MPRA

Munich Personal RePEc Archive

On the role of amenities in models of migration and regional development

Thomas A. Knapp and Philip E. Graves

University of Pennsylvania, Wilkes Barre, University of Colorado

1989

ON THE ROLE OF AMENITIES IN MODELS OF MIGRATION AND REGIONAL DEVELOPMENT*

Thomas A. Knapp and Philip E. Graves†

ABSTRACT. The role of location-specific amenities in human migration decisions, and subsequently regional development, is explored. A framework is developed which motivates a new assessment of existing alternative models of regional development, indicating the need for additional modeling efforts which focus upon amenities as critical elements in such analyses. The approach hinges upon the notion that amenity values are capitalized into wages, rents, or other local prices. This process of capitalization enables researchers to explore the implicit value that society places upon amenities, which can then be used in assessing future regional-development trends in a more comprehensive manner.

1. INTRODUCTION

Many recent approaches to explaining regional development incorporate the notion of location-fixed amenities to explain human migration decisions in both equilibrium and disequilibrium settings. According to such models, changes in consumption patterns of amenities are achievable only by relocation. Graves and Linneman (1979) for example, argue that in an equilibrium setting, rising per capita income levels lead to changing demands for location-specific amenities. These changing demands lead to migration flows to more desirable locations over time (Graves, 1983). The discussion focuses on the implications of the fact that the mobility behavior of firms and households, the impetus for regional development, is also the mechanism by which location-specific factors such as amenities are capitalized into land and labor markets. Joint examination of both the amenity capitalization process and other forces leads to a greater understanding of migration and regional development than can be achieved by separate examination. This paper explores the role of location-specific factors in human migration decisions and, hence, regional development.

We develop a framework which motivates a new assessment of existing alternative models of regional development, indicating the need for additional modeling efforts which focus upon amenities as critical elements in such analyses. The process of amenity capitalization via location and relocation enables researchers to explore the implicit value that society places upon amenities. This then permits the assessment of future regional development trends in a more comprehensive manner.

Consider first the most simple model utilized to describe regional development. The simple neoclassical model of regional development assumes a single output and an initial difference in endowments of capital and labor between two regions. A low-wage region with a relative abundance of labor (or, equivalently, a relative scarcity of capital) should experience increases in the capital-labor ratio and, therefore, higher wage growth. The low-wage area is characterized by a high marginal product of capital prompting capital inflow and labor outflow in some mix. This process should equilibrate wages in the long run.

Empirical evidence running counter to the previous argument, led Borts and Stein (1964) to develop a labor-supply-oriented model with an emphasis on the employment expansion and regional growth which stem from migration. Blanco (1963), Lowry (1966), and Mazek (1969) examine models emphasizing regional productivity differences—a demand-side approach. Both analytical approaches involve a convergence toward equilibrium; the fundamental stance in these models is one of disequilibrium.

Merging the two approaches to gain insights into the relative importance of supply-side versus demand-side influences, first Muth (1971) and, more recently, Greenwood (1975) and Greenwood and Hunt (1984) construct simultaneous equation models of regional growth and decline. These models are in the spirit of earlier work in that they are disequilibrium in nature.

Until quite recently, the critical variable which led to equilibrium in the preceding models was the wage rate [or, as in Todaro (1969), the expected wage rate proxied by the unemployment rate in combination with the wage rate]. Initially, nominal wages were used under the implicit presumption that the rate of inflation would be roughly similar across regions. The existence of substantial variation in regional prices led to attempts to employ a price-adjusted real wage rate. There are some difficulties involving the use of different bundles across regions, but most studies begin, at least implicitly, by including rents in this cost-of-living adjustment. This will lead to important errors in such models since the true role of rents is not properly perceived. We now turn to a discussion of the alternative approach to regional development.

While the preceding events unfolded, labor and urban economists were developing models largely in isolation from one another. Labor economists and economic historians became curious about why wage differentials (such as North/South) were so slow to disappear—the required degree of immobility and/or lack of information flow seemed implausibly large (Scully, 1969; Segal, 1961; Fuchs and Perlman, 1960; Carlino, 1986; Lande and Gordon, 1976). The recognition that more must be going on led to two major innovations. First, a series of studies have utilized measures of human capital, job characteristics, and industry mix to explain the persistence of regional wage differences (Coelho and Ghali, 1971; Ladenson, 1973; Bellante, 1979; Sahling and Smith, 1983; Farber and Newman, 1987). Second, following Rosen (1974), the hedonic pricing method has been used to assess the value of location-specific amenities.

Urban economists were also proceeding along similar lines with an emphasis on rent variation as the dependent variable in the hedonic analysis. The basic urban economics model involves a monocentric city on a flat, featureless plain.

Employment is presumed to be concentrated at the city center and commuting costs are assumed to be positive. In such a world, the travel-cost advantages of locations near the workplace are bid into rents in order to equalize utility of similar people across sites. Initially, the higher rents associated with more central locations are viewed in the model as affecting only the budget constraint. However, a modest generalization which is to consider *access* as a location-specific amenity led to putting a new variable—an amenity—directly into the utility function. This opened up a whole new spectrum of possibly important amenities as first suggested by Harris, Tolley and Harrell (1968). The hedonic technique is now frequently employed in urban economics as in labor economics in order to impute the value of location-specific amenities; in many cases values for the same amenities are being imputed in separate markets. We now consider the issues raised by this disparate literature in more detail, beginning first with the demand side approaches.

2. THE DEMAND-SIDE APPROACH

The basic approach of Blanco (1963), Lowry (1966), and Mazek (1969) assumes that increases in the demand for goods produced in specific existing regions leads to increased labor demand in those regions. Hence, in-migration from other regions occurs. Implicit in this approach is the assumption that further growth in a particular industry necessarily occurs at or adjacent to existing plant locations. In order for this to happen, these models must appeal to one or more of the following influences. Scale economies may not be fully utilized at the old output levels, or production functions may shift at existing locations (Haurin, 1982). Also, labor supply is assumed to be quite responsive to small changes in wages. For were this not the case, demand increases would result in large wage increases which would provide an impetus for firms to go elsewhere. This assumption, then, enables Blanco (1963), Lowry (1966), and Mazek (1969) to ignore how human location decisions relate to firm location decisions (this is somewhat understandable as very little is known about the determinants of firm location). This approach to regional growth and decline is depicted in Figure 1 below.

In the demand-driven model, urban growth and decline is then determined by the multiplier effects set off by the initial shift in the demand for labor. For example, newly hired employees and their accompanying dependents demand locally produced goods such as haircuts and the like. In this disequilibrium framework, wages, and utility are closely and monotonically related.

In-migration stems, in this model, from the demand side, and is often modeled as

(1)   in-migration $= f$ (wages, unemployment)
                                                 $(+)$ $(-)$

Income is often substituted for wages as a matter of convenience (although there are sound theoretical reasons for being skeptical of such a procedure, as seen later), and unemployment is added as a proxy for the probability of receiving employment (i.e., a migrant is not indifferent between two cities of the same wage if the unemployment rate differs between them).
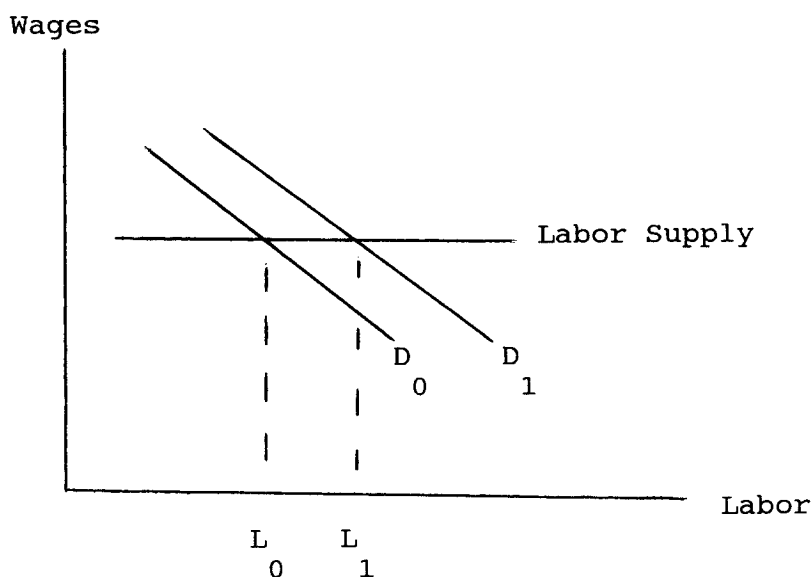
FIGURE 1:   The Demand-driven Approach.

This demand-driven model of regional growth and decline was quickly modified by the recognition that urban living costs become higher as the city becomes larger.[1] The wage or income term in the migration equations are deflated in some studies by a price index. This innovation was borrowed from the North/South wage-convergence debate where Coelho and Ghali (1971) first asserted that deflating earnings by cost of living resulted in an approximate equilibration of regional real wages. Later studies in this debate (Ladenson, 1973; Sahling and Smith, 1983; Bellante, 1979; Farber and Newman, 1987) utilize the BLS Urban Family Budgets and Comparative Indices for Selected Urban Areas. Since housing prices are included in the deflator, there began to be some consideration, implicitly, of the interactions between labor and land markets.

3. THE SUPPLY-SIDE APPROACH TO REGIONAL GROWTH AND DECLINE

Borts and Stein (1964) explain the apparent empirical contradictions of the neoclassical Hechscher-Ohlin model using a supply-dominated framework. The argument runs as follows: The outflow of labor from the low-wage area corresponds to an inflow of labor into the high-wage area. But with a constant-returns-to-scale production function and parametric output and price levels, the labor influx leads to employment gains of an equivalent amount with negligible changes in the wage rate in the high-wage region. That is, labor demand is virtually perfectly elastic in

---

[1]As pointed out by an anonymous referee, the cost of living may vary among cities for a number of reasons including climate (heating and building costs), distance from other urban centers (transportation costs), etc.
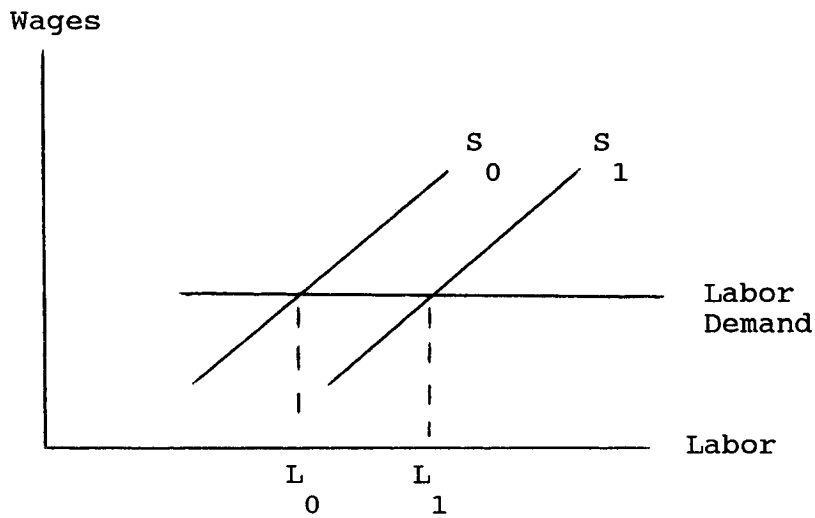
Wages

FIGURE 2:   The Supply-driven Approach.

all locations. Hence, migration and natural population increase from the low-wage agricultural sector to the high-wage manufacturing sector become important determinants of regional development. Diagrammatically, the situation is depicted as in Figure 2.

Note that the forces driving regional growth and decline in the supply-driven model as derived by Borts and Stein are largely demographic—the excess supply of labor from rural areas provided the impetus to urban growth. The diagram depicts shifts in labor supply as the driving force behind regional differences in population and employment. Other authors discuss notions such as the "bright city lights," infrastructure, and the like, adding amenities as explanatory variables (at least in verbal discussion) to the supply-oriented models of regional development. Measurement of the amenities is, in most cases, rather poor (e.g., using the number of freezing days as a proxy for warmth indicates that San Francisco is hotter than Phoenix).

4.   HEDONICS, COMPENSATING DIFFERENTIALS AND ATTEMPTS AT A MODELING SYNTHESIS

As discussed in the introduction, urban economists and labor/regional economists began to show an interest in valuing the amenities which appeared to be important determinants of rents and wages. Both of these recent uses of the hedonic technique in the spatial setting implicitly take an equilibrium stance. The valuations gauge compensation along indifference curves of equivalent satisfaction (whether wage compensation, assuming utility identical in homogeneous groups across labor markets, or rent compensation, assuming utility identical in homogeneous groups within a residential market). Clearly, amenities are important to regional growth and decline as disequilibrium variables, but they are argued in hedonic contexts to be fully capitalized into one market or another. Such an

approach assumes zero moving costs and complete information. Efforts to render the models more consistent with one another—to allow both equilibrium and disequilibrium influences to be simultaneously present in the model—lead to several modifications in the supply- and demand-driven approaches.

Graves (1976, 1979, 1980, 1983), Graves and Linneman (1979) and Graves and Regulska (1982) correct several of the problems with the early supply-oriented models. One line of research aims rather narrowly at improving single-equation net migration studies by incorporating insights from the recent hedonic approach to labor markets. That is, since a large portion of observed wage differentials will, in an equilibrium framework, represent compensation for (dis)amenities, one would not always expect migration *toward* high-wage areas (since they may be high-wage because they are undesirable). However, if one could statistically hold constant all of the important amenities, the remaining income effect is more likely to represent what it was felt to represent all along, namely variations in real utility that are arbitragable by net migration in the disequilibrium framework.

This thread of analysis was successful in that anomalies in earlier findings were readily explainable. Carefully measured amenities were found to be important in their own right. Their inclusion in the empirical estimations eliminated the frequently observed "wrong" signs on the income coefficient in net migration equations. The explanatory power of the empirical estimates increased greatly. And significant life-cycle effects were discovered.

Still, the theoretical model is deficient in important respects. Some of the problems are readily solved. Since the amenities are initially added to a model that is disequilibrium in nature (i.e., net migration proceeds toward those locations offering high incomes and, in the process, eliminates the income differential), it is not clear how one justifies the inclusion of amenity variables. Why would some initial scrambling not lead to the elimination of amenities as a source of continued migration? That is, unlike income, migration to a nice climate does not, in the process, reduce the quality of the climate—one expects that people move to desirable locations until wage (or rent, although this was not immediately perceived) compensation makes them indifferent among locations. Then, no further migration occurs due to amenity variation since compensation is present. Of course, this raises as yet unanswered questions about the nature of spatial production function advantages that enable compensation to be paid, but the point for present purposes is that migration should cease to be related to amenities in equilibrium. Yet amenities appear to be strongly related to on-going migration.

What are the difficulties with the demand-driven approach? First, as work proceeded which employed more-recent data on migration, it became ever more evident that Equation (1), when estimated, revealed an embarrassing number of unhypothesized signs (with people migrating in large numbers to areas of low income or to high-unemployment destinations) and, at the same time, the explanatory power of the relation was low. Moreover, as noted by Izraeli (1979) and others, serious flaws exist in the various cost-of-living indices. Rosen (1979) and Henderson (1982) find, additionally, that employing such indices results in minimal alterations in their estimated equations, in spite of a strong theoretical argument for including living-cost deflators. This does not mean that costs are irrelevant, but rather indicates model misspecification, as discussed later.

A serious problem is embedded in the early, and the most recent, attempts to control for cost-of-living differences. Since one of the most important reasons for the large variations in living-cost differentials is the large variation in housing costs, one must obtain some understanding of why housing costs vary. If transportation costs are low, so that the *ingredient* inputs are of roughly similar cost everywhere, then the price of housing will vary almost entirely due to either land or labor costs. There are reasons to expect that the big source of variation is land costs. Suppose that this is the case, namely, that all variation in housing costs is due to variation in land values or rents. Is this a benefit or a cost? Why are land rents high in the first place? The literature, to the extent that the issue has been thought about much, tends to take the view that these are costs, yet a very strong counterargument exists.

The original urban literature, with its drab monocentric featureless-plain city, certainly gives one the impression that rents are costs, costs associated with city size and the resulting value of nearness to the center. But, the seemingly small step of putting "access" as an amenity into the utility function makes it quite clear that rents represent a host of capitalized amenities—not just access, but also presence of an ocean, views, school quality, crime, environmental quality, and so on. Rents are high at *desirable* locations; they are both a cost and a benefit in exactly the same way that a lobster dinner costs more, but also provides greater benefits, than does a bean dinner. Thus the often-cited truism that high wages in a location merely compensate for high rents is called into question. Researchers must fully assess what is embodied in rents (costs and benefits) before making such conclusions. Yet to be resolved is the issue of how to measure and compare rents across cities, when rents may be high due to either production or consumption amenities.

5.   EQUILIBRIUM MODELS OF MIGRATION AND REGIONAL DEVELOPMENT

An equilibrium approach to regional development, focusing upon the role of amenities and amenity capitalization, serves to explain some of the difficulties of the supply- and demand-driven regional development and migration models. Suppose that one classifies goods, which are consumed, into two classes of goods: those that are mobile and can be consumed in variable quantities at all locations and those that are location-fixed. Location-fixed goods, such as climate, environmental quality, and the like, can only be varied in the amounts consumed by relocating. And, following standard theory, the desires to change the amounts consumed of such goods are related to both income and to relative prices. Of these two sources of demand change, it seems that income is the more important in explaining systematic regional growth and decline. The process in brief is as follows: a rise in real productivity everywhere (e.g., a human-capital increment to society) causes people to demand more of normal or superior goods. Some of those goods are location-specific and can only be varied in quantity consumed by relocating. Hence, migration to areas possessing, on net, normal bundles of location-specific traits is expected. This microeconomic model of migration provided a rationale for including amenities in net migration equations, but it did more than that. It raised, for the first time, a question that had not been addressed

before, namely, what is the relative importance of equilibrium versus disequilibrium forces in observed migration? Moreover, the microfoundation of migration suggests that what one means by "equilibrium" or "disequilibrium" is even somewhat ambiguous, since firm movement stimulated by past household movement will stimulate further household movement—in what sense is the household in "equilibrium" when forces are still present in the fuller model which will lead to further movement?

Work on mobility behavior at the individual level (Bartel, 1979; Graves and Linneman, 1979; Linneman and Graves, 1983; Polachek and Horvath, 1977), provides support for Sjaastad's (1962) notion that migration can be viewed as an investment in human capital (an investment having costs and benefits). Moreover, these works shed light on the nature of the variables entering the cost and benefit calculation and on their relative importance. More importantly for present purposes, is the fact that this work strongly suggests that the standard dichotomy classifying moves as being either job-related (interurban) versus residence-related (intraurban), is false. Long distance moves between labor markets are shown to be, in many cases, related to demands for broadly defined residence traits, while many moves within a local labor market are related to one's job. This finding added fuel to the argument that a model which integrates the land and labor markets is necessary before an understanding of regional growth and decline can be forthcoming.

Additional support for the idea that land and labor markets are inextricably intertwined is provided in a recent study by Graves (1983), although the stated purpose of the study is rather different. A single-equation model of net migration is advanced which explores the extent to which amenities are capitalized into rent as a single proxy variable. The advantages of such an approach, should it be feasible, are several: degrees of freedom are preserved in aggregate studies as compared to the inclusion of a host of amenity variables, multicollinearity problems are reduced with the single rent variable as compared to the large number of imprecisely estimated separate amenity effects, measurement error of amenity variables is reduced, and issues of perceptions of amenities corresponding to their "objective" measures are minimized. Moreover, the single variable compresses the amenity information into a dollar figure which is in units which are directly comparable to corresponding information from labor markets. This approach enabled amenities to be considered as a group.

The results of the Graves (1983) study strongly support the notions presented here regarding the microeconomics of human migration. Without the view espoused here, one's intuitive expectation would be that movement should occur *away* from high-rent locations. However, the observed movement is *toward* the high-rent locations. This is expected under two conditions: (1) if high-rent locations are high-rent because land markets capitalize desirable amenities, and (2) if desirable amenities are also superior or normal goods.

It is precisely this interaction between land and labor markets that is lacking in the modeling of overall regional growth and decline, since the preceding indicates that the role of rents and amenities cannot be assumed a priori to play a secondary role to wages as the equilibrating factor in the disequilibrium simultaneous-equation model setting.

Improving predictions of regional growth and decline requires not only accounting for life-cycle related changing demands for location-specific amenities, but also requires consideration of the role of compensating differentials. For example, as workers exit a relatively undesirable area, wages increase until out-migration is no longer desirable. The adjustment may also involve decreases in rents and other local prices, or changes in the levels of certain amenities, which vary with city size, may occur as a result. But how high can compensating differentials rise without causing firms to relocate to avoid high (and rising) labor costs? Firms on the margin would follow labor to the superior or normal locations thereby minimizing labor costs (more precisely, at some point the lower labor costs in the more desirable locations overcome whatever cost advantages or movement costs led to the firm occupying its initial location). Furthermore, amenities may influence production directly, in addition to lower labor costs. Just as consumer amenities influence labor supply via migration, producer amenities may influence firm location decisions and, therefore, the demand for labor. At this point, rents are important for the location decisions of both firms and households, as each relocate to the desirable areas, residential and industrial rents rise. This provides the built-in negative-feedback mechanism (along with endogenous disamenities such as congestion or pollution) that reduces the likelihood of predicting that all human activity ultimately concentrates at the single most desirable location. A broadening of this framework proves helpful in analyzing the rural-to-urban turnaround as well as the flight of industry from the Northeast and Midwest to the West and South.

6. A TAXONOMY OF THE ROLE OF AMENITIES IN MIGRATION AND REGIONAL RESEARCH

A brief taxonomy of the literature reviewed above serves to enhance the understanding of the role amenities play in the analysis of regional development as well as regional differences. The following diagram classifies certain articles according to how they explicitly or implicitly treat amenities. In this taxonomy it is the case that papers of very different focuses are merged. The design here is to express the common thread with respect to the relationship between amenities and regional perspective.

In Table 1, the pure trade-theory approach has little in the way of spatial content and one sees amenities of any sort precluded. The existence of persistent wage differentials is rationalized with disequilibrium models. As Fisher (1981) notes, without some notion of compensating differentials in the context of location specific amenity differences, regions collapse to a single area. While some equilibrium notions are present (these authors note that cost-of-living differences, skill-level differences, and labor-supply differences also account for some of the wage differentials), amenities are ignored [as noted by Henderson (1982), or the papers of Graves or Graves et al. cited previously, amenities render consistent the wage differentials and observed migration flows]. Therefore the work of Coelho and Ghali (1971) and Williamson (1977) are included in cell A. The disequilibrium-oriented simultaneous-equation models of Muth (1971) and Greenwood and Hunt (1984) provide other examples of interactions among the supply of and demand for labor which do not explicitly consider amenities. The impact of amenities in

TABLE 1:   A Taxonomy: Amenities in Migration and Regional Research

	No Producer Amenities	One or More Producer Amenities

No Consumer Amenities	(A)
	 Coelho & Ghali (1971)
	 Greenwood & Hunt (1984)
	 Muth (1971)
	 Williamson (1977)
	   (disequilibrium trade
	   type models)
		(B)
		 Fuchs (1967)
		 Hoch (1977) (rent as a cost)

One or More Consumer Amenities	(C)
	 Henderson (1982)
	 Cropper and Arriaga-Salinas
	   (1980)
	 Rosen (1979)
	 Izraeli (1979)
	   (wage acceptance equations
	   and rent gradients)
		(D)
		 Haurin (1980, 1982)
		 Roback (1982, 1988)
		 Bartik & Smith (1984)
		 Blomquist, Berger, & Hoehn (1988)
		   (some interaction between
		   wages and rents)

affecting the work/leisure choice, hence labor supply within an area, are ignored in all such studies. Fuchs (1967) notes a correlation between wages and city size, hypothesizing that perhaps urban disamenities may be relevant. Hoch (1977) believes that in addition to the above, cost differences explain much (but not all) of the wage differences. These studies are, therefore, included in cell B. To explain cost differences requires a theory of spatial productivity variation as discussed later.

Nordhaus and Tobin (1972) argue that accounting for the urban disamenities subtracts heavily from GNP. How do we classify this literature? Rosen (1979) argues that compensation of workers for urban consumer disamenities implies that cities have some corresponding productivity advantage in order to make feasible the compensating payments. If in the context of cities, production advantages mirror compensation for disamenities, we can think of cells B and C as the appropriate classification of this literature. See Tolley, Graves, and Gardner (1979) for a formal textual treatment of optimal city size.

To the extent that the literature on the productivity of cities considers agglomeration economies (Segal, 1976) or any other area-specific production shifters (Borts, 1960) these studies can be classified in cell B. This literature, although adding significantly to the analysis of city differences, does not address consumer behavior fully.

A different approach to the problem of analyzing amenities in the context of single cities follows the path of Alonso (1964) and Muth (1969), who explain the process where CBD access value is capitalized into rent gradients, thereby being priced in the land market. Combining this approach with Rosen's (1974) hedonic technique, rent-differential studies impute implicit amenity prices from rent variation in the intracity setting. It was thought clear that in the intracity setting that wages should not vary; rents should capitalize amenity variation. However, as outlined by Polinsky and Rubinfeld (1977), applying this technique to intracity

amenity variation requires very restrictive assumptions in order to rule out wage capitalization—no productivity considerations can be made so we classify this work in cell C.

Hence, a dichotomy emerges in the literature where wages presumably capitalize interurban amenity variation and rents supposedly reflect intraurban amenity variation. The wage approach represents the thrust of interregional or labor market comparisons while the property-value model is used to explain intracity differences. Hence the property value has not been treated as a useful tool for regional comparisons, yet as we argued previously it yields important insights relevant to the role of amenities in the analysis of regional development.

Izraeli (1979) attempts to merge the two approaches, developing a simultaneous-equation model where wages are a function of prices and prices are a function of wages. The model builds upon the same methodology as Tolley (1979) who derives a multiplier relationship between changes in wages and local prices. But this approach treats prices and rents as costs, and does not address the interaction of wages and rents in capitalizing amenity values. The approach does, however, set the stage for further work—that relating real wages to personal productivity variables and amenities across cities, such as Meyer and Leone (1977), therefore we classify this work in cell C.

But as Rosen (1979, p. 88) writes

> It is obvious that there is an important interaction between equalizing differences in wage rates and cost of living; any equalizing difference in wage rates must feed back into the cost of living index because they also alter the price of an important factor in the production of non-traded goods, which in turn affects living costs. Examining the ratio of wages to prices finesses this important problem without resolving it.

Rosen develops a model where households are self-producers of output goods and respond to amenities. This approach assumes away the role of firms. As Rosen points out, although he uses real wages as his dependent variable (wages over prices, including rents), the burden of adjustment is really on rents in his model since wages are fully determined by site productivity.

Despite using essentially the same methodology, Cropper and Arriaga-Salinas (1980) and Henderson (1982) assert that wages capitalize amenity variations. Cropper and Arriaga-Salinas assume city size is predetermined and that there are no agglomeration effects in order to diminish the role of rents. As Haurin (1982) points out, this is inconsistent with their assumption of freely mobile labor. Henderson allows cities to adjust, but evaluates amenity differences at the cities' edges where land values, rather than amenity values, reflect the opportunity cost of land in agriculture (plus expected development potential, which places some weight on amenity values as the rate at which cities will develop will depend on the levels of their amenities). The three preceding works are classified in cell C because they preclude analyses of firm behavior with respect to amenities; location-specific wage/amenity offerings are assumed but not explained because specification of the demand side is avoided.

Several authors (Haurin, 1980, 1982; Roback, 1982, 1988; Bartik and Smith, 1984; Blomquist, Berger, and Hoehn, 1988) have addressed the possibility of amenities being capitalized into both wages and rents such that both must be

modeled together to correctly value amenities. Haurin (1980) allows for amenities to affect utility, goods production, and housing production. The model assumes specific functional forms in order to derive theoretical results, but lacks an econometric assessment of the validity of the theoretical results. Haurin (1982) investigates the role of cost-side scale economies in formulating wage and rent capitalization of spatially invariant amenities. As mentioned previously, the role of scale economies is presumed to be of diminished import once cities are assumed to exist. Once again, no econometric evidence is presented.

Roback (1982) follows Rosen's (1979, p. 79) caveat

> It remains an open and interesting problem to ascertain a precise decomposition of the separate roles of money wage rates and costs of living in determining market equilibrium location patterns; a determination must await a more complete specification, including the role of agglomeration economies, location decisions of firms, and the demand for labor.

Thus, the amenity capitalization literature, just as the regional development field, struggles with the issue of the relative importance of and the correct specification of supply versus demand factors. Roback develops a simple general equilibrium model allowing for wages and rents to interact in determining implicit amenity prices. She allows amenities, wages and rents to influence both consumers and producers. This is more general than Rosen (1979) because firms are now influenced by amenities, which in turn affect wages.

Recognized in some of the preceding models is the fact that amenity-rich cities become large cities, and the influx of population is the mechanism which raises rents and lowers real wages. Thus the Roback model provides a method of performing cross-city amenity valuation analysis that incorporates both wage and property-value capitalization of amenity values.[2] Roback (1982) argues that amenities may influence productivity, therefore just as amenities are used in the supply-driven models, there is also justification for their use in the demand-driven models.[3] Thus the Roback-type models are assigned to cell D.

7. CONCLUSIONS AND AREAS FOR FUTURE RESEARCH EFFORT

In general, location-specific amenities can be thought of as examples of the general set of location-specific factors that influence productivity therefore firm location decisions and the demand for labor. Roback (1982) argues strongly that amenities may influence productivity. Therefore, just as amenities are used in the supply-driven models, there is equal justification for their use in the demand driven models.

---

[2] Roback (1982) avoids the issue of how to measure and compare rents across cities by assuming uniform amenity levels for all locations within a given city. Thus by assumption she justifies the use of a single rent value per city in empirical work. The ramifications of this assumption have not been fully addressed in the literature. Hoehn, Berger, and Blomquist (1987) relax this assumption in their theory but restore it in their empirical work. This complex issue is beyond the scope of this paper. See Knapp (1985) for further discussion.

[3] The models of Blomquist, Berger, and Hoehn (1988); Hoehn, Berger, and Blomquist (1987); and Bartik and Smith (1984) are essentially the same as Roback (1982).

What is the role of the broadened view of amenities research with regard to the equilibrium versus disequilibrium perspectives of regional development? What if cities and regions are in varying degrees of development towards equilibrium? How is the process of amenity capitalization affected by the degree of disequilibrium? There are no easy answers to these questions, but perhaps some speculation is in order.

It might be the case in the early stages of the development of an amenity-rich site, that low wages tend to reflect the presence of the amenity relatively more than rents, while of course the full value of the amenity is not reflected in general due to the presence of disequilibrium. One could, however imagine land speculation anticipating growth such that the full value of the amenity is reflected in this market.

As suggested by earlier discussion, the relative importance of amenities versus other factors figures prominently in the answer to a long-standing question in migration and regional development: "Do jobs follow people or do people follow jobs?" Although this question is perhaps simplistic, it provides a useful paradigm for assessing various research efforts and for suggesting new avenues of inquiry. For example, alternative motivations are prevalent for different age groups.[4] Retiree mobility behavior reflects different factors than the mobility behavior of those still in the labor force. See Graves (1979) and Graves and Knapp (1988) for a full discussion of theoretical and empirical aspects of life-cycle migration. From a historical perspective, one might argue that in the disequilibrium setting of the early development of the U.S., people followed jobs. Production advantages of certain sites led to differential growth; populations followed the exploitation of these advantages, seeking a standard of living higher than that offered in agriculture. The exhaustion and increasing spatial uniformity of production advantages (such as the advent of the service economy, reduced transportation, transaction and communication costs, combined with increasing information flows regarding regional opportunities) together imply not only a convergence toward equilibrium, but a structural change in the motivation for ongoing regional development. With decreasing ties to other location-specific factors, the firm's location decisions can entertain local labor costs (and to a lesser extent, depending on the firm, land costs).

Jobs may follow people, if household migration decisions are increasingly influenced by demands for location-specific amenities as argued by Graves (1983) and Graves and Linneman (1979). The indirect effect of low wages (via high labor supply in nice areas) upon firm location decisions begins to outweigh the direct demand-site site-specific factors influencing firm location decisions. In studies of the aggregate determinants of country growth, Carlino and Mills (1985, 1987) present evidence consistent with this hypothesis. First, employment growth appears to be caused largely by population growth rather than conversely. Second, certain demand-side variables (tax breaks and industrial development bonds) fail to significantly spur growth while supply variables such as education expenditures

---

[4]Special thanks to an anonymous referee for pointing out this issue.

and climate variables are found to significantly influence county growth. Highway miles are found to influence growth, but this variable can be seen as a shifter for both supply and demand for labor.

Additional considerations further complicate the simultaneity issues, as summarized by Greenwood and Hunt (1984). These considerations are those for which a labor supply response yields secondary demand-side effects, specifically (a) migrants may exhibit differing levels of human capital thereby increasing local productivity, (b) migrants may bring nonhuman capital and nonlabor income with them, (c) migrants may induce investment in local infrastructure, (d) migrants may increase the demand for local goods, and, finally, (e) migrants may contribute to economies of scale or agglomeration effects.

There are, implicit in the preceding discussion, some labor-market implications which have not, to our knowledge, been discussed in the literature. First, at the household optimum, the work-leisure decision will be different in a nice area than in an undesirable area. Specifically, in the nice area one would expect that the lower relative return to labor-market activity would induce substitution toward home production. Hence, one would expect a lower worker-to-nonworker ratio and, perhaps, a shorter average workweek (inclusive of overtime) in the nicer areas. Even the preceding, apparently straightforward expectation is, however, not unambiguous; the higher rents in the desirable areas might induce an increase in supply of labor to pay in the market for the amenities consumed. The ultimate effect will depend, in part, on the degree to which the world is in equilibrium, and on the degree of relative capitalization in land and labor markets in that equilibrium (the latter may vary at each site depending on land availability, etc.). Yet another force complicating the matter is the probability of direct interactions between the demand for leisure and the demand for amenities. One would expect the amenities and leisure are complementary goods, supporting the initial contention that labor force participation should be lower in the nice areas. Subgroups of the population are likely to have differential responses to these variables, as discussed recently by Roback (1988).

Aside from the previous arguments regarding the indirect demand-side effects generated by supply-side factors, is there a place for the demand-side approach in the long run? It appears to us that demand-side considerations will become secondary to the influence of labor-supply related phenomena. This is, of course, an empirical question which can only be resolved after further modeling. That modeling will involve interacting individual firms and households (each having varying demands for amenities and differing costs of movement depending on firm and household specific traits) with the spatial array of amenity bundles offered at alternative locations.

Thus, the research effort advocated in this paper focuses upon location-specific amenities as a critical factor in determining regional futures. Since regional development is to a great extent determined by the mobility behavior of firms and households, a greater understanding of regional futures may result from research that takes a closer look at the increasing relative importance of amenities as a determinant of mobility behavior.

REFERENCES

Alonso, William. 1964. *Location and Land Use.* Cambridge: Harvard University Press.

Bartel, Ann P. 1979. "What Role Does Mobility Play?" *American Economic Review,* 69, 775–86.

Bartik, Timothy and V. Kerry Smith. 1984. "Urban Amenities and Public Policy," Working Paper No. 84-W18, Economics Department, Vanderbilt University.

Bellante, Don. 1979. "The North-South Differential and the Migration of Heterogeneous Labor," *American Economic Review,* 69, 166–175.

Blanco, Cicely. 1963. "The Determinants of Interstate Population Movements," *Journal of Regional Science,* 5, 77–84.

Blomquist, Glenn, Mark Berger, and John Hoehn. 1988. "New Estimates of the Quality of Life in Urban Areas," *American Economic Review,* 78, 89–107.

Borts, George H. 1960. "The Equalization of Returns and Regional Economic Growth," *American Economic Review,* 50, 319–347.

Borts, George H. and Jerome L. Stein. 1964. *Economic Growth in a Free Market.* New York: Columbia University Press.

Carlino, Gerald A. 1986. "Do Regional Wages Differ?" *Business Review,* July/August, 3–16.

Carlino, Gerald and Edwin S. Mills. 1985. "Do Public Policies Affect County Growth?," *Business Review,* July–August, 3–16.

————. 1987. "The Determinants of County Growth," *Journal of Regional Science,* 27, 39–54.

Coelho, Phillip and Moheb A. Ghali. 1971. "The End of the North-South Wage Differential," *American Economic Review,* 61, 932–937.

Cropper, Maureen L. and A. S. Arriaga-Salinas. 1980. "Intercity Wage Differentials and the Value of Air Quality," *Journal of Urban Economics,* 8, 236–54.

Farber, Stephen C. and Robert J. Newman. 1987. "Accounting for South/Non-South Real Wage Differentials and for Changes in Those Differentials over Time," *Review of Economics and Statistics,* 69, 215–223.

Fisher, Anthony C. 1981. *Resource and Environmental Economics.* New York: Cambridge University Press.

Fuchs, Victor R. 1967. "Differentials in Hourly Earnings by Region and City Size, 1959," NBER Occasional Paper 101, New York: Columbia University Press.

Fuchs, Victor R. and R. Perlman. 1960. "Recent Trends in Southern Wage Differentials," *Review of Economics and Statistics,* 42, 292–300.

Graves, Philip E. 1976. "A Reexamination of Migration, Economic Opportunity, and the Quality of Life," *Journal of Regional Science,* 16, 107–112.

————. 1979. "A Life-Cycle Empirical Analysis of Migration and Climate, by Race," *Journal of Urban Economics,* 6, 135–47.

————. 1980. "Migration and Climate," *Journal of Regional Science,* 20, 227–37.

————. 1983. "Migration with a Composite Amenity: The Role of Rents," *Journal of Regional Science,* 23, 541–46.

Graves, Philip E. and Thomas Knapp. 1988. "Mobility Behavior of the Elderly," *Journal of Urban Economics,* 23, 1–8.

Graves, Philip E. and Peter Linneman. 1979. "Household Migration: Theoretical and Empirical Results," *Journal of Urban Economics,* 6, 383–404.

Graves, Philip E. and Joanna Regulska. 1982. "Amenities and Migration Over the Life-Cycle," in Douglas Diamond and George Tolley (eds.), *The Economics of Urban Amenities.* New York: Academic Press, pp. 210–221.

Greenwood, Michael J. 1975. "A Simultaneous-Equations Model of Urban Growth and Migration," *Journal of the American Statistical Association,* 70, 797–810.

Greenwood, Michael J. and Gary L. Hunt. 1984. "Migration and Interregional Employment Redistribution in the U.S.," *American Economic Review,* 74, 957–969.

Harris, R. N., George S. Tolley, and C. Harrell. 1968. "The Residence Site Choice," *Review of Economics and Statistics,* 50, 241–247.

Haurin, Donald. 1980. "The Regional Distribution of Population Migration, and Climate," *Quarterly Journal of Economics*, 95, 293–308.

———. 1982. "Urban Structure, Wage Rates, and Regional Amenities," in Douglas B. Diamond and George S. Tolley (eds.), *The Economics of Urban Amenities*. New York: Academic Press, pp. 195–210.

Henderson, J. Vernon. 1982. "Evaluating Consumer Amenities and Interregional Welfare Differences," *Journal of Urban Economics*, 11, 32–59.

Hoch, Irving. 1977. "Variations in the Quality of Life Among Cities and Regions," in Lowdon Wingo and Robert Evans (eds.), *Public Economics and the Quality of Life*. Baltimore: Resources for the Future and Johns Hopkins University Press, pp. 28–65.

Hoehn, John, Mark Berger, and Glenn A. Blomquist. 1987. "A Hedonic Model of Interregional Wages, Rents and Amenity Values," *Journal of Regional Science, 27*, 605–620.

Izraeli, Oded. 1979. "Externalities and Intercity Wage and Price Differentials," in George S. Tolley, Philip E. Graves, and John L. Gardner (eds.), *Urban Growth Policy in a Market Economy*. New York: Academic Press, pp. 159–96.

Knapp, Thomas A. 1985. "The Theory of Amenity Valuations: Interactions Between Land and Labor Markets," unpublished Ph.D. dissertation, University of Colorado.

Ladenson, Mark L. 1973. "The End of the North-South Wage Differential: Comment," *American Economic Review*, 63, 754–756.

Lande, Paul and Peter Gordon. 1976. "Regional Growth in the U.S.: A Reexamination of the Neoclassical Model," *Journal of Regional Science, 17*, 61–69.

Linneman, Peter and Philip E. Graves. 1983. "Migration and Job Change: A Multinomial Logit Approach," *Journal of Urban Economics, 14*, 263–79.

Lowry, Ira. 1966. *Migration and Metropolitan Growth: Two Analytical Models*. San Francisco: Chandler Publishing Co.

Mazek, W. 1969. "Unemployment and the Efficiency of Migration: The Case of Laborers," *Journal of Regional Science, 9*, 101–107.

Meyer, John R. and Robert A. Leone. 1977. "The Urban Disamenity Revisited," in Lowdon Wingo and Robert Evans (eds.), *Public Economics and the Quality of Life*. Baltimore: Resources for the Future and Johns Hopkins University Press, pp. 66–91.

Muth, Richard. 1969. *Cities and Housing*. Chicago: University of Chicago Press.

———. 1971. "Migration: Chicken or Egg?" *Southern Economic Journal*, 37, 295–306.

Nordhaus, William and James Tobin. 1972. "Is Growth Obsolete?" in *Economic Growth*. Vol. 5 in series; Economic Research: Retrospects and Prospects, NBER.

Polachek, Soloman and Francis Horvath. 1977. "A Life-Cycle Approach to Migration: Analysis of the Perspicacious Peregrinator," in R. Ehrenburg (ed.), *Research in Labor Economics*. Greenwich, Connecticut: JAI Press, pp. 103–149.

Polinsky, A. Mitchell and Daniel Rubinfeld. 1977. "Property Values and the Benefits of Environmental Improvements: Theory and Measurement," in Lowdon Wingo and Robert Evans (eds.), *Public Economics and the Quality of Life*. Baltimore: Resources for the Future and Johns Hopkins University Press, pp. 154–180.

Roback, Jennifer. 1982. "Wages, Rents, and the Quality of Life," *Journal of Political Economy*, 90, 1257–1278.

———. 1988. "Wages, Rents, and Amenities: Differences Among Workers and Regions," *Economic Inquiry*, 26, 23–41.

Rosen, Sherwin. 1979. "Wage-Based Indexes of Urban Quality of Life," in Peter Mieszkowski and Mahlon Straszheim (eds.), *Current Issues in Urban Economics*. Baltimore: Johns Hopkins Press, pp. 74–104.

———. 1974. "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *Journal of Political Economy*, 82, 34–55.

Sahling, Leonard H. and Sharon P. Smith. 1983. "Regional Wage Differences: Has the South Risen Again?," *Review of Economics and Statistics*, 65, 131–135.

Scully, Gerald W. 1969. "Interstate Wage Differentials: A Cross Section Analysis," *American Economic Review*, 59, 757–73.

Segal, Daniel. 1976. "Are There Returns to Scale in City Size?," *Review of Economics and Statistics*, 58, 339–350.

Segal, Martin. 1961. "Regional Wage Differences in Manufacturing in the Post-War Period," *Review of Economics and Statistics,* 43, 148–155.

Sjaastad, Lawrence. 1972. "The Costs and Returns of Human Migration," *Journal of Political Economy,* 70, 80–93.

Todaro, Michael P. 1969. "A Model of Labor Migration and Urban Unemployment in Less Developed Countries," *American Economic Review,* 59, 138–148.

Tolley, George S., Philip E. Graves, and John L. Gardner. 1979. *Urban Growth Policy in a Market Economy.* New York: Academic Press.

Williamson, J. G. 1977. "Unbalanced Growth, Inequality, and Regional Development: Some Lessons from American History" (Mimeographed).