ACCESSIBILITY TO JOBS AND LABOR MARKET OUTCOMES OF RESIDENTS

Qingyun Shen, University of Michigan, Department of Urban and Regional Planning, sqingyun@umich.edu

ABSTRACT

The impact of the location characteristics of housing on residents' socio-economic status has been under scholarly investigation for decades. One seminal work is the spatial mismatch hypothesis by John Kain who proposed a theory that the unemployment of inner city residents is to a large extent caused by their isolation from jobs in suburbs. In order to decentralize poverty and to improve the employment outcomes of inner-city residents, the Department of Housing and Urban Development of the United States launched several housing programs (e.g. Moving-To-Opportunity or MTO program, Section 8 Housing, etc.) and allocated billions of dollars to subsidize low-income people to relocate into more affluent suburban communities. However, the impact of these housing programs on the labor market outcomes of subsidy recipients was observed to be limited or unclear. This study attempts to reveal the underlying relationship between housing location and the labor market outcomes of residents by taking a transportation perspective—using transportation accessibility as an indicator of the convenience of housing location. The result of this study suggests that a simple dichotomy of inner-city and suburb in the discussion of housing location impact should be discarded. Instead, accessibility to jobs from the housing location, among other factors, has the real influence on the labor market outcomes of residents. Therefore, government subsidies used to relocate people into suburban housing locations would not efficiently improve residents' labor market outcomes unless the transportation accessibility of those locations is also improved. Such conclusion has important implications for both housing and transportation policies.

Keywords: Accessibility, Housing Location, Employment, Spatial Mismatch

SPATIAL MISMATCH AND UNEMPLOYMENT

Employment decentralization and a widening skills gap between city and suburban residents in the United States have long been documented (Blackley, 1990). Of particular concern is the migration of blue-collar and service jobs from the central city to the suburbs, the so-called “job sprawl”. Especially, regions heavily dependent upon manufacturing, like Detroit, have among the highest rates of “job sprawl” (Kneebone, 2009). According to a report recently released by Brookings Institution (Kneebone, 2009), over 77% of jobs in Metro Detroit are located farther than ten miles from city centre. Such a phenomenon of job sprawl decreases employment options for less mobile central city residents; the result is an inherent disadvantage for these people in terms of finding adequate entry-level employment.

Responding to this concern, Kain (1968) proposed the spatial mismatch hypothesis as to explain the cause of minority unemployment and poverty in inner cities. Kain(1968)’s theory stated that the isolation of inner city under-employed residents from suburban job opportunities is partly due to the discrimination in the housing market and the uneven distribution of non-white employment across the urban areas.

This theory has influenced both housing and transportation policies in the United States. Since the 1990s, various housing mobility programs were introduced in the U.S. Those programs were designed to move low-income people from inner-cities to suburban regions where more jobs are believed to be available. Such housing mobility programs include one of the earliest experiment, Gautreaux program in Chicago (Popkin et al., 1993; Rosenbaum and Popkin, 1991), and the later widely-known “Move-To-Opportunity” (MTO) program (Briggs, 1997) by the federal Department of Housing and Urban Development (HUD), as well as the establishment of the latest housing subsidy program of HUD: Section 8, a.k.a. housing vouchers. In the Gautreaux program, low-income African-Americans are randomly assigned to move to middle-income white-dominated suburbs (the experiment group) or to low-income African-American-dominated urban areas (the controlling group). The findings from this program show that those suburban movers experience higher employment than their peers in the controlling group who stay in the city centre. Scholars find similar results from the MTO program (Rosenbaum and Harris, 2001) as well. However, some researchers argue that it is a rush to label those experimental programs as “successes” and that “a change of address alone” (Turner and Briggs, 2008) would never compensate for the major barriers to employment for some people. Further, another strong argument is that improved employment outcomes in these programs are due to the higher quality of the suburban neighbourhoods in terms of better services and social networks, rather than their spatial locations per se. Therefore, these experimental cannot be used as proof to declare that suburban housing locations are necessarily better than central-city residences in terms of improving employment outcomes of residents.

The central-versus-suburban dichotomy in the discussion of housing location can be quite misleading. Although there is an observed trend that the jobs are decentralized to some extent, the spatial pattern of employment distribution in a metropolitan region may vary a lot. Jobs can be dispersed across the entire metro, or very centralized in the central city, or quite localized or regionalized at notable sub-centres, or anything in between. Even if the proximity to jobs does have a positive effect on employment outcome of residents, whether moving residents to suburban areas can improve their employment outcomes will depend on the specific spatial pattern of jobs distribution in the region.

Nevertheless, Kain's hypothesis has inspired much empirical research on the relationship between housing location and employment outcomes ever since (Blackley, 1990; Carlson and Theodore, 1997; Cooke, 1993; 1996; 1997; Ellwood, 1986; Holloway, 1996; 1997; to name a few). Yet the results are inconsistent and sometimes conflicting (Jencks and Mayer, 1990).

Some of the empirical research supports the spatial mismatch theory. For instance, Ihlanfeldt and Sjoquist (1989) found that job access explained about 30% to 50% of the difference between African-American and white teenagers in the employment rate. Similar results are presented in another piece by Ihlanfeldt (1992). Carlson and Theodore (1997) reported a statistically significant association between spatial mismatch and earnings, although the effect of space was much less than that of race. A study by Holloway (1997) showed that the impact of job access on employment for African-American male youth remains statistically significant from 1980 to 1990, with decreasing magnitude, though. O'Regan and Quigley (1996) also focused on youth and draw similar conclusion.

Some other evidence suggests that the location is just a veil of the real underlying cause of high unemployment for central-city minorities—the racial discrimination issue in labour market (Leonard, 1987). In an influential study of African-American households in Chicago, Ellwood (1986) found comparably high unemployment rates among African-Americans with similar education levels regardless of whether they resided on the Southside, away from job opportunities, or west of the city near the booming Interstate 88 employment corridor. From this he concluded that the chief reason for persistent unemployment among African-Americans is “race” rather than “space”. Cooke (1993) found no correlation between neighbourhood unemployment rates and the ratio of low-skill jobs to population in Indianapolis. Similar conclusions were drawn by Kasinitz and Rosenberg (1994) based on their survey study of the Red Hook neighbourhood in Brooklyn, New York. Their interviews with local residents and employers revealed that unemployment stems primarily from discrimination in hiring and the absence of place-based social networks. By using the data from San Francisco Bay Area, Cervero et al. (1998) examined the relative contribution of accessibility versus other factors in explaining unemployment rates through path analysis and found that unemployment is far more strongly associated with race than with job accessibility. Sanchez et al. (2004) found that improved transit and employment access have not played significant roles in the welfare-to-work transition for welfare recipients in the six selected metropolitan areas.

So far, most of the studies on this topic were focused on a particular group of people (e.g. minorities, welfare recipients, youth, etc.). Existing studies that include a more general population usually had to make the compromise of using aggregated data, thus missing personal information and characteristics. This study will expand the research scope of classic spatial mismatch hypothesis and its followers to a more general population without losing the personal details. It attempts to evaluate the relationship between housing location and employment outcomes of all residents in metropolitan regions using person as the unit of analysis. This study also questions the central-versus-suburban dichotomy in the original spatial mismatch statement and reveals the importance of specific spatial pattern of employment distribution in determining the applicability of spatial mismatch theory in different metropolitan regions.

MEASUREMENT OF ACCESSIBILITY TO JOBS

Although some studies have used distance to jobs, travel times, accumulated opportunities as indicators of spatial mismatch, this study will join a few scholars like Cevero et al. (1998) and Sanchez et al. (2004) to apply gravity-based accessibility metrics as the measurement of the “convenience” of housing locations in terms of possibly affecting employment outcomes. The gravity-based accessibility was originally formulated by Hansen (1959) and recently applied and developed by Grengs et al. (2010). Accessibility measure has the advantage over any simple measure of distance or time because it is a composite measurement of both. The formula of accessibility calculation is written as below.

$$A_i = \sum_{i=1}^{n} O_j f(C_{ij})$$

Where:

i and j denote locations (or zones) in a metropolitan area which has n number of zones in total;

A_i is the accessibility value for location i;

O_j is the number of opportunities in location j; When calculating the job accessibility indicators, the opportunities are number of jobs;

$f(C_{ij})$ is the impedance function measuring the smoothness of spatial movement between location i and j, which is proposed by Wilson (1971) and is expressed as an exponential function:

$$f(C_{ij}) = e^{-\beta C_{ij}}$$

In this function, *e* is the mathematical constant that is the base of the natural logarithm, which is approximately 2.718281828;

C_{ij} is the travel time from location i to location j, as is estimated in typical travel models;

β is empirically calibrated parameter which measures the “friction”. This study borrows the value of β from the calibration by Grengs et al. (2010), which is 0.10.

Two accessibility scores are calculated for each location: work accessibility by automobile and work accessibility by transit. A person’s accessibility is then determined by her travel mode. The person will be assigned the accessibility by auto if she has the access to driving (defined as having a valid driver’s license AND at least one vehicle in the household); otherwise, the person will be assigned the accessibility by transit. This process is called modal match, which ensures that the potential access to jobs of a resident at a housing location is a good estimate of the potential opportunities that can be reached from the location. Intuitively and empirically, for residents living at the same location, people who have access to cars will have a much higher accessibility than people who do not.

THE MODEL OF EMPLOYMENT OUTCOMES

This study applies a probit regression model so as to examine the relationship between the work accessibility of housing location and the working status of individual residents. Probit model is chosen over regular linear regression model because it ensures that the predicted values of working status would be the probability of being employed, ranging from '0' meaning 'absolutely no chance of being employed' to '1' meaning 'absolutely certain of being employed'. The probability is given by:

$$P(Y = 1 | X = x) = \phi(x' \beta)$$

Where:

Y is the dependent variable, which is a binary variable denoting the working status of a resident, with a value of either '1' (working) or '0' (not working);

X is a vector of all the independent variables that are included in the model;

φ is the cumulative distribution function of the standard normal distribution;

β is the vector of coefficients on the independent variables, which is estimated by maximum likelihood techniques in STATA 10.0 package.

The key independent variable in this model is the measure of job accessibility of the location where the resident lives in by the applicable travelling mode of the resident. Since the gravity-based accessibility values in a metropolitan region would range from less than 100 to more than 100,000, accessibility scores are transformed into a logarithm format to be put in the regression. Other controlling independent variables that are considered to be entered in the regression as independent variables include the 15 ones that fall in the three following categories:

Category One: Personal characteristics, including:

1. Age, as a continuous numeric variable. Any case with an age that falls outside of the range [16, 65] is excluded from the data to prevent any bias induced by underage employment or retirement.
2. Gender, as a dummy variable, where 0=male and 1=female
3. Disability status, as a dummy variable, where 0=no disability and 1=disabled
4. Driver's license status, as a dummy variable, where 0=no driver' license and 1=having driver's license. Although we make the modal match of accessibility based on the presence of automobiles in the households, not the license status of a particular person, this information is still relevant as it shows how frequent and flexible the use of automobiles can be. The probability of being employed might be higher if a person has a driver's license, as he/she does not have to depend on others to offer a ride either when doing job searches or when commuting to jobs.

Category Two: Household characteristics, including:

5. Household size, as a continuous numeric variable

6. Household income, as a categorical variable with 16 different income ranges which may vary by metropolitan area
7. Number of other workers in the household, as a continuous numeric variable. This number shows how many residents in the household excluding the respondent him/herself is/are currently working.
8. African-American householder, as a dummy variable, where '1' means that the householder is African-American and'0' means otherwise.
9. Asian householder, as a dummy variable, where '1' means that the householder is Asian and'0' means otherwise.
10. Householder ethnicity, as a dummy variable, where '1' means that the householder is Hispanic or Latino, and '0' means otherwise.
11. Number of vehicles in the household, as a continuous numeric variable.
12. Number of bicycles in the household, as a continuous numeric variable.

Category Three: Neighbourhood Characteristics, including:

13. Percentage of African-American population in the census block group where the residents live in.
14. Per Capita Income of the census block group where the residents live in. Following the convention of treating income in regressions, I transform the numbers into logarithm format to prevent the bias due to the huge variation in the absolute values and the broad range of income.
15. Area type of the neighbourhood in which the residents live, as a categorical variable, which can take the values of 'urban', or 'suburban', or 'rural', or 'other'.

DATA SOURCES AND CASES OF STUDY

San Francisco and Detroit were selected as the cases of study. The geographic definition of these selected metropolitan areas follow the boundaries used by the local Metropolitan Planning Organizations for transportation and planning purposes, which is close to but may not be exactly the metropolitan geographical boundaries defined by the US Census Bureau.

Although the selection of cases is partly based on data availability, this study does have a special interest in Detroit because of two reasons. One, the original spatial mismatch hypothesis was developed under the circumstances that manufacturing jobs are suburbanized, which lead to unemployment of inner-city minorities. Detroit metropolitan area is a typical region that has undergone such process. Therefore, Detroit becomes a natural test field of the spatial mismatch hypothesis. The other reason is that the unemployment rate and the level of job sprawl in the Detroit region is among the highest across the United States (Kneebone, 2009). In such severe situation, the examination of the accessibility effect on employment outcomes of the metro residents would have important potential policy relevance.

Given the special interest in Detroit as a case, San Francisco is chosen based on its similar size yet contrasting features in the unemployment level, racial composition, and employment establishment. The table below provides an overview of selected socio-economic indicators of the two regions.

Table 1 Socio-economic Indicators of The Two Cases

Metropolitan Area	Total Population (Millions)	Total Jobs (Millions)	Unemployment Rate Overall	Percentage of African-Americans in central city	Percentage of jobs in Manufacturing
San Francisco	6.8	4.1	4.8%	7.8%	14.6%
Detroit	4.8	2.8	8.4%	81.6%	22.8%

For calculating accessibility measures, travel demand modelling data are collected from the MPO. These data contain matrices of interactions between all Traffic Analysis Zones (TAZs) in the region, including travel times and the number of trips between zones. The TAZ is the primary geographic unit of transportation modelling. The zonal interactions are provided by travel mode (auto and transit), which makes it possible to calculate the accessibility by two different modes for residents at the same location. Data on business establishments are purchased from the private vendor Claritas, Inc. (Claritas 2002).

Data of the variables falling in the personal characteristics category and the household characteristics category are obtained from the most recent Regional Household Travel Survey (RHTS). Figure 1 and 2 are the maps of housing locations of respondents in the RHTS in the two metropolitan areas.

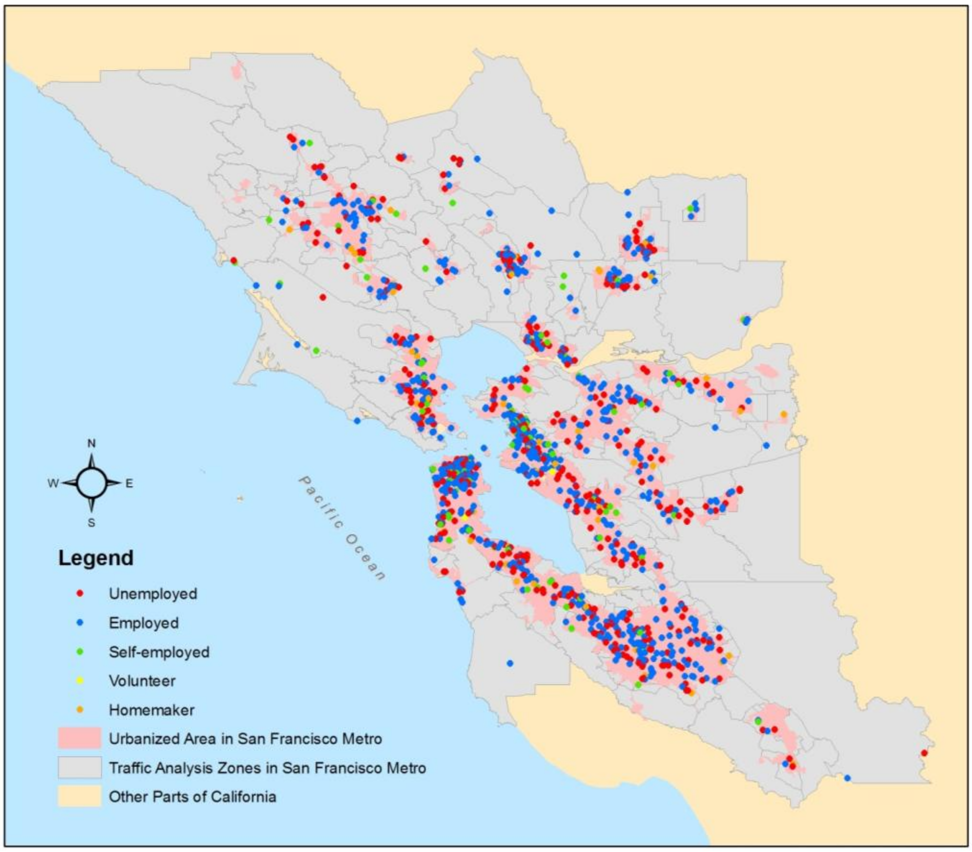

Figure 1 – Map of Respondents' Locations in the Sample by Working Status in San Francisco Metropolitan Area

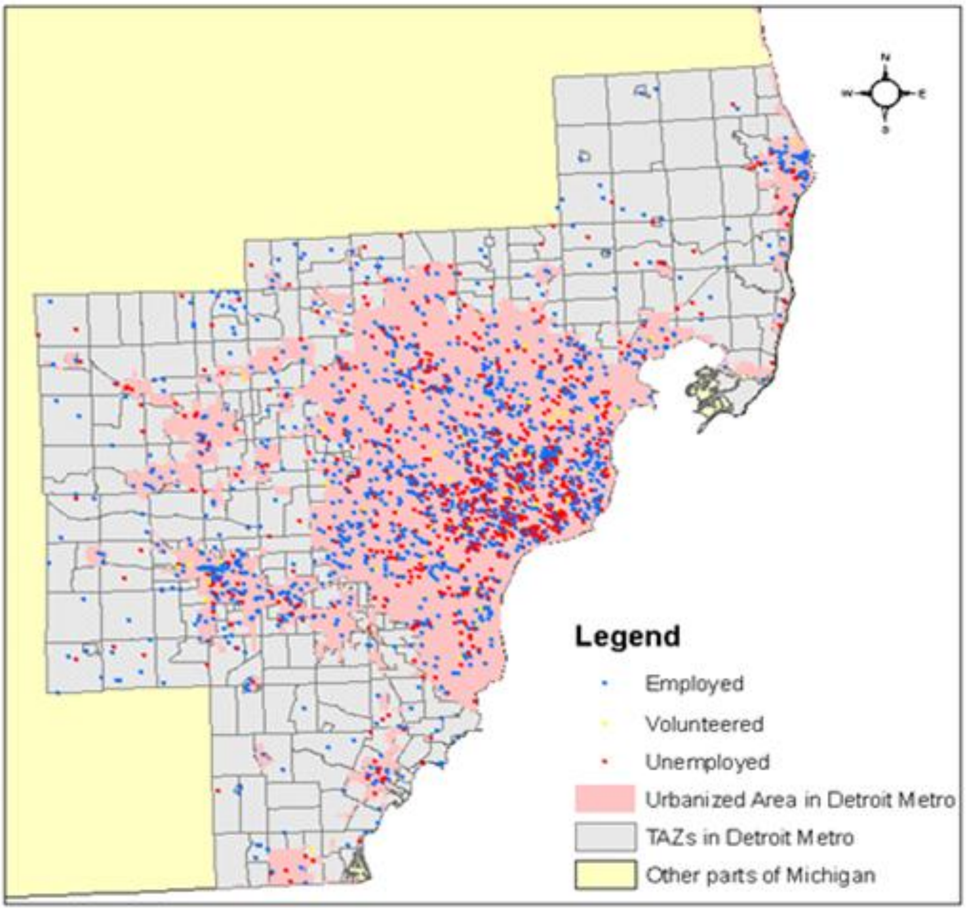

Figure 2 – Map of Respondents' Locations in the Sample by Working Status in Detroit Metropolitan Area

As the two maps show, the samples of residents represented the entire population quire well in that the samples both covered the urbanized area and the rural area in the two metropolitan areas, with more cases selected in the urbanized areas than out of them.

Lastly, data of the variables in the neighbourhood characteristics category are collected from Census 2000 SF3 datasets. I used ArcGIS application to link the characteristics of census block groups with the residents by spatially joining the housing locations to the locations of census block groups which the residences fall in.

MODEL RESULTS AND FINDINGS

The results from the regression models of working status on accessibility and other controlling variables are presented in Table 2 below. In both models, the dependent variable is the working status and independent variables are those listed in the model section above.

Independent variables that are not statistically significant in the models are not shown in the table.

Table 1 Coefficients on Independent Variables in the Working Status Probit Model

Independent Variables	San Francisco	Detroit
Logarithm of job accessibility	0.03***	0.04***
Age	-0.04***	-0.02***
Gender (1=male, 0=female)	-0.54***	0.10***
Disability Status	-0.81***	n/a
Driver's License Status	0.65***	0.22***
Household Size	-0.22***	-0.027***
Number of other workers	0.10***	0.04***
Neighbourhood's Population Density	n/a	-0.06***
Logarithm of Neighbourhood's Per Capita Income	-0.26***	0.07***

***marks significant at alpha=0.01 level.

Despite the dissimilarity between the two metropolitan areas in our study, both models show a consistent finding that job accessibility of housing location is positively associated with the likelihood of being working/employed, after controlling for age, gender, race, and household and neighbourhood features. Such effect shows to be stronger in the case of Detroit than that of San Francisco, which may very likely be the result of more decentralization of jobs in Detroit region.

Unlike some of the previous findings from the relevant literature, concentration of African-American population in the neighbourhood is not a considerable factor that affects residents' employment status. In these two cases, race and ethnicity seem to be not as significant as some of the previous studies have discovered. The reason for this, however, may be quite different in the two regions. In San Francisco, where the population is very diversified, with share of multiple racial groups fairly balanced in the work force, discrimination again minorities may less likely to happen. In Detroit, where there is a dominant African-American population in the central city and a large share of African-American population overall, being African-American may not be a disadvantage in the job market. Moreover, in both cases, the insignificance of race in employment outcomes could also be partly explained by the improved equity in labour market. After all, it has been about thirty years after the approval of The *Equal Employment Opportunity Act* of 1972 (Public Law 92-261) in the United States, which was designed to ensure fair treatment to all segments of society without regard to race, religion, colour, national origin, or sex.

Another intriguing finding from Table 2 is that the association between neighbourhood income level and residents' employment status is negative in San Francisco, yet positive in Detroit. We may infer that improving the housing mobility by moving unemployed people to wealthier neighbourhood would be more likely to succeed in Detroit than in San Francisco. In San Francisco, living in a wealthy neighbourhood does not lead to better job opportunities for residents.

CONCLUSION

This study is inspired by a classic spatial mismatch theory and its following studies in the literature. The analysis conducted in the study expands the research scope of the existing literature by revealing the relationship between employment and accessibility of housing location for all the population in metropolitan regions. Using gravity-based accessibility metrics as to measure the housing location convenience, with the help of detailed regional household travel survey data, this study is able to apply the analysis to a wide range of population at a micro level.

Detroit and San Francisco, the two selected cases in this study are the two metropolitan regions in the United States that share similar population size yet bear drastically different demographic and economic features. However, the probit models of working status for two regions both show a very consistent finding on the effect of accessibility on employment outcomes—significantly positive. Moreover, such positive effect is stronger in a region that has more severe job decentralization like Detroit. The finding that race no longer plays a role in determining people's employment outcomes is very appealing. Explanations to this include more diversity in population (as the case of San Francisco) and/or the dominance of a minority group which may be conventionally viewed as minority (as the case of Detroit). The association between neighborhood income and the employment outcomes of residents is still a puzzle. In one case, it is positive; while it is negative in the other. Some further studies on the mechanism of the impact of neighborhood affluence on employment need to be conducted before a final inference can be drawn from here.

REFERENCES

Blackley PR, 1990, "Spatial mismatch in urban labor markets: evidence from large U.S. metropolitan areas." Social Science Quarterly 71: 39-52

Briggs X, 1997, "Moving up versus moving out: Neighborhood effects in housing mobility programs." Housing Policy Debate 8: 195-233

Carlson V and Theodore N, 1997, "Employment availability for entry-level workers: An examination of the spatial mismatch hypothesis in Chicago." Urban Geography 18: 228-242

Cervero R, Rood T and Appleyard B, 1999, "Tracking accessibility: employment and housing opportunities in the San Francisco Bay Area." Environment and Planning A, 31: 1259-1278

Claritas, Inc. (2002). Claritas Business-Facts Methodology. Ithaca, NY: Claritas.

Cooke T, 1993, "Proximity to job opportunities and African-American male unemployment: A test of the spatial mismatch hypothesis in Indianapolis." Professional Geographer 45: 407-415

Cooke T, 1996, "City-suburb differences in African American male labor market achievement." Professional Geographer 48: 458-467

Cooke T, Ross S, 1999, "Sample selection bias in models of commuting time." Urban Studies 36(9): 1597-1611

Ellwood D, 1986, "The spatial mismatch hypothesis: are there teenage jobs missing in the ghetto?" in Black Youth Employment Crisis, Eds. R Freeman, H Holzer, University of Chicago Press: Chicago, IL. Pp. 147-190

Grengs, Joe, Jonathan Levine, Qing Shen, and Qingyun Shen. Intermetropolitan Comparison of Transportation Accessibility: Sorting Out Mobility and Proximity in San Francisco and Washington, D.C. (Forthcoming in Journal of Planning Education and Research, June 2010).

Hansen W, 1959, "How accessibility shapes land use." Journal of the American Institute of Planners 25: 73-76

Holloway S, 1996, "Job accessibility and male teenage employment, 1980-1990: The declining significance of space." Professional Geographer 48: 445-458

Ihlandfeldt K, Sjoquist D, 1989, "The impact of job decentralization on the economic welfare of central city blacks," Journal of Urban Economics 26: 110-130

Ihlandfeldt K, Sjoquist D, 1992, "The role of space in determining the occupation of black and white workers," Regional Science and Urban Economics 21: 295-299

Jencks C, and Meyer S, 1990, "Residential segregation, job proximity, and black job opportunities," in Inner-city Poverty in the United States. Eds. L Lynn Jr., M McGeary. National Academy Press: Washington D.C. pp. 187-222

Kain J, 1968, "Housing segregation, negro employment, and metropolitan decentralization," Quarterly Journal of Economics 82: 175-197

Kain J, 1993, "The spatial mismatch hypothesis: three decades later," Housing Policy Debate 3: 371-460.

Kasinitz P and Rosenberg J, 1996, "Missing the connection: Social isolation and employment on the Brooklyn waterfront." Social Problems 43: 180-196

Kneebone E, 2009, "Job Sprawl Revisited: The changing geography of metropolitan employment." The Brookings Institution. April 6, 2009. <http://www.brookings.edu/reports/2009/0406_job_sprawl_kneebone.aspx> Last accessed by the author on April 8, 2009.

Leonard J, 1987, "The interaction of residential segregation and employment discrimination," Journal of Urban Economics 21: 323-346

O'Regan K and Quigley J, 1996, "Spatial effects upon teenage outcomes." New England Economic Review, May/June: 41-58

Popkin S, Rosenbaum J, and Meaden P, 1993, "Labor market experiences of low-income black women in middle-class suburbs: Evidence from a survey of Gautreaux program participants." Journal of Policy Analysis and Management 12: 556-573

Rosenbaum E and Harris L, 2001, "Residential mobility and opportunities: Early Impacts of the Moving to Opportunity demonstration program in Chicago." Housing Policy Debate 12 (2): 321-346

Rosenbaum J and Popkin S, 1991, "Black pioneers: Do their moves to the suburbs increase economic opportunities for mothers and children?" Housing Policy Debate 2: 179

Sanchez TW, Shen Q, and Peng ZR, 2004, "Transit Mobility, Job Access and Low-income labour participation in US metropolitan areas." Urban Studies 41(7): 1313-1331

Turner MA and Briggs X, 2008, "Assisted housing mobility and the success of low-income mobility families: Lessons for policy, practice, and future research." Washington D.C.: The Urban Institute.