



WORKING PAPER

Welcome to the Neighborhood: How Can Regional Science Contribute to the Study of Neighborhoods?

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I. Introduction

Although debates rage about exactly how and to what extent, there is strong evidence that neighborhoods shape their residents' lives. Motivated by this premise, researchers in many disciplines – from sociology to public health to economics - are using new data and methods to add to a growing body of work on neighborhoods. Regional scientists have contributed to some degree to this literature, but fairly narrowly. In all the articles published in the *Journal of Regional Science* since its inception, the term 'neighborhood' has only shown up in 11 titles. Yannis Ioannides and Giorgio Topa offer a useful summary of the literature on social interactions and the importance of neighborhoods in shaping them. Here we wish to argue that there are additional reasons for regional scientists to study neighborhoods – and many important ways that regional scientists can help to build our understanding of how neighborhoods matter, how they change, and how residents are distributed across them.

II. Why Should a Regional Scientist Study Neighborhoods?

At the broadest level, regional science concerns the social and economic conditions of sub-national units, with a particular focus on the role of spatial relationships. The multi-disciplinary field addresses such questions as the regional impact of the arrivals and departures of firms, the importance of regional agglomerations, regional migration patterns of households, and the environmental impacts of regional social and economic change. Our claim is that all of these questions are important to ask at the level of the neighborhood as well as the region. After all, neighborhoods are essentially mini-regions, and indeed, neighborhoods may affect the well-being of households (as well as the profitability of firms) more immediately than regions through delivering a set of social conditions, physical amenities, and local public services, and through shaping access to the broader region.

Moreover, studying neighborhoods should enrich the discipline's understanding of regional issues. For one thing, in making their location decisions, households and businesses choose neighborhoods to locate in, not simply regions. As such, neighborhoods are often the engine of broader regional development. For another, the spatial arrangement of neighborhoods, and sorting among them, also contribute to overall levels of coordination and interaction within a region. In essence, we are arguing that through conditions internal to the neighborhood such as local services, through neighborhood links to external resources and the region, and via their overall distribution, neighborhoods matter to phenomena that regional scientists study. We expand a bit more on each of these broad categories before considering the specific contributions regional scientist could make to these areas in the near future.

Conditions and Local Services

As Ioannides and Topa make clear, there is considerable evidence that space – and neighborhoods, shape social interactions and the formation of social networks. While their focus is primarily on the importance of spatially-influenced interactions on job networks and employment, they make clear that social actions may matter much more broadly. For example, social interactions can help to build – or undermine – norms about education, parenting, and health-related behaviors. Growing evidence suggests that crime and safety levels in neighborhoods are critical too (see Ellen and Turner, 2003). People who live in high-crime

neighborhoods naturally face higher risks of being victimized. In addition, children who witness violent crime first hand may suffer significant and lasting emotional trauma while parents may feel greater stress (Furstenberg, 1993; Jarrett, 1997; Martinez and Richters, 1993). It is revealing that the families participating in the Moving to Opportunity Demonstration (MTO) program listed victimization and fear of violent crime as their primary reasons for participating in the demonstration, and that those who moved to lower poverty areas through the program consistently describe the security of their new environments as a major improvement in their lives (Popkin, Harris, and Cunningham, 2002). It is also likely that crime affects the profitability of local businesses but there is limited research on this question (see Bowes 2007).

Neighborhoods also deliver a set of physical amenities. They deliver views and topography, a street grid, air quality, and given the durability of building structures, a stock of buildings of a given vintage and design. These physical aspects may make neighborhoods more aesthetically appealing, shape the activity that occurs within them, and potentially even affect the health of residents.

Another critical aspect of neighborhoods is that they are often the locus through which public services and goods are delivered. Many public goods are provided at sub-jurisdiction levels, and there is a large degree of variation across neighborhoods in their quality. Within a given jurisdiction, we see variability in the availability of well-maintained parks, police protection, high-quality health services, and perhaps most critically, the performance of schools.

Finally, while we typically consider neighborhoods as places where households live and interact, businesses are located in neighborhoods too. Many draw customers from their local neighborhoods; some hire workers from the local neighborhoods; and all enjoy locally-provided public services. Most are also affected by the activities of their neighboring businesses. There is considerable evidence that at least some sources of agglomeration occur at geographies smaller than the level of the region or jurisdiction (Rosenthal and Strange, 2005; Arzaghi and Henderson, 2004; Anderson et al, 2004). Indeed, Rosenthal and Strange (2005) find that agglomeration effects decay significantly at a distance of just one mile.

Access and Environmental Implications

Neighborhoods matter to residents and businesses not only for what they offer internally, but also for the access that they provide to external resources, including proximity to other neighborhoods. For while much is delivered at the level of the neighborhood, both businesses and households need to utilize resources from the broader region as well, such as job opportunities for households and both customers and workers for local businesses. Neighborhoods affect access to jobs, and the broader arrangement of neighborhoods shapes overall commuting patterns in a metropolitan region. The nature of access provided by neighborhoods therefore matters for the types of location and commuting decisions regional scientists study. In addition, foreshadowing our later discussion, more densely arranged neighborhoods typically correlate with less driving and more environmentally sustainable regions.

Sorting Across Neighborhoods

In his contribution to this volume, Vernon Henderson argues that inequality across areas (regions, cities) is one of the two critical areas in urbanization and development on which we need more research. We offer a similar argument regarding inequalities within regions and cities, and across neighborhoods. U.S. metropolitan areas are extremely segregated by race, and to some degree by income, and the neighborhoods that are populated by different groups are far from separate but equal. Indeed, there is growing evidence that this sorting may lead to reduced educational attainment and inferior labor outcomes for minority youth (Cutler and Glaeser, 1997). Thus, differences across neighborhoods in these attributes, and more critically, differential access to neighborhoods, is its own area of interest for those concerned with the health and functioning of regions and cities.

III. Unanswered Questions

While we now know a great deal about the importance of neighborhoods, there are many remaining puzzles and many key policy questions that could be addressed with improved research on neighborhoods. More relevant for our purposes, there are many questions that regional scientists seem particularly well-suited to answer. Here we highlight three sets of questions. Note that all three questions offer an opportunity for regional scientists to contribute to policy, which is something they have been accused of failing to do in the past.¹ Addressing these questions effectively will also require regional scientists to consider some critical aspects of the urban environment to which they have typically paid little attention in the past: local governments and services and race.

Gentrification/Neighborhood Change

From North (1955) to Krugman (1991) and Fujita and Thisse (2002), regional scientists have contributed invaluable insights to our understanding of the process and nature of regional growth. Using many of the same tools, regional scientists can also contribute to our understanding of neighborhood change and development – or gentrification as it commonly dubbed in popular discourse.

Many existing papers have described the pace of neighborhood economic change (Aaronson, 2001; Ellen and O'Regan, 2008; Rosenthal, 2006). Aaronson (2001) finds a fair degree of persistence in neighborhood income over a twenty-year period between 1970 and 1990, but Rosenthal (2006) examines neighborhoods over a longer period of time and finds substantial movement in relative income status. Ellen and O'Regan (2008) meanwhile compare changes over different decades and report that low-income neighborhoods were far more likely to experience income gains during the 1990s than during earlier decades. A full 56 percent of the neighborhoods in the bottom quintile of relative income (defined as the ratio of their mean income to the mean income of their metropolitan area) experienced a gain in status during the 1990s, and 19 percent enjoyed a gain of more than 10 percentage points (Ellen and O'Regan, 2008). Research on the concentration of poverty also suggests a decline in the number of high-poverty neighborhoods during the 1990s, again suggesting substantial change during that decade (Jargowsky, 2003).

¹ See discussions in the special symposium issue on the status and future of the field, *International Journal of Regional Science* (1995).

While this work has demonstrated that many neighborhoods (and an increasing number of low-income neighborhoods) experience fairly substantial gains in income (at least over some time periods), many key puzzles remain about both the causes of such change (how and why neighborhoods change) and the consequences. Indeed, virtually all the papers on neighborhood change call for additional analysis of the dynamics of neighborhood composition.

Rosenthal (2006) suggests that there are two main competing theories about the determinants of economic gain offered in the economics literature. The first theory follows from the filtering model, which posits that as a neighborhood's housing stock ages and deteriorates, it becomes less desirable to higher-income households (Muth 1972; Sweeney 1974). However, once the quality of a neighborhood's housing stock falls to a certain level, the neighborhood becomes a target for redevelopment. The second theory focuses instead on social externalities – or essentially, racial or class preferences as drivers of neighborhood change (Bailey, 1959). As Schelling (1971) has so elegantly shown, if households care about the composition of their neighbors, then small changes in demographic make-up can lead to the rapid tipping of neighborhoods from one group to another. Note that the tipping literature has focused on explaining the rapid transition of neighborhoods from higher to lower status. It is not clear that the behavior of households will be as sensitive to small *increases* in the status of residents.

Few studies have empirically tested these alternative explanations; those that do find that age of housing is predictive, as are certain measures of socioeconomic status. Brueckner (1977) studies neighborhoods in eight cities during the 1950s and 1960s and identifies several housing characteristics related to neighborhood decline, including lower homeownership rates and older housing. Rosenthal (2006) finds that newly built homes are linked to gains in economic status, as are very old homes, which are presumably ripe for redevelopment. As for socioeconomic status, he finds that initial homeownership rates and education levels are positively linked to income gains, while higher concentrations of minority residents are associated with losses. Brueckner and Rosenthal (2005) find further evidence that dwelling age affects residential location patterns.

While these papers have certainly offered insights into these dynamics and their underlying causes, a key shortcoming of these existing analyses is that they rely on aggregate census data as snapshots in time and thus can only offer limited insights about the underlying changes in the incomes and spatial arrangements of households that ultimately drive such change. Moreover, these papers emphasize neither the role of local government nor the possibility of neighborhood spillovers. Yet both are critical. Clearly the services provided by local governments shape location decisions, and the most pressing question for local officials and policymakers is arguably which types of public or philanthropic investments can help to jump-start residential demand in a local neighborhood. Should local governments, for instance, invest in renovating aging housing, refurbishing parks, improving schools, reducing crime or bolstering commercial streetscapes? We encourage regional scientists to examine how different investments affect neighborhood trajectories. Moreover, it seems likely that the changing fortunes of one community would affect the desirability of its neighboring areas.

Thus, we also encourage regional scientists to study how – through spatial spillovers – these neighborhood-level investments affect the development of neighboring areas and the larger region. Armed with their rich understanding of growth models and location decisions and their tools of spatial analysis, regional scientists are well-positioned to provide answers. Moreover, the longitudinal, spatially disaggregated data that is critical for identifying the causal impacts of these investments, is now available in many jurisdictions.

More broadly, we encourage regional scientists to pay attention not only to the causes of neighborhood change but also to its consequences, about which there are many unanswered questions. Virtually all of the literature and discussion about the consequences of gentrification has focused on the extent to which low-income residents are displaced as a result of the change. But an equally important concern is what happens to the quality of life of the residents who stay in the community. In particular, a key question of interest is whether and how local public services and quality of life change as neighborhoods change. While gentrification may involve the opening of fancy boutiques and restaurants, it may also engender more fundamental changes in neighborhood quality of life. Local public services may improve and retail choices may expand. The influx of more affluent residents may also lead to safer streets, greater connections to jobs, and a more educated and engaged set of parents supporting local schools. A true normative assessment of neighborhood economic change must consider changes in public services and conditions as well as any increases in rents.

A few papers have examined changes in crime rates in gentrifying neighborhoods, and suggest that crime rates actually *rise* as neighborhoods change, due to the high levels of residential and social instability (Covington and Taylor, 1985; Van Wilsem, Wittebrood, and Dirk de Graaf, 2006). There are some reasons to question whether the associations identified are causal, however, and one paper suggests that over longer-term, crime may in fact decline (McDonald, 1986). So surely, more work is welcome. Moreover, virtually no work to our knowledge has considered whether changes in the quality of local schools or the delivery of local public services more broadly accompany gentrification.

Finally, the most fundamental question is whether and how neighborhoods can change so that benefits exceed costs for local residents. Are any changes that occur valued by households more than the associated increase in rents that they must pay to remain in the community and enjoy them? Can policies aid in generating more inclusive growth and development? Or should policies rather focus on assistance to households rather than neighborhoods?

Neighborhoods, Commuting, and Environmental Sustainability

There is growing concern about the environmental costs of energy use. Concern about household energy consumption has focused on the three main contributors to the urban footprint: food, housing, and transport (Holding and Norland, 2005).² The latter clearly falls within the purview of regional scientists: how aspects of urban form shape transportation use and ultimately energy use and sustainability.

² The ecological footprint is frequently used in the sustainability and environmental literature as a summary approach to capturing overall impacts. See Holding, 2004, for an example.

Regional science has a long history of research on commuting patterns, including the development of behavioral models of demand for travel (i.e., McFadden, 1975; Train, 1986). But interest in land use policies as a potential means of influencing travel behavior, is more recent. Since the early 1990s, there has been a rapid expansion of research in the transportation and urban planning fields, which considers the effect of the built environment on travel outcomes.³ Specifically, this work aims to assess whether alternative urban design features help to decrease travel, increase the share of trips conducted via public transit or walking, and decrease the environmental footprint of city residents.

Recent extensive reviews of this literature conclude that there is likely an association between the built environment and travel, but with many caveats on how this should be interpreted (Handy et al, 2004; Cao et al 2008). Boarnet and Crane (2001), for example, argue that much of this literature suffers from inadequate modeling of the underlying complex behavior, poor handling of statistical issues, and use of inappropriate data. The authors then model the demand for travel explicitly, using more sophisticated estimation techniques, with spatially and geographically appropriate data, to shed light on their claims. This kind of careful modeling and estimation of spatial phenomena, which is the hallmark of regional science, is a prime example of how we believe regional science can contribute to current pressing questions related to neighborhoods.⁴

Perhaps the key problem with this literature is ambiguity about the direction of causality – that is, whether the design of the neighborhood itself affects behavior or whether it attracts residents who have particular preferences for those designs and the travel options they present.⁵ By failing to account for this selection, the bulk of the existing literature has limited relevance for policy decisions. In a recent review of thirty-eight studies that attempt to address the residential selection issue, Cao et al. (2008) report that the studies attempting to account for selection generally find weaker evidence that the built environment affects travel behavior than has work that ignored selection. The authors outline nine approaches taken to address endogeneity, the most recent of which is more careful modeling of the joint behavior processes (i.e. joint discrete choice models, structural equations and mutually dependent choice models). Work in this area is quite new.

Plantinga and Bernell (2005, 2007) raise a similar endogeneity concern with respect to a related literature, the relationship between urban form and obesity and caution that many of the policy prescriptions that are based on previous work overstate possible impacts on health through manipulating urban form..⁶ A growing number of researchers in public health and urban

³ See Handy et al (2004) for a useful review of research in this area.

⁴ Granted, this article was published in a transportation journal, rather than in regional science. However, given the affiliation of the lead author, we choose to claim this as a contribution of regional science to this literature.

⁵ For a good description of these issues, see Cao et al, 2008.

⁶ We note that this work was published in the Journal of Regional Science.

planning have interpreted the higher prevalence of obesity in less dense areas as causal, suggesting that changes in the built environment may improve health outcomes. Using data from the NLSY (which includes information on weight), matched with county of residence, Plantinga and Bernell explicitly model household selection into high or low density locations (counties), and then assess the effect of the surrounding density on subsequent changes in obesity.⁷ They find that selection does indeed matter and does contribute to the negative association between density and obesity. Specifically, they find that those with lower body mass indices (used by health professionals to assess obesity) are also more likely to select high density locations. After controlling for selection, people moving to more dense communities do experience a decline in weight. However, given that people with higher BMI's are less likely to move to dense areas, the expected health benefits from building denser communities have been overstated.

This work is particularly relevant for our discussion because of the more expansive modeling done in the 2005 paper. In addition to incorporating household preferences into location decisions, key features of urban land market are also endogenous to the model: density, housing prices and wages. That other aspects of urban form are themselves the product of household *and business* decisions, is currently missing from research on land use and travel behavior. Making additional progress in understanding the underlying behavioral reactions and issues of endogeneity with respect to land use will require the type of modeling and careful estimation procedures that regional scientists possess. Indeed, regional scientists can justifiably claim to be at the forefront of such residential choice and travel models. Furthermore, evidence in this emerging literature suggests that specific features of the built environment do affect residential choice, which is quite relevant for the residential choice models currently employed by regional scientists.⁸

In addition to the central issue of causation, broadly construed, there are two additional unanswered questions in this area to which regional scientist can contribute. First, as noted in the review by Handy, et al (2004), there has been little assessment of the relative magnitudes of those land use effects that have been found. This greatly reduces the usefulness of these studies for policy purposes. To extend this point, the studies we have reviewed do not consider the efficacy of alternative land use policies in altering travel behavior. Boarnet and Crane (2001) argue that taxes and congestion pricing policies could be more effective, but the existing research (primarily outside of regional science) does not attempt to consider such alternatives. Regional scientist might be better situated to consider the wider range of policy options.

Lastly, Handy et al (2004) argue that a more detailed assessment of the variation of impacts, particularly across households (people) of different racial and socioeconomic backgrounds is needed. In an extensive review of much of this literature, Ewing and Cervero (2001) attempt to synthesize what is known about the importance of socioeconomic

⁷ Specifically, pre-move body weight is controlled for in the selection model, and post-move changes in body weight are examined in the second model.

⁸ We have in mind the approaches employed in recent papers such as Bhat and Guo, 2007; Pinjari et al, 2007

characteristics of households in determining their travel behavior – mode of travel, length of travel, etc. They conclude that SES matters for most aspects of travel behavior, and may even be the most important for some (such as trip generation). Given the importance of these factors in determining travel behavior, it is certainly possible that the effects of urban form may vary across groups. The existing literature on commuting choice and patterns has done a better job on considering variation by household type and other demographics than has most of the work on the effects of the built environment.⁹

Each of these research directions would greatly strengthen the current knowledge of the causal affect of neighborhood (and broader) design features on travel behavior. This would contribute to a better understanding of both residential choices and travel behavior, while potentially shedding light on the efficacy of designing neighborhoods in ways that reduce energy consumption.

Segregation and Sorting

Regional scientists have not paid a great deal of attention in recent years to sorting by income and race. (In the past 30 years, only two articles published in the *Journal of Regional Science* have focused on segregation: Goodman, 1985; and Dawkins, 2006). Yet the regions they study are extraordinarily segregated by income and race. And at least in the case of African American youth, there is growing work suggesting that this segregation may be harmful to their labor, education and even health outcomes (Cutler and Glaeser, 1997; Ellen, 2000). Benabou (1996), meanwhile, argues that economic segregation can be harmful to all families in the longer run.

There are many ways that regional scientists can contribute to our understanding of this segregation and its implications. First and perhaps most directly, they can develop new ways to measure segregation. Most research on racial segregation relies on the dissimilarity index and/or the isolation index. But both of these indices have well-known limitations (Iceland, Weinberg, and Steinmetz, 2002). Most importantly, both of these indices treat individual neighborhoods as islands and disregard the composition of the neighborhoods surrounding them. This suggests that that neighborhood interactions and influences are fully contained within one neighborhood, which is clearly not realistic.¹⁰ To use such aspatial measures to depict what is inherently a spatial relationship seriously hinders research in this area.

Second, these indices fall short in capturing segregation among multiple racial and ethnic groups. The dissimilarity index is a dichotomous index, and only measures segregation between two groups. The isolation index, meanwhile, only captures the extent to which residents of an area tend to live among others of their same group, and thus fails to communicate anything about the composition of the other residents living in their communities. Other problems with the dissimilarity index are that it is unstable when the minority population is small and insensitive to

⁹ See Handy (2005) for an assessment of these research weaknesses.

¹⁰ For example, Topa (2001) examines the effects of nearby neighborhoods on social networks and job outcomes.

changes in the redistribution of minority group members among the set of neighborhoods that are all above or below the citywide mean, in terms of their minority share. In essence, it is insensitive to changes within the tails of the distribution, which may be where most policy interventions are aimed. Meanwhile, the isolation index is notably affected by changes in the overall composition of the larger city or metropolitan area, even when no change in the spatial distribution of groups has occurred.¹¹

Existing methods are arguably even more inadequate in capturing economic segregation. There is little consensus about the appropriate index to use, and perhaps as a result, little research on the extent of economic segregation (Dawkins, 2006). The indices that are used to capture income segregation tend to rely on arbitrary income cut-offs like the poverty rate (e.g., Abramson, Tobin, and Vandergoot, 1995), and thus ignore the overall distribution of incomes. And like the indices that measure racial segregation, they are fundamentally aspatial (Jargowsky, 1996). Dawkins (2006) overcomes some of these shortcomings with his ‘spatial ordering index.’ But more work should be done to test the properties of his proposed index as well as to explore alternatives. Regional scientists seem particularly well-equipped to contribute to developing better measures of the sorting of households across space.

In addition to developing better measures of racial and economic segregation, regional scientists could also contribute to the understanding of their causes. Considerable uncertainty remains about the extent to which housing market discrimination, differences in housing search and information, disparities in the distribution of affordable housing, and household tastes drive segregation (Ellen 2008). While some other scholars may have a comparative advantage in measuring racial preferences, there are many questions that regional scientists are well-suited to studying – for example, measuring the spatial distribution of affordable housing and determining the extent to which the spatial concentration of affordable housing drives segregation. Similarly, the decentralization of employment may have implications for residential sorting that are frequently ignored in other social sciences.

Finally, there is also much uncertainty about the consequences of segregation, which regional scientists could help to clarify. Cutler and Glaeser (1997) find that the labor market outcomes of black teens and young adults are diminished in metropolitan areas where blacks are more residentially segregated. But there has been virtually no work studying whether segregation has similar effects on the labor market prospects of other minority groups. Plus, there is virtually no work examining whether the form of segregation matters. If minority groups are concentrated in inner suburbs rather than central city areas, are they better off in terms of job access or educational outcomes? Finally, we understand little about the mechanisms through which segregation affects labor market outcomes. While overall the evidence on the importance of physical proximity to jobs is mixed, this may be due in part to the use of simplistic measures of job access. As researchers have employed more sophisticated measures (ranging from

¹¹ There are, of course, other measures of segregation that do not suffer from these particular weaknesses, such as the Entropy Index. However, it too is aspatial.

commute time, to detailed data on access to public transit, to gravity models of employment and changes in employment), the preponderance of evidence suggests that access to jobs matters.¹²

In addition, segregation may also affect job access through truncating information networks. Regional scientists could contribute to our understanding of the spatial aspects of these social networks and offer a more nuanced view of job access, taking into account the availability and speed of public transit, for example. Regional scientists could also help to develop methods of measuring the differences among groups in segregated areas in access to other meaningful services like high-quality schools, safe neighborhoods, and high-quality health services.

IV. Availability of New Data

We have laid out above a number of ways that we think regional scientists could help to further our understanding of neighborhood issues. All of this work would reach considerably beyond the existing research, and much of it is only now possible due to the availability of new sources of data. We highlight three general categories.

a. Administrative data with geographic identifiers, i.e. property values, crime

With increasing frequency, researchers are obtaining current and historical data on crime, schools, vital statistics, property values, welfare receipt, and other important neighborhood attributes from state and local administrative data systems. These data offer a much richer set of neighborhood attributes than are available via the Census, and they are collected on a more frequent basis and thus available in a more timely fashion. A particularly exciting possibility for research on neighborhoods is the availability of geo-coded data available at geographies smaller than the census tract. Because these data are often available at the address level, they can be aggregated to almost any set of neighborhood boundaries. Plus, these data are typically available on an annual basis and thus often provide more current and flexible evidence of trends in neighborhood housing markets and broader social conditions than decennial census data (Kingsley 1998; Kingsley 1999).

These data offer tremendous potential for neighborhood research. For example, researchers have used parcel-level data on property values and public investments to arrive at estimates of the neighborhood impacts of such initiatives as community gardens, subsidized housing and targeted community investment (Voicu and Been, 2007; Galster, Tatian and Accordino, 2006; Schwartz et al, 2006). Other researchers have used parcel-level data on property values to measure the effects of proximity to local spillover impacts of environmental disamenities such as landfills and rail lines (Hite, Chern, Hitzhusen, and Randall, 2001; Clark 2006).

¹² Ihlanfeldt and Sjoquist 1990; O'Regan and Quigley, 1998; Raphael. 1998.

b. Individual-level administrative data on students

Research has shown that the performance of local schools is a critical factor in residential location decisions, and thus a second and quite important development is the availability of administrative data on public school children. Many school systems now make available annual, student-level data, offering important opportunities for researchers interested in neighborhoods. Since these data typically include demographic information about the children and their families and because elementary school attendance is determined by residence in most districts, such timely data on student body composition can provide a window into annual demographic changes in a community. In addition, these data also allow researchers to develop more sophisticated measures of school performance, such as value-added measures, which measure school quality as the average improvement in student outcomes above and beyond their starting values (Brasington 1999).

c. RDC data matching individual residential decisions to neighborhood location

Finally a third opportunity, highlighted by Ioannides and Topa (2009), is the presence of Census Research Data Centers, which allow researchers to gain access to micro household data linked to geographic identifiers, such as census tracts. In other words, after obtaining clearance, researchers can work with geocoded, micro data sets that identify the neighborhood in which each household lives. Such data sets enable researchers to model the residential decisions made by individual households, for example. They also potentially enable researchers to employ multi-level modeling techniques, as these data can be linked with a variety of additional data sources that include geographic identifiers. Bayer, Ross, and Topa (2005), for instance, use 1990 decennial census data for the Boston metropolitan area to measure the extent to which social interactions among neighbors affect labor market outcomes. The RDC data allow them to identify the actual block of both residence and employment, and they find that individuals residing on the same block are more likely to work together than those in nearby blocks. There are now nine Census Research Data Centers around the country.

V. Conclusion

As we hope this paper has made clear, regional scientists have a great deal to contribute to the study of neighborhoods. Neighborhoods are ultimately micro-regions, so the theories and tools used to study regional growth can surely be applied to the examination of neighborhood growth. Moreover, we believe strongly that greater knowledge of neighborhood patterns and development will enrich our understanding of regions themselves.

References

- Aaronson, Daniel. 2001. "Neighborhood Dynamics," *Journal of Urban Economics*, 49(1), 1-31.
- Abramson, Alan J., Mitchell S. Tobin and Matthew R. VanderGoot. 1995. "Changing Geography of Metropolitan Opportunity: The Segregation of the Poor in the U.S. Metropolitan Areas, 1970-1990," *Housing Policy Debate* 6(1), 7-44.
- Anderson et al. (2004).
- Arzaghai, Mohammed and J. Vernon Henderson. 2004. "Networking Off Madison Avenue," Working Paper, Brown University.
- Bailey, Martin. 1959. "Note on the Economics of Residential Zoning and Urban Renewal," *Land Economics*, 35, 288-92.
- Bayer, Patrick, Stephen Ross, and Giorgio Topa. 2005. "Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes," Working Paper No. 11019, National Bureau of Economic Research.
- Voicu, Ioan and Vicki Been. 2007. "The Effects of Community Gardens on Neighboring Property Values," *Real Estate Economics*, 36(2), 241-283.
- Benabou, Roland. 1996. "Equity and Efficiency in Human Capital Investment: the Local Connection," *Review of Economic Studies*, 63 (2154), 237-65.
- Boarnet, Marlon G. and Randall Crane. 2001. "The Influences of Land Use on Travel Behavior: Specification and Estimation Strategies," *Transportation Research Part A*, 35(9).
- Bowes, David R. 2007. "A Two-Stage Model of the Simultaneous Relationship between Retail Development and Crime," *Economic Development Quarterly* 21(1), 79-90.
- Brasington, David M. 1999. "Which Measures of School Quality Does the Housing Market Value?," *Journal of Real Estate Research*, 18(3), 395-414.
- Brueckner, Jan. 1977. "The Determinants of Residential Succession," *Journal of Urban Economics*, 4(1), 45-59.
- Brueckner, Jan and Stuart Rosenthal. 2005. "Gentrification and Neighborhood Cycles: Will America's Future Downtowns Be Rich?" Working Paper.
- Cao, Xinju, Patricia Mokhtarian, and Susan Handy. 2008. "Examining the Impacts of Residential Self-selection on Travel Behavior: Methodologies and Empirical Findings." Working Paper.

- Clark. 2006. Covington, Jeanette, and Ralph Taylor. 1985. "Gentrification and Crime: Robbery and Larceny Changes in Appreciating Baltimore Neighborhoods During the 1970s," *Urban Affairs Quarterly*, 25 (1):142-172.
- Cutler, David M. and Glaeser, Edward L. 1997. "Are Ghettos Good or Bad?," *The Quarterly Journal of Economics*, 112(3), 827-872.
- Dawkins, Casey J. 2006. "Space and the Measurement of Income Segregation," *Journal of Regional Science*, 47(2), 255-272.
- Ellen, Ingrid Gould. 2000. "Is Segregation Bad for Your Health? The Case of Low Birth Weight," *Brookings-Wharton Papers on Urban Affairs*, 2000, 203-229.
- Ellen, Ingrid Gould. 2008. "Understanding Segregation in the Year 2000." In James H. Carr and Nandinee Kutty (eds.), *Segregation: The Rising Costs for America*. Routledge, 2008, pp. 261-278.
- Ellen, Ingrid Gould and Katherine O'Regan. 2008. "Reversal of Fortunes? Low Income Neighborhoods in the 1990s," *Urban Studies* 45(4), 2008: 845-869.
- Ellen, Ingrid Gould, and Margery Austin Turner. 2003. "Do Neighborhoods Matter and Why? What Have We Learned from MTO?" In John M. Goering and Judith D. Feins (eds.), *Choosing a Better Life? A Social Experiment in Leaving Poverty Behind: Evaluation of the Moving to Opportunity Program*. Washington, DC: Urban Institute Press, pp. 313-338.
- Ewing, Reid and Robert Cervero. 2001. "Travel and the Built Environment." *Transportation Research Record*, 1780: 87-114.
- Goodman, A.C. 1985. "A Note On Neighborhood Size and the Measurement of Segregation Indices," *Journal of Regional Science*, 25, 471-476.
- Fujita, Masahisa and Jacques-François Thisse. 2002. *Economics of Agglomeration: Cities, Industrial Location, and Regional Growth*. Cambridge: Cambridge University Press.
- Furstenburg, Frank F. Jr. 1993. How Families Manage Risk and Opportunity in Dangerous Neighborhoods. In *Sociology and the Public Agenda*, edited by W.J. Wilson. Newbury Park, CA: Sage Publications.
- Galster, George, Peter Tatian, and John Accordino. 2006. "Targeting Investments for Community Revitalization," *Journal of the American Planning Association*, 72 (4), 457-474.

- Handy, Susan, Marlon Boarnet, Reid Ewing, and Richard Killingsworth. 2002. "How the Built Environment affects Physical Activity: a View from Planning," *American Journal of Preventative Medicine*, 23(2), 64-73.
- Handy, Susan L., Xinyu Cao, Patricia L. Mokhtarian. 2005. "Correlation or Causality between the Built Environment and Travel Behavior? Evidence from Northern California." *Transportation Research Part D*, 10(6), 427-444.
- Hite, Diane, Wen S. Chern, Fred Hitzhusen and Alan Randall. 2001. "Property-Value Impacts of an Environmental Disamenity: The Case of Landfills," *The Journal of Real Estate Finance and Economics*, 22(2-3).
- Holding, Erling. 2004. "Ecological Footprints and Sustainable Development," *Journal of Housing and the Built Environment*, 19(1), 91-109.
- Holding, Erling and Ingrid Norland. 2005. "Three challenges for the Compact City as a Sustainable Urban Form," *Urban Studies*, 42(12), 2145-2166.
- Iceland, John, Daniel Weinberg, and Erika Steinmetz. 2002. *Census Bureau Series CENSR-3, Racial and Ethnic Segregation in the United States: 1980-2000*. Washington, DC: U.S. Government Printing Office.
- Ihlanfeldt, Keith and David Sjoquist. 1990. "Job Accessibility and Racial Differences in Youth Employment," *American Economic Review*, 80(1):267-276.
- Ioannides, Yannis and Giorgio Topa. 2009. "Neighborhood Effects: Accomplishments and Looking Beyond Them," paper presented at the Journal of Regional Science 50th Anniversary Symposium.
- Jargowsky, Paul A. 1996. "Take the Money and Run: Economic Segregation in U.S. Metropolitan Areas," *American Sociological Review*, 61: 984-998.
- Jargowsky, Paul A. 2003. "Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s," *Living Cities Census Series, Metropolitan Policy Program*.
- Jarrett, Robin L. 1997. "Bringing Families Back in: Neighborhoods' Effects on Child Development." In *Neighborhood Poverty, Volume 2: Policy Implications in Studying Neighborhoods*, edited by Jeanne Brooks-Gunn, Greg Duncan, and Lawrence Aber, pp. 48-64. New York: Russell Sage Foundation Press.
- Kinglsey, G. Thomas. 1998. "Neighborhood Indicators: Taking Advantage of New Potential," The Urban Institute.
- Kingsley, G. Thomas. 1999. "Building and Operating Neighborhood Indicator Systems: a guidebook," The Urban Institute.

- Krugman, Paul, 1991. "Increasing Returns and Economic Geography," *Journal of Political Economy*, 99(3), 483-99.
- Martinez, Pedro, and John Richters. 1993. "The NIMH Community Violence Project: Children's Distress Symptoms Associated with Violence Exposure," *Psychiatry* 56, 22-35.
- McDonald, Scott. 1986. "Does Gentrification Affect Crime Rates?" In *Crime and Justice, Volume 8: Communities and Crime*, edited by Albert Reiss and Michael Tonry. Chicago: University of Chicago Press.
- McFadden, Daniel. 1974. "The Measurement of Travel Demand," *Journal of Public Economics*, 3, 303-328.
- Muth, Richard. 1972. "A vintage model of the housing stock," *Regional Science Association Papers Proceedings* 30(2), 141-56.
- North, Douglass C. 1955. "Location Theory and Regional Economic Growth," *Journal of Political Economy*, 63(3), 243-258.
- O'Regan, Katherine and John Quigley. 1998. "Where Youth Live: Economic Effects of Urban Space on Employment," *Urban Studies* 35(7), 1187-205.
- Pinjari, Adbul, Ram Pendyala, Chandra Bhat and Paul Waddell. 2007. "Modeling Residential Sorting Effect is to Understand the Impact of the Built Environment on Commute Mode Choice," *Transportation*, 34(5), 557-573.
- Plantinga, Andrew and Stephanie Bernell. 2005. "A Spatial Economic Analysis of Urban Land Use and Obesity", *Journal of Regional Science*, 45(3), 473-492.
- Plantinga, Andrew and Stephanie Bernell. 2007. "The Association between Urban Sprawl and Obesity: Is it a Two Way Street?" *Journal of Regional Science*, 47(5), 857-879.
- Popkin, Susan J., Laura E. Harris, and Mary K. Cunningham. 2002. "Families in Transition: A Qualitative Analysis of the MTO Experience." Report Prepared for the U.S. Department of Housing and Urban Development.
- Raphael, Steven. 1998. "The Spatial Mismatch Hypothesis and Black Youth Joblessness: Evidence from the San Francisco Bay Area," *Journal of Urban Economics*, 43(1), 79-111.
- Rosenthal, Stuart. 2006. "Old Homes, Externalities, and Poor Neighborhoods: A Model of Urban Decline and Renewal," Working paper.
- Rosenthal, Stuart and William C. Strange. 2005. "Agglomeration and Hours Worked," Working Paper.

- Schelling, Thomas. 1971. "Dynamic models of segregation," *Journal of Mathematical Sociology*, 1, 143–86.
- Schwartz, Amy Ellen, Ingrid Gould Ellen, Michael Schill, and Ioan Voicu. 2006. "The External Effects of Place-Based Subsidized Housing," *Regional Science and Urban Economics*, 36(6).
- Sweeney, James. 1974. "A Commodity Hierarchy Model of the Rental Housing Market," *Journal of Urban Economics* 1, 288–323.
- Train, Kenneth. 1986. *Qualitative Choice Analysis: Theory, Econometrics and an Application to Automobile Demand*. Massachusetts: The MIT Press.
- Topa, Giorgio. 2001. "Social Interactions, Local Spillovers and Unemployment," *Review of Economic Studies*, 68, 261-295.
- Van Wilsem, Johann, Karen Wittebrood, and Nan Dirk de Graaf. 2006. "Socioeconomic Dynamics of Neighborhoods and the Risk of Crime Victimization: A Multilevel Study of Improving, Declining, and Stable Areas in the Netherlands," *Social Forces*, 53(2), 226–247.