisfaction; hence, the partial derivatives associated with these variables in the following general functional form are positive:

$$U = U(X, Z, A, S, T). \tag{1}$$

People locate in those areas giving them the highest level of satisfaction. However, the interactions among site offerings can be complex. From the perspective of ordinary goods consumption desirable locations are those where people are most productive. Moreover, if the productive areas are also desirable in terms of amenities they are still more attractive as places to

live. It is possible that the world is "out of equilibrium" in the sense that there are locations which give higher levels of satisfaction than other locations; that is, the U of (1) should be subscripted to reflect the fact that utility may not be the same everywhere. But is the world likely to be very far from an equilibrium in which utility is the same everywhere? We believe not, on the grounds that mobility in the United States is quite high and information about alternative locations is good. Additionally, important insights regarding ongoing migration patterns follow from an analytical construct invoking equilibrium. Locations with high levels of amenities have people move toward them until wages fall and/or rents rise sufficiently to render the levels of satisfaction the same in all locations. If we assume that equilibrium roughly characterizes the world, then utility is the same everywhere and this is accomplished via the wage and rent compensation incorporated in the following Beckerian "full-income" constraint, where 720 is the number of hours in a month:

$$I = Y + w(A)*(720) = X + p(w, r)*Z + r(A)*S + w(A)*T, \quad (2)$$

where

I = total income from all sources (in terms of the numeraire good, X, whose spatially invariant price is normalized to unity)
Y = nonwage income which is spatially invariant
$w(A)$ = the wage rate (which depends on amenities)
$p(w, r)$ = the price of nontraded goods and services which depends on local variations in wages and rents
$r(\mathfrak{M})$ = rental cost of lot size (which depends on amenities).

We have, then, that compensation occurs in land and labor markets which makes our homogeneous working household indifferent among locations—those locations which are nicer are more expensive by an amount exactly offsetting their amenity advantages. Only changes in either people traits (e.g., rising real incomes everywhere with amenities being superior goods) or in location traits (e.g., rising crime rates at particular locations) can result in relocations in this model and those relocations give rise to a new set of compensating differentials in the land and labor markets which reestablish equilibrium. Note that models which assign the equilibrating process to either rents or wages alone (i.e., the intraurban rent gradient approach of urban economists or the interurban wage models of labor economists) are, as first demonstrated by Roback [6], special cases of this more general model. These special cases are unrealistic.

Manipulating the first-order conditions which arise from the individual household's constrained optimization in the standard manner yields the

following:

$$U_x = \lambda \tag{3}$$

$$U_z/U_x = p(w, r) \tag{4}$$

$$U_s/U_x = r(A) \tag{5}$$

$$U_t/U_x = w(A) \tag{6}$$

$$U_a/U_x = dr/dA * S - dw/dA * (720 - T) \tag{7}$$

The interpretation of (3)–(6) is standard with the marginal rates of substitution between various goods being equal to their price ratios. Equation (7) is more complicated, indicating that the marginal rate of substitution between amenities and the numeraire good depends on how amenities are capitalized. If they are priced only in the land market, as presumed in the hedonic analyses of urban economics, the second term drops out; if they are priced only in the labor market, as presumed in the hedonic analyses of labor economics, the first term drops out. In general, amenity values will be capitalized in both markets (see Roback's [6] general equilibrium framework). Equation (7) shows that the price of a unit change in the amenity is equal to the positive impact on rents (per unit of area) times the amount of lot size purchased minus the (negative) impact on wages (per hour) times the number of hours worked. The aggregate impact of the location decisions of the households gives rise in general equilibrium to the dr/dA and dw/dA terms in (7) which are, then, parametric to the decision of any individual household.

Thus far we have shed little light on the mobility of the elderly. In the case of diverse types of households all of which are in the labor force, people differences affecting either the utility function or the budget constraint do not alter the results much. Additional provisos need to be attached to the analysis, most notably that if people of all types, say those at each educational level, exist at each location, then compensation guarantees that they receive the same utility in each location. That utility varies with each type of person and the structure of compensation also varies. For example, the wage compensation necessary to lure a highly educated person to an undesirable area might be expected to be larger (if amenities are superior) than that necessary to lure one with less human capital. Indeed, stratifying by occupational categories has been shown to lead to varying degrees of compensation (see Rosen [7]). However, it is seldom clear whether such disaggregation reflects people differences or a mix of influences including spatial productivity differences as well.

But one difference, which exists for the preceding types of people differences as well, is important when one considers the elderly. While people of various skills compete in different labor markets, people of all types compete in the same *land* market. That is, a desirable plot of land is

occupied by the highest bidder, whether that be a doctor or an accountant, but the compensation in a desirable area may differ between these two groups. In the case of workers, this alters the ratio of labor to land market compensation, but that effect is important in the case of the retired elderly.

To clarify, return to the budget constraint, (2), and note how it changes when one retires. Equation (8) represents the budget constraint facing a newly retired person, assuming that this person has a negligible effect on existing compensation patterns:

$$I = Y = X + p(w, r) * Z + r(A) * S. \tag{8}$$

This revised budget constraint gives rise to a different set of first-order conditions and, consequently, a new optimal relative quantity of the amenity and the numeraire good:

$$U_a/U_x = dr/dA * S. \tag{9}$$

This tangency, abstracting from possible income effects, involves larger "purchases" (through location) of the amenity since the wage component of the amenity price is zero to the retired. In addition, the prices of nontraded goods are lower where wages are depressed because of desirable amenity levels (recall (4)).[2] Moreover, looking at (8), since income is independent of location, the productive locations, which have high wages and hence high nontraded goods prices, are unattractive to retirees.

Modest generalizations of this retiree location model raise several questions. First, there are many amenities—would one expect that they differ in the extent to which they are capitalized in the land market versus the labor market? It seems that a larger proportion of the price of a very location-specific amenity, like ocean access, would be capitalized into rents, while a spatially ubiquitous amenity, such as warmth in the desert southwest, might be capitalized largely in wages. Second, do the compensation shares vary across sites, even when considering only one amenity? Suppose a unit improvement in air quality is worth $500 annually to people. Is it not possible, even likely, that in San Francisco the shares could be $100 in wages and $400 in rents, while in Phoenix the shares could be reversed, with most of the compensation occurring in labor markets? If so, the implications for retirement mobility patterns are clear: retirees seek locations where both the amenity bundle and the compensation pattern result in relatively more of the compensation for amenities occurring in labor markets.

A third question is whether we can consider the retired as a small group in terms of not affecting the pattern of compensation—are they really price

[2]Note that both w and r in the nontraded goods price, $p(w, r)$, are functions of A—Equation (9) could be modified to directly incorporate these effects. We ignore this chain-rule impact to focus directly on differences due to retirement.

takers? Or, are their numbers sufficiently large, and growing, to alter the ratio of compensation occurring in land versus labor markets? Presumably, if the retired are a large group in this sense, a higher percentage of the compensation for amenities occurs in land markets. We do not know the extent to which this possibility dilutes the results presented here, although it is unlikely that qualitative changes would result.

What kinds of locations are likely to offer the bundle of amenities having the property that the amenity values are capitalized into wages and not rents? In general, it is easy to establish that, for working households, amenities tend to be capitalized in both markets, though to varying degrees. This follows most obviously from city size effects; the desirable areas have influxes of people which drive down wages (encouraging further firm inmigration) and which drive up rents as described in the usual urban rent gradient analysis. A potential mover considers not only his or her wage offer at a particular location, but also the cost-of-living and endogenous disamenities which depend on how many other households have chosen that location.

For the retired population, the situation is different, as already implied. Sites exhibiting consumer amenities that are also productive have an ambiguous wage effect, but have unambiguously higher rents [6]. One should not expect retirees to locate in such areas, since much of the amenity value is reflected in land markets. Locations offering ubiquitous amenities, such as a warm climate which extends far beyond the boundaries of the city, have relatively large portions of compensation occurring in labor markets. Such amenities are attractive to retirees since they have lower relative prices than other amenities. By forming communities at the fringes of such areas, the retired can increase not only their real utility for the two reasons already discussed, but they can also alter the package of publicly supplied goods to suit their interests, enabling them to get more from their tax dollars. For example, residents of Sun City, Arizona, have eliminated the need to supply educational facilities by proscribing those with children less than 18 years old, substituting golf courses, entertainment bandshells, and the like.

What else may be learned from the revised budget constraint applicable to the retired elderly? First, note that the size of the retirement pension is a function of the wage compensation at the retirement work site. The pension from an amenity-rich, low-wage area will be lower than that from an amenity-poor, high-wage area. Hence a retired janitor from Phoenix may not be able to consider as large a range of locations as a retired janitor from Detroit. Also, the term on the right hand side of (2) is not in (8); that is, there are no foregone earnings associated with decisions to acquire more leisure. At the larger amounts of leisure consumed, the complementarities embedded in the utility function (1) become important. Of interest for

present concerns is the complementarity of leisure with amenities and lot size. If, holding concerns of health status constant, leisure and lot size are complements (e.g., using leisure time in the pursuit of the ultimate rose garden), then this provides a further impetus for relocating to areas in which the amenities are capitalized largely in wages and not in land. Leisure is, moreover, likely also to be complementary with amenities since amenities enhance the enjoyment of recreational activities such as golf, tennis, and the like. Since the working population is largely constrained to the indoors in a modern industrial/commercial society, the nonworking population is likely to spend a larger percentage of their time outdoors, hence climatic amenities are likely to be important to the retired. This effect may well be offset for the elderly whose activities are constrained by health; for this portion of the elderly desired lot size may be smaller, rather than larger, and outdoor climate may be of little interest when compared to access to relatives and friends. Hence, one will not expect the flows of elderly migrants to be unidirectional.

For a low-pension retiree, cost savings may override amenity preferences in the location decision. Examples of low-cost areas would be locations where *dis*amenities are capitalized largely in rents, rather than in higher wages. Hence, one expects to observe large concentrations of the poorer elderly in large unrenewed urban areas with high levels of disamenities. Moreover, as health status declines, amenity demands become less important for retirees of all pension levels. Hence, the presence of substantial return migration from Florida, Arizona, Texas, and California as health status declines. Indeed, these return flows account for the observation that Florida has comparatively few hospital beds and nursing homes per capita.

III. CONCLUSIONS

A number of hypotheses are suggested by the model of Section II. Unfortunately, little in the way of appropriate research has been conducted. The problem is that there are no efforts to date which properly interact individual traits (age and health status) with location traits (climate and crime).[3] A multinomial analysis, employing individual traits as independent variables and with the dependent variables being "movement to place of

[3] The importance of individual traits is the focus of Graves and Linneman [11], where probit regressions assess the probability of moving as a function of a host of individual traits. Some suggestive work (e.g., Graves [1], Graves and Regulska [4], or Rudzitis [8]) aggregates individuals into groups having different traits, notably age, and finds that location traits do have different effects on mobility across such groups. These aggregate studies have less formal modeling appeal than the probit or logit analyses conducted to date, yet they offer insights as to *where*, and not merely why, individuals migrate. Of note is that the effect of income at a destination on migration reverses sign (becoming negative) as groups closer to retirement are considered—this is consistent with seeking lower costs of local goods at retirement.

type i" (characterized by amenity, rent, and wage data), would be the next step. Such a step is computationally difficult and involves merging location data with individual data. Additionally, further evidence on the wage and rent components of amenity prices would serve to reveal what sorts of locations would be expected to be differentially more attractive to the elderly in terms of their price composition. Research efforts of these types, guided by the model presented here, should serve to enhance our understanding of the complex influence of amenities upon the elderly retiree.

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