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Spatial Equilibrium in the Labor Market

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Spatial Equilibrium in the Labor Market

Philip E. Graves

I. Introduction

People have been moving from location to location for millennia. Such moves were prompted by a myriad of motivations, ranging from famine, war, and religious persecution to the present concern with spatial equilibrium in labor markets. With primitive transportation technology, moves—particularly moves covering long distances—were very costly. In some cases, such as slavery, the moves were involuntary, while in other cases the moves, while voluntary, involved indentured or redemptioner servitude as a means of paying the high costs of passage. Chiswick and Hatton (2002) review the determinants and consequences of intercontinental migration over four centuries, with an emphasis on the Colonial and post-Colonial period. Rosenbloom (2002) provides an excellent review of the development of labor markets in the U.S. in a primarily cliometric framework. Both of the preceding provide the background for the present chapter.

The central purpose here is to explore the role of migration 1) as a response to labor market variables and 2) as a cause of change in labor market variables. We shall see that the labor economics literature’s traditional view of spatial equilibrium in labor markets has clear implications about the role of migration along these two dimensions. Specifically, this more traditional view of migration argues that migration occurs as a response to arbitrageable variations in wage rates, a form of human capital investment. As first emphasized in detail by Sjaastad (1962), migration would be expected to occur when the present value of the benefits of a move exceed present value of the costs of that move. As we shall see in Section II, under this approach the benefits of a move have been either implicitly or explicitly taken to be the higher wages obtainable in a potential destination. That is, higher wages in a location are presumed to correspond to higher utility levels in that location. The long-run spatial equilibrium in this view of migration would be one of convergence in wage levels over space. Thus, 1) migrants respond to higher wages in a location with in-migration to that location, and 2) the resulting in-migration reduces the divergence in wage levels over space.

A newer approach derives its insights much more explicitly from the urban/regional economics literature, rather than the labor economics literature briefly described above. The early theory of this more general approach is developed in Graves and Linneman (1979), with an early empirical quasi-dynamic application of the comparative-static theory in Graves (1979). The theory did not receive widespread attention until the now-classic contributions by Roback (1982, 1988) and the supporting empirical work by Blomquist, Berger, and Hoehn (1988). In this approach, wages are only one of many things, notably rents and natural and man-made amenity levels, which vary
over space. Roback explores the implications of assuming that spatial equilibrium is in existence, examining the nature of that equilibrium, an equilibrium in which utility levels and firm profitability are presumed equal everywhere. In this view, as we shall see in Section III below, wages and rents are expected to offset variations in amenities, hence there is no longer an expectation of wage convergence, although it will become apparent that rent changes over time complicate an understanding of this prediction. That is, if rents tend, in the long run, to capture the full value of amenities (both household and firm amenities), then one would expect wage convergence to occur. The motivations for convergence will be seen, however, to be markedly different in the two approaches in terms of understanding the nature of the spatial labor market.

II. The Traditional Labor Economics View of Spatial Labor Markets

To characterize the labor economic approach to migration, let utility be a function of goods consumption, as is implicit in the most basic texts in economics:

1) \( U = U(X) \),

where \( X \) is a vector of goods consumed, with \( U \) increasing in each element of \( X \) (any “bad” is redefined as a “good,” e.g. pollution becomes pollution abatement). Equation 1) is maximized subject to the usual budget constraint:

2) \( \max U = U(X) \)
   \[ \text{s.t. } Y = PX \]

where \( P \) is the vector of prices corresponding to each element of the goods vector. This utility function can be written as an indirect utility function:

3) \( \max V = V(P,Y) \)

where \( V \) is decreasing in \( P \) and increasing in \( Y \). Taking labor supply to be fixed, for simplicity (and to make some comparisons in the next section), the \( i^{th} \) migrant’s location decision among the \( j \) locations becomes:

4) \( \max V_{ij} = V(P_{ij},Y_{ij}) - C_{ij} \)

Where migrant \( i \) faces prices, specific to his/her consumption bundle, which vary over space and faces incomes, specific to his/her human capital, which also vary over space. The \( C_{ij} \) term measures the monetary and psychological costs of moving to location \( j \), where this cost, too, is specific to migrant \( i \) (i.e. age, wage rate, distance to location \( j \), affinity to friends or relatives and the like can vary among migrants causing the costs of movement to vary).

In this simple model, potential migrants would not move if the cost of moving from their initial location, \( j_0 \), exceeded the gain from moving to any alternative location \( j \neq 0 \). If a move occurs, it would be to the location with the highest net benefit of movement, \( j^* \). In an even more
simplified world with all goods being tradable at negligible transportation costs, prices would not vary and potential migrants would move to the locations with highest net income \((Y_j - C_j)\).

The preceding simple model predicts that movement would generally occur from low wage to high wage areas, and aggregating to the local labor market level, the movement would tend to lead toward wage convergence. Low wage locations would lose labor supply as households moved away, causing wages to rise; high wage locations would experience increases in labor supply, causing wages to fall. A more detailed discussion of how well this model predicts relative to its alternative in Section III comes later; for present purposes, it is sufficient to note that non-convergence, or implausibly slow convergence, is frequently observed (see Shiller 2009). Moreover, Shiller finds that to the extent that there has been convergence, it has slowed or reversed beginning in the 1980s. Moreover, in areas with high levels of net in-migration there are also high levels of out-migration which would seem difficult to reconcile with the simple model of this section (Galle and Williams 1972).

### III. An Urban/Regional View of Spatial Labor Markets

In light of the observation that convergence appears to be occurring either not at all or at a pace which is implausibly slow, might there be an alternative way of looking at labor markets that is consistent with this observation? Rosen (1979) and Roback (1982) provide an alternative view of labor market functioning that relies on assumed equilibrium in utility levels over space. The underlying notion is quite simple—just as there is no such thing as a “fast lane” on a freeway during rush hour, there is no such thing as a “nice place” to live vis-à-vis other places. Movement would be expected to occur to approximately equate speed in each lane, in the first case, and in the latter case, movement would be expected to occur to make all locations approximately equally desirable. Movement to the “nice” place should continue to occur until either high housing prices or low wages make that place no nicer than elsewhere. The details of the argument are, however, not quite this simple (see Graves 2011 for a graphical treatment of this so-called hedonic valuation method, Palmquist 1991 and 2005, Rosen 1974, and Taylor 2008 for the formal equations for this model corresponding to those for the disequilibrium model of Section II). Our treatment here will be more intuitive, driven by words.

Locations offer amenities, which may be either natural or man-made, that affect utility in the case of households (e.g. desirable weather, scenic views, restaurant diversity and quality) and affect production functions in the case of firms (e.g. deep-water ports, access to mine mouth, right to work laws). Considering these cases separately, if a location is unusually desirable to households, they would be expected to enter driving up housing demand and increasing the supply of labor. Hence, in equilibrium, a nice location should have higher housing costs (property values or rents) and lower wages. Conversely, an undesirable location would be expected, in equilibrium, to have some mix of lower housing costs and higher wages. If a location is sufficiently undesirable, it might lose its entire population, disappearing, as in the case
of Ghost Towns (see Graves, Weiler, and Tynon 2009), if firms are unable to sufficiently compensate households, as for example “when the vein runs out.”

Turning to firm amenities, desirable locations would lead to firm in-migration, and that movement would be expected to increase demand for land (directly for industrial sites, and indirectly for new employee housing) and increase the demand for labor. Hence, a desirable firm location, relative to others, would be expected to have—other things equal—higher housing prices (property values and rents) and higher wages. Similarly, locations that are undesirable to firms would be characterized by lower housing prices and wages.

Temporarily assuming homogeneity for simplicity, where all households possess the same utility functions and all firms possess the same production functions, all locations will have amenity bundles that would be, on net, reliably characterized as in Figure 1:

<table>
<thead>
<tr>
<th>Good for Households</th>
<th>Good for Firms</th>
<th>Neutral for Firms</th>
<th>Bad for Firms</th>
</tr>
</thead>
<tbody>
<tr>
<td>R &gt; Ro</td>
<td>R &gt; Ro</td>
<td>R?</td>
<td></td>
</tr>
<tr>
<td>W?</td>
<td>W &lt; Wo</td>
<td>W &lt; Wo</td>
<td></td>
</tr>
<tr>
<td>R &gt; Ro</td>
<td>(Base Case)</td>
<td></td>
<td>R &lt; Ro</td>
</tr>
<tr>
<td>W &gt; Wo</td>
<td>R = Ro</td>
<td>W = Wo</td>
<td>W &lt; Wo</td>
</tr>
<tr>
<td>R?</td>
<td>R &lt; Ro</td>
<td></td>
<td>R &lt; Ro</td>
</tr>
<tr>
<td>W &gt; Wo</td>
<td>W &gt; Wo</td>
<td></td>
<td>W?</td>
</tr>
</tbody>
</table>

Figure 1. Wage and Rent Expectations under Various Amenity Assumptions

Note that in the table, the “base-case” location (neither good nor bad for either firms or households) is seen in the center cell, where the rent is Ro and the wage is Wo. The wage and rent combination in this cell may be thought of as representing an “average” location. All other
cases represent locations with amenity bundles that are either good or bad for one or both of households and firms relative to this average location. The cases merit consideration in more detail.

If a location is both good for firms and good for households, this location will clearly become quite large with much higher than average rents since both firms and households will want to move in (e.g. San Francisco Bay area). The impact on wages will, in general, be ambiguous since the influx of households would lower wages while the influx of firms would raise wages. This ambiguity is reflected in the ? symbols of Figure 1—without more information on the relative importance of the amenity to firms versus households it is not possible to know what wages will be like compared to ordinary (base-case) locations. Conversely, in the bottom right cell, a location that is undesirable for both firms and households will have unambiguously lower rents but wages that may be higher or lower than Wo, depending on relative undesirability.

A location that is bad for households and good for firms (lower left cell in Figure 1), will have unambiguously higher wages in equilibrium (smaller supply of labor and larger demand for labor reinforce each other in raising wages). The impact on rents is now ambiguous, since without further information about the relative magnitude of the (dis)amenity we do not know whether the location will be larger or smaller than average. Conversely, in the upper right cell, if a location is bad for firms and good for households it will have unambiguously lower wages, with an ambiguous effect on rents, because the relative importance of the (dis)amenity is not known without further information from empirical investigations.

A confusion that persists in the general population, and to a lesser extent among economists, is the role of “cost-of-living” in labor market equilibrium. In the case of a location that is very desirable to households and neutral to firms, the higher rents are not a higher “cost” of living but rather a higher “benefit” of living, just one that we, perhaps unfortunately, have to pay for. A nice location vis-à-vis an undesirable location is exactly analogous to comparing a new BMW to an ‘80s GMC K-car…you pay more for the former, but you get more. Note however that when an amenity is neutral for households but desirable for firms, the higher rents do reflect a higher “cost-of-living.” However, in equilibrium, that higher cost of living must be compensated for by higher wages…households can be no worse off financially in such locations in equilibrium, because such amenity-neutral locations would otherwise be less desirable than alternatives.

From this point on, it is assumed that Section II’s disequilibrium view of labor economics is no longer an appropriate way to view spatial labor market equilibrium (see Partridge 2010 for a recent gathering of corroborative evidence). It is likely that arbitrageable variation in real utility was the dominant cause of labor market flows when costs of movement were high and when information about the benefits of movement was costly, if available at all. Costs of movement have fallen dramatically, especially relative to income growth in the United States (e.g. Interstate Highway System, more widely available and reliable automobiles, falling airfares and long-distance phone rates to maintain psychological and other connections). Rapid advances in
information technology (e.g. television beginning in the ‘50s, ubiquitous by the ‘60s, internet) have resulted in Americans in all locations knowing a great deal about the general nature of many if not most potential destinations. Additionally, as first made clear by Roback, it is now apparent that the labor markets and the land markets cannot be considered separately, since an amenity will generally be capitalized into both markets, something completely ignored in the labor market arbitrage model.

Two early empirical findings initiated the shift from the labor market disequilibrium approach. Graves (1976), using data from the 1960’s, found net migration was occurring to locations with lower incomes, not to locations with higher incomes. Only when climate amenities were introduced into the regression did the income variable take on its “proper” sign; clearly if all amenities could be held constant in an estimating equation, more income would have to be preferred to less. Moreover, in the context of the labor market disequilibrium approach, higher rents were taken to be higher “costs of living,” hence would, ceteris paribus, be expected to lead to lower real incomes—one should expect movement, holding nominal income constant, away from high-rent locations. Yet exactly the opposite was seen to be occurring in Graves (1983), where migrants were moving toward high-rent locations, holding income constant. These two results strongly support a model in which the rising national income of earlier years led to greater demands for desirable locations, driving down wages and driving up rents, and in the 1960’s, with income continuing to rise, migration continued to the desirable locations, despite the lower wages and higher rents observed in such locations.

Finally, note too that, as with the case of the “fast lane” on the freeway, it does not necessarily take many movers to yield an equilibrium in which real utility is approximately equal across space. This is not to argue that there are no longer any variations in utility over space, but rather that the dominant observed pattern is one of equilibrium (as discussed in Mueser and Graves 1993, shocks to employment continue to occur, but they are more intertemporally and spatially random than are the systematic amenity influences). To a large extent, the importance of demand-side influences relative to supply-side influences depends on the time perspective of interest: for near-term interests, the demand-side approach becomes more relevant (see Greenwood 1985, Greenwood and Hunt 1989, and Greenwood, et al. 1991) while for longer-term interests the supply-side approach becomes more relevant (an early supply-side approach, though driven by excess labor in agriculture rather than amenities, was Borts and Stein 1964).

IV. Spatial Labor Market Equilibrium in the Urban/Regional View with Suggestions for Future Research

Taking the equilibrium view, the central observation to make is that there is no compelling reason to expect wage convergence. Indeed, since wage differentials are compensatory for amenity differentials, one might expect wage divergence over time, if desirable locations are also normal or superior, as might be expected. That is, as first discussed in Graves 1979, rising income nation-wide will increase the demand for many things such as restaurant meals, clothing,
automobiles and the like—but while those goods can be incremented in situ, increased demand for lower humidity or more sunshine require migration toward areas offering these non-tradable goods. Thus, one might expect that the on-going migration from undesirable (high-wage) locations to desirable (low-wage) locations would lead to a growing wage gap over time, not a narrowing gap as would be expected in the disequilibrium view.

On the other hand, rents might capture increasing percentages of the value of a location’s amenities over time, as nice places become larger. This is particularly likely if, as will occur with an aging population, an increasing percentage of households have no members in the labor force—such households would be expected to move to locations where amenities are capitalized largely in wages, since they do not have to pay that compensation (see Graves and Waldman 1991). In the process of moving, these households will increase the share of amenity compensation occurring in land markets, at least to some extent. Moreover, if there are endogenous disamenities that are functions of city size (e.g. pollution or congestion), nice places might become less nice—the compensation for say good climate may not go entirely into wages and rents, but also into off-setting endogenous “bads.” Hence, at the level of theory, it is unclear whether wage differentials over space would be expected to converge or diverge over time, when exogenous variables (e.g. national income growth and increasing average age) affecting the demand for locations change in magnitude.

However, dropping the assumptions made earlier that households have identical preferences and firms have identical production functions, allows a fairly wide range of predictions regarding the spatial labor market equilibrium.

First, as already mentioned, an aging population with fewer labor force members will result in a higher percentage of households not in the labor force. The movement of these households to desirable locations with their amenity values largely capitalized into labor markets will drive up rents, reducing the percentage of the amenity value capitalized into lower wages. Similarly, such households leaving the undesirable locations will lower rents, decreasing the wage compensation necessary to equilibrate utility over space; hence, the mere fact that a population is aging results in wage convergence, a prediction that, as far as I know, has not been made before despite it being a fairly clear implication of the model.

More generally, the rich (high-skilled and well-educated) will outbid the poor (low-skilled and poorly-educated) for the desirable areas, much as they outbid them for BMWs, while the poor will outbid the rich for the undesirable areas, much as they outbid them for ‘80s K-cars. However, the rich in the desirable areas will demand the services of the poor. Since the rents will be determined by the rich buyers, the poor will be unwilling to work in the nice locations unless they receive wage compensation. The nature of the compensation will depend on how close desirable and undesirable areas are to one another. If they are quite close (e.g. as in some parts of Los Angeles), the necessary wage compensation will be the commuting cost of the poor. If there are no undesirable locations near to the desirable area, the necessary wage compensation
will be the difference between value of the amenity to the rich and to the poor, adjusted for differential lot sizes for the two groups (a “stand-alone” topic we shall return to). In terms of the spatial labor market equilibrium, the wages of the poor will be higher in the desirable location—to those not carefully considering the situation, it might be inferred that the desirable location to the rich is actually undesirable to the poor. This is another example of the tricky interaction between wage and rent compensation in the equilibrium urban/regional approach.

In addition to aging and income, another exogenous variable with potentially important—yet unexplored—implications for the wage-rent hedonic analyses is the presence and number of children in a household. The effects of children are clear within an urban area—young married couples tend to centrally locate (to minimize average commute times and take advantage of central amenities such as restaurant and cultural diversity) until their children reach school age, at which point most move to the suburbs to obtain larger lot sizes, better education, and lower crime rates (many such moves are socially inefficient, as emphasized in Graves 2003).

These intra-metro effects are likely to exist over a broader array of spatial locations, with larger families moving to metropolitan areas with lower housing prices vis-à-vis childless or small families. Those movements will have had impacts on the equilibrium wage compensation in the U.S. since the trend in average family size has been markedly downward from the ’50s, with 3.37 persons per household, to the present 2.6 persons per household (http://www.infoplease.com/ipa/A0884238.html). If the growing numbers of childless and small family households prefer high amenity and more central locations, such locations will become more costly in land markets. Whether this leads to a lower or higher amount of amenity capitalization in labor markets depends on whether such families have a higher or lower number of labor force participants and housing density. If, as was the historical case, bigger families are likely to have fewer labor force participants as one spouse stays home to take care of the children, an influx of childless and small families might lower wage rates, leading to increasing divergence in wages over space.

The preceding examples of individual traits that vary among households (income, age, and number of children) are traits that are widespread in the population. This would lead to the expectation that, in equilibrium, utility will be equilibrated over space. That is, there will be no “spatial consumer surplus.” Essentially, at a full hedonic equilibrium, households could flip a coin to decide where to live, because compensation for variation in amenities would result in equal utility in all locations. For some traits, however, it may well be that the number of households possessing a strong demand for a particular amenity is smaller than the number of locations offering that amenity. In this case, individual households can obtain spatial consumer surplus, being better off—possibly much better off—in some locations than in others. A disabled person, for example, might get far greater than average benefit from access to public transit, but the number of disabled individuals might be quite small relative to the number of locations offering that access. A passionate mountain climber might well obtain greater than normal satisfaction from occupying a town near climbing opportunities than do other occupants.
of that town. To the extent that unusual preferences relative to the opportunities available are important, amenities will be undervalued in land and labor markets by the hedonic method. It is quite likely that those in the “upper tails” of the demands for a wide variety of amenities might be paying less than their willingness-to-pay for the levels consumed. The true value of the amenity, e.g. public transit, is the sum of the observed willingness-to-pay plus any unobserved consumer surplus.

A long-standing interest in labor economics is the return to education. At first blush, it would seem that amenity compensation in labor markets would result in an understatement of the returns to education. Since the more highly educated would have higher lifetime expected incomes, regardless of location, one would surmise that they would want to locate in the more desirable locations; but since the desirable locations offer lower wages, ceteris paribus, the highly educated would appear to get a lower financial return from their education, since they would be taking part of that return in the form of amenity consumption. It turns out, surprisingly, that this is not the case (see Graves, Arthur, and Sexton 1999a for more detailed discussion and a graphical treatment). The reason is that, in the actual array of locations in the U.S., desirable locations for households are even more desirable to firms. Consider the upper left cell in Figure 1, where it was shown that locations desirable to both firms and households will be large with high rents, while the impact on wages is ambiguous, depending on relative desirability which is an empirical issue. In the data of Blomquist, Berger, and Hoehn (and very likely most other more recent empirical studies) the locations that were desirable to households were even more desirable to firms, hence while the greater supply of labor leads to wage reduction, the demand for labor is greater yet, leading on net to higher wages in such areas. Hence, earnings functions that aim to estimate the return to education overstate the benefits of education in analyses ignoring amenities (for a somewhat different approach yielding the same conclusion see Dahl 2002).

Another long-standing issue in the labor economics literature is the magnitude of the return to unionization. Unions have, as an historical fact, been concentrated in the Northeast and upper Midwest. As noted in Graves, Arthur, and Sexton (1999a), all studies of unionization fail to control for amenities. In one of their specifications, fully one-half of the presumed benefits of unionization were seen to be related to the fact that unions were stronger in areas of less desirable amenities, particularly climate—unions are getting “credit” for what is really compensation for a bad weather. A detailed analysis at a more disaggregated level would be better able to better separate the relative importance of amenities and unionization.

Interestingly, amenities are actually substantially more important than they appear in existing empirical studies, because these studies ignore fringe benefits. It turns out that fringe benefits are spatially varying in ways that reinforce observed wage compensation for amenities (see Graves, Arthur, and Sexton 1999b). Fringe benefits are substantially higher in the Midwest and Northeast than they are in the South and West, perhaps in part because of structural differences in the nature of occupations among the regions. Hence, the higher wages that are paid in the
former regions to compensate for undesirable climates would be higher yet, were full compensation employed rather than just wage compensation. Similarly, the desirable South and West regions have both lower wages and lower levels of fringe benefits. If foreign and other competition is causing the fringe benefits to decline, as appears to be the case in the Northeast and Midwest, this would lead to wage divergence as the necessary compensation would cause wages to rise as fringe benefit fall in equilibrium.

As mentioned at the outset, some authors have regarded the ratio of net migration to the gross flows as a measure of “migration efficiency.” In the context of the labor market disequilibrium approach, this notion makes a fair amount of sense—it would seem inefficient to have large numbers of people moving both in and out, when net in-migration is occurring. If people are moving in because wages are higher in a location, it would seem odd (“inefficient”) that many people are also moving out. Yet, an empirical regularity is that when net in-migration is large to a location so are the flows of out-migration. In the urban/regional equilibrium view, this empirical regularity is actually to be expected. As individuals move in to, for example, desirable locations they drive up rents and lower wages (and also increase endogenous levels of disamenities), which in turn results in others leaving, as an optimal reaction to these changes, not as a matter of “inefficiency.” Some will cash out of their houses as their property value increases resulting in a non-optimally large share of wealth in housing. Others will leave as the property comes to be worth less to them than to the newcomers. And still others will leave because congestion and air pollution are of particular importance to them. Finally, some will leave because their wages are lower in ways that the amenity level no longer compensates for.

Another issue in the urban/regional approach, that has implications for spatial equilibrium in the labor market, is the appropriate capitalization rate to use when converting rents into property values or vice versa. Linneman (1980) and Linneman and Voith (1991) argue that to consider either rents or property values separately in a hedonic valuation function results in selectivity bias, hence they should be considered together. However, doing so raises the question of how to merge rent data with property value data. In the earlier paper, Linneman found that a 3 percent capitalization rate was appropriate to convert property values into rental flow equivalents for 1973 Chicago data. In the later study a capitalization rate (varying with traits of the household head) was argued to be 10 percent for 1982 data from Philadelphia.

For analyses within any particular housing market, it seems important to correctly merge the data to avoid selectivity bias present in using either property values or rents separately. If, however, a study is being conducted using data at a national or large regional level (to, for example, estimate the value of a greater variety of amenity bundles), there are additional concerns. In areas expected to grow (in either size or value due to growing demand for the amenities offered), property values will be high relative to current rents, because those rents are expected to be increasing—there is the expectation of two forms of return to housing in growing areas, rents collected currently and growth in property value over time as the rental stream gets larger. Conversely, in areas expected to lose population, rents will be expected to fall in the future, so
current property values will be low relative to current rents, since a fall in values is expected. These results are required to have housing investment profitability be the same in both growing and declining markets.

To get a sense of the disparity in rent/value ratios, using 2009 Census data the entire state of Colorado had a median housing value of $234,100 and a median monthly rental housing cost of $835, for a rent/value ratio of .00356. The state of Michigan had median housing value of $147,500 and a median monthly rental housing cost of $709, a rent/value ratio of .00481. There is, perhaps not surprisingly, great variation of these numbers within states and that variation is consistent with the arguments made here. For example, Aspen City ($860,000, $1,319, .00153) and Boulder City ($464,200, $998, .00215) have very low rent/value ratios relative to Colorado as a whole, while Birmingham City ($388,800, $1,145, .00294) and Ann Arbor ($244,300, $950, .00389) also have lower numbers than averages for Michigan.

What are the implications of the preceding for the spatial labor market equilibrium? For locations that are expected to either grow in size or that possess superior amenities that are expected to be valued more in the future, using a single capitalization rate results in hedonic analyses that are biased. The United States average rent/value ratio is .00441 ($185,400, $817), while Hawaii’s rent/value ratio is .00234 ($521,500, $1,221) and Oklahoma’s rent/value ratio is .00621 ($98,800, $614). The percentage owner-occupied in Hawaii is 58.1% compared to Oklahoma’s 67.9% and a national average of 66.9%. If the national capitalization rate were applied to Hawaii, imputed rents would be $2,300/month, when actual rents were only $1,221. Averaging the numbers with a weighting of 58.1% on the former would imply a weighted hedonic rent-equivalent value of $1,848, rather than the actual rental rate of $1,221; for Oklahoma, using the national capitalization rate would result in a weighted hedonic rent-equivalent value of $493, far below the actual $614 rents actually being paid. Hence, using a single capitalization rate in a national hedonic study will bias upward the rents estimated for nice locations and will bias downward the rents estimated in more undesirable locations—if, on the other hand, rents were capitalized up to property values with a constant national capitalization rate, property values would be biased downward in nice places and biased upward in less nice places.

Assuming that property values are converted to rents, and under strong homogeneity assumptions that rental housing and owner-occupied housing are equivalent, as are renters and owners, then labor would “look” from the hedonic housing models to require less compensation in nice places (since more of the niceness appears to be going into rents than is actually the case) and to require more compensation in the undesirable places because less dis-amenity appears to be capitalized into rents in those locations. In light of the difficulties raised here, along with the likelihood that rental housing and owner housing are different as are renters and owners, it would seem that an argument could be made for conducting separate analyses for each group, resulting in different amenity values for each group. Obtaining the “true” amenity value of a location,
then, might merely be a matter of weighting the values obtained in the separate analyses by the percentages of people in each group, which would vary by location.

Closely related to the preceding difficulty with hedonic models is the ubiquitous assumption in the theory of a constant lot size and a constant dollop of work effort (the forty-hour week), each normalized to unity. This would not seem, at first thought, to be a great difficulty at the empirical level since the labor hedonic data could be restricted to full-time workers and the housing hedonic could include lot size as an explanatory variable. However, both the quantity supplied (e.g. perhaps fewer hours at lower wage rates in nice places) and the supply of labor (e.g. shifting if leisure is a complement or a substitute with amenities) are likely to vary in what are currently unknown ways with wage variation due to variation in amenities. Moreover, any particular wage level can occur with either high rents (if a location is high in either household amenities or firm amenities or both) or with low rents (if a location is undesirable to either or both)—and one would generally expect that housing prices would not be independent of work effort, apart from simple Cobb-Douglas utility characterizations. If leisure is complementary with amenities, the supply of labor will be lower in nice places (wages higher) and higher in undesirable locations (wages lower). The assumption of a fixed amount of labor in all locations will then bias downward the apparent value of amenities. Moreover, if desirable locations are also superior, the assumption of a constant amount of work effort over space will, then, result in a bias that will, over time, look like more convergence is going on than actually is.

In addition, how to handle lot size is complicated. Consider an amenity bundle, common in practice, which is comprised of amenities whose consumption is independent of lot size—for example access to the Central Business District in the standard urban model or access to a wide variety of other amenities, such as nearness to an ocean or the breathing of air of various quality levels. In such situations, one would expect substitution of capital for land to occur (e.g. high-rise buildings as one approaches the CBD radially). How much is being paid for the amenity in this case depends critically on lot size...if one buys twice the average lot size, one is paying twice as much as others for the amenity. This implies that merely holding lot size constant in the rent hedonic is insufficient; to obtain marginal prices an interaction term between lot size and the various amenities must be introduced.

If actual lot sizes get smaller in high amenity locations, as would generally be expected, the assumption that lot sizes are constant leads to a bias that underestimates the amenity values. And, if smaller lots sizes, ceteris paribus, are less desirable than larger lot sizes, again as expected, the nice places are a little less nice for this reason, hence wages in nice areas would be biased upward by the constant lot size assumption, while wages would be biased downward in the less desirable areas where lot sizes would be larger than average. Thus, there appears to be greater convergence in wages than there truly is, just because of the assumption of constant lot size.
The standard models also assume competitive land and labor markets. As but one important case where this assumption is not valid, consider the California Coastal Commission that regulates building construction in coastal California. Were it not for the stringent zoning of this commission, it is very likely that virtually the entire coastline of California would look like Collins Blvd in South Beach, Miami, with high-rises lining the ocean and extending inward. This might result in a much larger percentage of the U.S. population living in California. The “value of ocean access,” would be seen to be vastly higher in such a world. This is not necessarily to argue that the zoning is inefficient as it is possible, though I suspect highly unlikely, that non-use values of all Americans might exceed the use values of the many millions of residents who would occupy those buildings. The scenic views from the Pacific Coast Highway certainly have value, to Californians and visitors alike, but those values are not being captured by property value studies, since the properties that “would” be there in a free market setting are prohibited by the Coastal Commission. The large lot zoning requirements effectively restrict ocean access to the very rich (e.g. as in Malibu) who are willing to pay a great deal for ocean access, with the less-rich who would like to acquire ocean access along with potentially much smaller lot sizes being effectively excluded by CCC zoning laws.

The hedonic method implicitly assumes that all amenities associated with a location are accurately perceived by households and firms. This is not controversial for amenities whose benefits are sensed by our five senses (e.g. view premiums, the sound of the ocean, smells of various sorts, the feel of warmth on the skin, the diversity of tastes available in locations with many fine restaurants). However, there are amenities whose benefits are unlikely to be fully captured by the senses. Environmental improvements, for example, might be partially perceived by the senses, but complex health effects, the magnitude of which experts in the field argue about, are unlikely to be perceived accurately if at all. In such cases, the hedonic method is very likely to undervalue the amenity, with property values too low and wage rates too high in the clean locations.

Some effects might even be quite mis-perceived. For example, acid-polluted lakes offer much greater water visibility than do non-acid-polluted lakes—cleaning up such lakes might lead property values to fall around them, if people think that being able to see deeper in the lake is an important trait. Nearness to hazardous waste dumps has a very large negative effect on property values (and perhaps wages, to the extent that wage variation occurs within labor markets, as seen in Blomquist, Berger, and Hoehn), even when knowledgeable experts assert that there can be no local effects associated with the dump. Individuals receive more radiation leaning against a granite wall in Grand Central Station than they would receive leaning against the outside wall of a nuclear reactor, yet thousands do the former every day that would be horrified to contemplate the latter.

What is one to make of these examples? In the case of amenity benefits that are not fully perceived, an argument could be made for adding benefits from health effects models (e.g. number of asthma attacks averted times the willingness-to-pay for an averted asthma attack,
number of lives saved times $7 million dollars, the current value of a statistical life saved being employed by the EPA) to those from hedonic models. However, this is likely to involve some double counting as households might infer that smelly air is unhealthy air. Also, if an individual “feels” damaged by a hazardous waste dump or a nuclear reactor, then is that not a real damage? If that individual gets an ulcer from worry, it is still an ulcer. One might argue that public authorities should attempt to educate households about the true risks of damage they face from various sources, since households are notoriously bad at assessing such risks. On the other hand, the dread associated with some risks (e.g. cancer, terrorist attack) may truly be greater than that associated with other risks (e.g. dying in a car crash), and willingness-to-pay to avoid the first group of risks may be genuinely greater than WTP for the latter risks.

It should be noted that the array of amenity levels among locations is not independent of either technology or public policy. The creation of the interstate highway system in the 1950’s and 1960’s hastened the decline of the Rustbelt and the expansion of the Sunbelt. However, the latter expansion would have been much smaller were it not for the invention and widespread innovation of air conditioning in the South and Southwest. Uniform national environmental standards (e.g. the requirement that all cars be equipped with catalytic convertors) have the practical effect of causing movement to the areas that most benefit from such policies—Los Angeles, with frequent stagnant air conditions, benefits more from such policies than does Chicago. What these examples imply is that one cannot run a hedonic equation at one point in time and apply the results to time periods far before or far after that study.

In certain relatively rare cases, the nature of the underlying preferences for an amenity matter greatly to its valuation. Normally, economists do not care at all “why” households desire the goods they desire, it not mattering whether one person wants a refrigerator to keep beer cold while another wants a refrigerator for fresh produce or ice cubes. In either case, the estimation of the price, cross-price, and income elasticities of interest to the economists is unaffected. Even in situations in which economists think about the underlying motives (as with the medium of exchange, asset, and precautionary motives for holding money), the estimations and conclusions are unaffected by those thoughts. For environmental goods, however, the nature of the preferences matter in a way not widely known, as suggested by the California Coastal Commission discussion above.

Environmental economists typically talk about 1) use values, 2) option to use values, 3) bequest motives, and 4) preservation/existence values. Unlike the case of the refrigerator, these values frequently “clash,” in the sense that some households want to use an amenity directly while others would like preserve the amenity in its unused state. Are the demands for non-use of the California coastline as large as or larger than the use values? Is Central Park in New York City more valuable as a park than the billions, perhaps trillions, of dollars it would be worth if developed? Is it better to allow snowmobiles in Yellowstone Park in the winter when their noise and pollution disturbs the wildlife at a time when other stresses on the animals are at their annual peak? These are difficult questions, yet decisions have to be made; the decision to do nothing is
itself a decision with costs and benefits. The decisions in these clashing cases are difficult largely because there is great controversy about the methods of ascertaining non-use value vis-à-vis the methods employed—one of which is the hedonic method discussed here—to get estimates of use values. The takeaway message, though, is that the non-use value of the amenity, from society’s perspective might be larger than the benefits of using the amenity, the latter being measured by the higher property values and lower wage rates associated with using the amenity.

The discussion of this section has involved many topics related to the spatial labor market equilibrium. Many of these topics are either not discussed at all in the existing literature or the discussions are, as here, unduly preliminary to obtain solid policy-relevant conclusions. It is to be hoped, however, that the research initiatives sketched in this section will lead to more substantive contributions in the years to come.

References


http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml (source for rent/value data).


