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Job Proximity and the Urban Employment Problem: Do Suitable Nearby Jobs Improve Neighbourhood Employment Rates?

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Summary. Due to a scarcity of small-area jobs data, much of the spatial mismatch literature has not directly addressed the impact of nearby jobs on neighbourhood employment rates. Such analysis is particularly needed when considering the probable effects of neighbourhood-targeted economic development. Moreover, the occupational mix of jobs and their match with resident skills have not been dealt with adequately. A consistent measure of job proximity is found to have a significant but modest effect on neighbourhood employment and unemployment rates, with a standard deviation increase resulting in an increase in the employment rate of approximately six-tenths of a percentage point and a reduction in unemployment of approximately three-tenths of a percentage point. When considering occupational match and the average occupational level of nearby jobs, the effect of nearby jobs is larger. Race and educational attainment are found to have the largest effects on employment rates.

1. Introduction

The problem of geographically concentrated and growing unemployment in urban areas in the US has been well documented (Kasarda, 1993; Massey and Denton, 1993; Wilson, 1996). Policies aimed at mitigating this problem include supply- and demand-side approaches. Supply-side policies include job training and education efforts, as well as programmes to increase the residential and transport mobility of central-city residents so that they have better access to suburban jobs. Demand-side policies include economic development efforts that create or retain jobs in an area. More specifically, economic development may involve creating jobs throughout the entire metropolitan area or, alternatively, might consist of job-creation efforts in and around high-unemployment neighbourhoods. Bartik (1991) and Freeman (1991) argue that positive labour demand shocks to metropolitan economies improve the employment and, particularly, the earnings prospects of black males, who disproportionately live in high-unemployment neighbourhoods. Such analysis, however, does not argue convincingly that metropolitan job growth will permanently and substantially reduce unemployment in small areas that have suffered from large increases in unemployment over the past 30 years.

Neighbourhood job-creation policies are often seen as more direct demand-side

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attacks on the problem of concentrated unemployment than metropolitan-wide efforts. Such policies are concerned much more with the spatial distribution of jobs within a metropolitan area and much less with the aggregate growth of jobs across an entire metropolitan area. At the federal level, economic development efforts targeting distressed urban neighbourhoods began after World War II, starting with amendments to the Housing Act of 1949 that authorised federal funds for commercial redevelopment projects. With the War on Poverty in the mid-1960s came programmes such as Model Cities and support for community development corporations, which were later eliminated or scaled back. With Nixon's New Federalism came the Community Development Block Grant in 1974, which is generally targeted to distressed census tracts (Vidal, 1995; Eisenger, 1988). While such policies have been aimed at economic development, job creation has typically been only one of many objectives, including the physical redevelopment of neighbourhoods, access to goods and services and other quality of life issues. State and local governments have also adopted economic development policies targeting small areas, many with job creation among their primary objectives. Among the most popular of state policies have been enterprise zones, in which tax and other incentives are used to attract and create jobs, ostensibly for the benefit of local residents (Butler, 1991; Erickson, 1992). The federal Empowerment Zone programme is among the most recent major initiatives in this arena.

Some who view intra-metropolitan space as a major barrier to employment argue that the promotion of residential or transport mobility among inner-city residents provides a more realistic or cost-effective approach to reducing the spatial mismatch between jobs and the unemployed (Rosenbaum and Popkin, 1991; Hughes, 1995). Beyond the questions regarding the feasibility of redeveloping the economies of inner cities, however, there remains the question whether such development is likely to reduce unemployment among residents of these areas.

This study uses 1990 journey-to-work census data for the Chicago metropolitan area to determine whether and to what extent the presence of nearby jobs affects neighbourhood employment rates. The methodology is designed to be particularly relevant to the context of neighbourhood-targeted, place-based, development policies and to consider the nature as well as the magnitude of nearby jobs.

2. Previous Approaches to Determining the Impact of Spatial Job Access on Employment

Since Kain's (1968) seminal work, a good deal of research has been aimed at determining the effect of space on the employment of blacks and others living far from growing suburban job centres (Holzer, 1991; Ihlanfeldt, 1992; Jencks and Mayer, 1990; Kain, 1992). The methodologies used in such research, however, have generally not utilised sufficient geographical detail on job locations to address, in a direct fashion, the impact of jobs near small, high-unemployment areas, even though unemployment rates vary greatly over very small distances. More specifically, the literature has not focused on the effects of jobs within radii consistent with economic development policies that target distressed neighbourhoods. This has been due in part to the scarcity of small-area, place-of-work or jobs data. Sources such as the Public Use Microdata Sample (PUMS) of the decennial census do not provide small area specificity on job locations. PUMS disaggregates central cities into too few place-of-work locations making it insufficient for identifying the number and types of jobs in close proximity to a small neighbourhood area. Studies that have attempted to estimate the effect of job proximity or access (for example, Ihlanfeldt, 1993; Ihlanfeldt and Sjoquist, 1990) have often used proxies for actual job proximity, such as commute times, which may be biased. For example, if commute time varies by race even after controlling for spatial job access, skills and other factors, then it is a biased proxy for spatial job access. In fact, after controlling for job proximity, occupational level, age and other factors, Immergluck (1996) finds that the proportion of employed residents working within two miles of their neighbourhood is significantly lower in black Chicago neighbourhoods than in white areas. Even among studies that have used direct measures of job proximity (for example, O'Regan and Quigley, 1991), the geography has often been too gross, including the use of central-city–suburban job ratios. In other cases (for example, Ellwood, 1986; Simpson, 1982, 1992), job–resident ratios have not been symmetrically or systematically developed.

While some consensus appears to have developed that spatial barriers to employment can be significant, the debate continues, especially over the magnitude of the effects and the appropriate specification of job-access measures. In their analysis of 1990 Detroit data, Bauder and Perle (1995) find that spatial job access has only a minimal effect on job access, and Carlson and Theodore (1997) find very small effects of job proximity on earnings in examining 1990 PUMS and zip-code-level jobs data for Chicago. In examining data for the San Francisco area, Raphael (1995) finds substantial employment rate effects due to changes in the number of jobs near the residential location of workers. Rogers (1997) uses zip-code job-access measures for the Pittsburgh area to find, like Raphael, that an increase in the number of jobs near workers' places of residence reduces unemployment spells. Rogers considers only job levels or job growth, and not resident population densities, in her specifications of job access, thus not accounting for how many other residents are competing for nearby jobs. None of these recent studies seeks to measure the impact of jobs near a neighbourhood at a radius consistent with neighbourhood economic development policy. Moreover, while some consider general occupational levels and industrial mix, none explicitly controls for the occupational mix of nearby jobs *vis-à-vis* residents.

The relative importance of changes in job levels versus the raw levels of jobs remains ambiguous. While it may be that the changes in the number of jobs affect the number of employment opportunities in an area, large variances in job densities across urban areas should result in neighbourhoods with more nearby jobs also having many more gross job openings at local firms over a given time period. Holzer (1996) finds that gross openings and gross hires are driven by employee turnover, not net employment growth at firms. Of course, net growth affects gross hires, but because annual turnover runs on the order of 20–25 per cent of total employment at a firm (Holzer, 1996), even substantial growth or loss of employment might not be as important as the raw level of jobs in determining gross hires. Annual net job growth or loss is likely to be modest compared to annual turnover rates. For the decade from 1979 to 1989 on Chicago's predominantly black West Side, which bore a disproportionate share of the city's job loss, the decline in jobs amounted to only 22 per cent over the decade, or less than an average of 2.5 per cent per year.[1]

Gross hires are likely to be an important measure of nearby labour demand because as the number of gross openings increases, the opportunity for matches to arise between nearby jobs and neighbourhood residents should increase. Even if an area loses a substantial number of jobs, if many jobs remain in the area, regular employee turnover will still create many openings, providing a relatively high level of appropriate job matches with nearby residents. This is not to say that net employment growth should have no effect. Rather, it seems that both raw level and net growth should be expected to have some effect, and that raw level may be more important given the magnitude of annual employee turnover at firms.

A common problem with much of the spatial job access literature is that it does not distinguish among the occupations of jobs located near residents or the degree to which these jobs match the occupations of the residents. I develop a spatially uniform and consistent approach for measuring near-the-neighbourhood job access consistent with neighbourhood economic development policy and practice. I consider not only the gross number of nearby jobs, but also the occupational level of the jobs and their match to the specific skills of neighbourhood residents.

Among the methodologies most relevant to estimating the impact of job proximity on neighbourhood unemployment rates are those of Simpson (1982, 1992) and Ellwood (1986). Simpson utilises data on jobs and residents of 32 boroughs of Greater London from the 1971 Census of England and Wales to regress the borough unemployment rate on the number of jobs per resident. He also includes an occupational skill measure among his independent variables. His results suggest that a 10 per cent increase in unskilled jobs in a borough with an equal number of unskilled jobs and residents would lower unemployment by 2.5 per cent. Simpson's areas are very large, however, with populations of the order of 250 000, not suitable for examining the problems of highly concentrated unemployment in most cities. He also utilises the same areas for measuring job proximity that he uses for measuring unemployment. As will be explained, below, job proximity should be measured over a substantially larger area than unemployment.

Using 1970 commuting survey data from Chicago, Ellwood utilises a job proximity measure he terms an 'import ratio', which is equal to the number of jobs per resident-worker in a relatively large community zone that contains the smaller census tracts for which he has worker data, including employment rates. He finds that a doubling of the import ratio increases employment rates by only one percentage point. Ellwood's community zones are fixed aggregations of census tracts and, so, are not constructed symmetrically around each tract. Thus, many tracts lie on the boundaries of the zones they are in, making the zones poor measures of job access. Finally, neither Ellwood nor Simpson incorporates any comprehensive measure of how well jobs near the neighbourhood match the occupational mix or level of neighbourhood residents.

3. Developing a Model of the Small-area Employment Rate

A comprehensive theoretical treatment of the relationship between urban spatial structure and urban unemployment is provided by Simpson (1992), who develops a theory of spatial mobility to explain urban unemployment problems. Simpson asserts that the metropolitan areas consist of a series of urban sub-divisions or local labour market islands. Like Kain (1968), he argues that mobility among the islands is costly in both direct (travel costs) and indirect (job information) terms. He assumes that all workers prefer the local labour market of their place of residence. According to Simpson, when local labour market demand is high, local wage offers are high as firms compete for relatively scarce local workers. Workers accept these offers and unemployment rates are low. Wage offers for higher-skilled jobs are less sensitive to local labour demand than are offers for lower-skilled jobs, and higher-skilled workers are assumed to adopt more formal and spatially extensive job-search strategies due to the sparseness of suitable job opportunities across islands. Thus, spatial barriers primarily affect low- and moderate-skilled workers.

The potential for nearby labour demand to affect small-area employment rates should be especially strong in the case of large, densely populated metropolitan areas with significant traffic congestion such as Chicago, where commute times can be substantial. Information barriers may also be greater in more segregated urban areas like Chicago. In these areas, the knowledge of jobs in distant locations may be scarce, especially for lower-skilled workers, due to greater levels of social isolation.

I develop a model for small-area employment rates that builds on the work of Kain (1968), Ellwood (1986) and Simpson (1992). The model assumes a circular job catchment area extending a constant radius from the centre of a small residential zone, so that the zone employment rate is expected to increase as the number of jobs within the catchment area rises. Catchment areas with more jobs generate more gross hires, which neighbourhood residents are likely to learn about more easily than jobs farther away, and which pose minimal commuting cost barriers. If proximity to jobs improves employment prospects for zone residents as this model implies, nearby jobs will be accessible to residents of the nearby job catchment area as well. More persons living in the nearby job area increase the competition zone residents face for these jobs. Thus, the measure of a zone's physical accessibility to nearby jobs should not be the number of jobs alone, but the ratio of jobs to the number of persons in the labour force within radius d—the nearby jobs–labour force ratio.

Workers in higher-skilled occupations have been found to conduct more spatially expansive job-searches than workers in lower occupational levels (Simpson, 1992; Granovetter, 1992). Therefore, nearby labour demand is not expected to affect the employment prospects of workers in high-skilled occupations. A more complete set of employment determinants is drawn from the literature. (See Table 1 for a full list and description of variables.) Key factors should include measures of the average occupational level and race of residents in the labour force, and the similarity between the occupations of the nearby jobs and the occupations of the zone labour force. The average occupational level of nearby jobs may also prove important, again based on the notion of a wider geographical job–resident match process for higher-skilled occupations. The gender of the neighbourhood labour force may also be an important factor because male and female employment rates tend to differ. Much of the recent literature on the problems of urban employment has focused on the particular problems of minority men. The proportion of working-age persons under age 25 is expected to affect employment—and especially unemployment—rates as unemployment among youth is generally higher, especially in urban areas. The resulting general model for estimating the zone employment rate is:

$$e = \alpha + \beta(J_{LM(d)}/R_{LM(d)}) + \gamma(x_1, \ldots x_k) \qquad (1)$$

where, e = the employment rate for the working age population of the zone; $J_{LM(d)}$ = the number of jobs in low- and moderate-skilled occupations within distance, d; $R_{LM(d)}$ = the number of residents in low- and moderate-skilled occupations in the labour-force (including the unemployed) within distance d; $J_{LM(d)}/R_{LM(d)}$ = nearby jobs–labour force ratio; $x_1, \ldots x_k$ is a vector of characteristics of zone residents, nearby jobs, and occupational similarity between the two; and β is expected to be positive.

The model presented in equation (1) requires two types of geographical units. First, the smaller residential zone must be chosen. Because the model incorporates both labour supply and demand factors, and because labour supply characteristics, including race and skills, vary greatly over relatively small distances, a small zone is most appropriate. Moreover, to ensure adequate variances for independent variables and a large number of observations for model estimation, residential areas should be chosen as small as is practical. The lower limit is determined primarily by maintaining sufficient population in each observation to permit the characterisation of zones across a variety of features (for example, employment status, occupation level, occupational dissimilarity) and by the minimum disaggregation level of the available data. In the data set used here, the smallest unit is a half-mile-by-half-mile area commonly called a quartersection, which is adopted as the residential zone.

While employment rates can vary widely over very small areas, zone residents seeking and finding nearby jobs are more likely to find work in some larger, surrounding area than in the zone itself. The model utilises a circular job catchment area of radius d surrounding and including the zone. Jobs within this catchment area are considered nearby. Adopting a job catchment area that is sub-

Table 1. Summary statistics for dependent and independent variables

Variable description	Variable name	All residential zones: Mean	All residential zones: Standard deviation	Zones that are at least 90 per cent black: Mean	Zones that are at least 90 per cent black: Standard deviation
Employed persons 16 and older/ persons age 16–64	Employment rate	0.76	0.11	0.56	0.12
Unemployment rate	Unemployment	0.07	0.06	0.20	0.07
Low- and moderate-skilled jobs within 2 miles/low-and moderate-skilled labour force within 2 miles	Jobs–labour force ratio	0.87	0.52	0.51	0.28
Occupational level index for jobs within 2 miles[a]	Job occupation level	10.94	0.26	11.09	0.18
Occupational dissimilarity between employed residents in residential zone and jobs within 2 miles[b]	Occupational dissimilarity	0.19	0.06	0.26	0.05
Occupational level index for employed residents	Resident occupation level	10.81	0.89	9.87	0.59
Proportion of residents 18 and older with high-school diploma or equivalent[c]	High-school education	0.77	0.12	0.64	0.09
Proportion of residents who are black	Proportion black	0.18	0.33	0.98	0.02
Proportion of residents who are Hispanic	Proportion Hispanic	0.08	0.15	0.003	0.01
Proportion of residents in the labour force who are female	Female labour force	0.46	0.05	0.52	0.04
Proportion of residents age 16–64 who are under 25	Proportion under 25	0.19	0.06	0.24	0.04
n		1629		186	

[a] The job occupational level index is a weighted average of the hourly wages of the occupations of nearby jobs, with the weights being the share of nearby jobs in each occupation and the wages being the average hourly wage for all workers in the occupation in the metropolitan area from the Public Use Microsample census data for Chicago. Fourteen occupational categories are used. The resident occupation level index is calculated the same way, with the weights being the share of employed residents in each occupation.
[b] The occupational dissimilarity index =

$$\sum_{k=1}^{14} 1/2\ \{\text{ABSOLUTE VALUE}\ [(j_k/j) - (r_k/r)]\}$$

where j = the total number of jobs within 2 miles of the residential quartersection. j_k = the number of jobs in occupational class k within 2 miles of the residential quartersection for $k = 1$ to 14; r = the number of employed residents in the quartersection: and r_k = the number of residents of the quartersection employed in occupation k, for $k = 1$ to 14.
[c] Due to limitations of the CTPP data, educational attainment data are approximated by using the weighted average of high-school attainment rates for all census tracts which overlap with the observation quartersection. Census tract data are from the 1990 Census STF3A.

stantially larger than the zone itself mitigates problems of jobs–employment causality. If the zone and job catchment areas were similarly sized, then the jobs–labour force ratio of equation (1) could be the result, rather than the cause, of higher employment levels among zone residents. With a job catchment area much larger than the zone, this endogeneity is mitigated and the jobs–labour force ratio can be treated as essentially exogenous to resident employment.

In order to infer the impact on resident employment due to targeted job creation, it is helpful to choose a job catchment radius generally consistent with current neighbourhood economic development policies. Neighbourhood-targeted economic development efforts in the US tend to serve areas of the order of 5–25 square miles. For example, the federal Empowerment Zone programme limits zone areas to 20 square miles. The eight urban Empowerment Zones designated in 1994 range from 4.4 to 19.3 square miles in area with those in the larger cities ranging from 7.6 to 19.3 square miles (Great Cities Institute, 1996). Assuming a job catchment area that is circular, a range of 5–25 square miles implies a radius of between 1.3 and 2.8 miles. Given this range, a 2-mile radius is adopted around each residential zone or quartersection.[2] The geographical units adopted capture the labour supply differences among urban neighbourhoods, provide a large degree of freedom in statistical calculations, recognise the radial nature of surrounding labour markets, mitigate concerns about job-employment causality, and are consistent with neighbourhood economic development policy.

Intra-urban data are susceptible to problem of positive spatial autocorrelation, which occurs when the regression residuals of a pair of nearby observations are more similar than those of more distant pairs. Indeed, given the nature of the jobs–labour force variable and small-area urban employment rates, some degree of autocorrelation among OLS residuals is certainly likely. Two forms of spatial autocorrelation are of concern, spatial error and spatial lag. Spatial error specification is appropriate when the error term is expected to be correlated with error terms for nearby observations. Ignoring this form of autocorrelation does not affect the consistency of estimators, only their efficiency (Anselin, 1988). Given the large size of the data set here, a consistent estimator is sufficient. On the other hand, ignoring a spatial lag form of correlation, in which the dependent variable is correlated with the dependent variable of nearby observations, results in inconsistent, biased estimators. Therefore, a spatially lagged dependent variable is added to the right hand side of equation (1):

$$e = \alpha + \rho\omega + \beta(J_{LM(d)}/R_{LM(d)}) + \gamma(x_1, \ldots x_k) \qquad (2)$$

where, ω is a spatially lagged value of the zone employment rate; and ρ is the spatial autoregressive coefficient, and expected to be positive; and $\beta > 0$ is expected.

The spatially lagged variable, ω, is calculated by averaging the employment rates observations within two miles, as identified by a contiguity matrix (Anselin, 1992). For large data sets, Anselin (1988,1992) provides an instrumental variables approach for spatial lag estimation. The contiguity matrix is used to derive lagged values of each independent variable, and then these variables are used as instruments for the lagged dependent variable, ω.

4. The Data

The data used to estimate the model of resident employment shown in equation (2), as well as an identical model for unemployment come from the 1990 Census Transportation and Planning Package (CTPP) Urban Element for Chicago. The CTPP, which is derived from the 1990 Census long-form survey of the population, provides information on residents and job-holders aggregated at small geographical levels (United States Bureau of the Census, 1993). In the case of Chicago, the CTPP data are generally aggregated at the residential quartersection level, which is used as the residential zone for estimating equation (2). From the CTPP, a

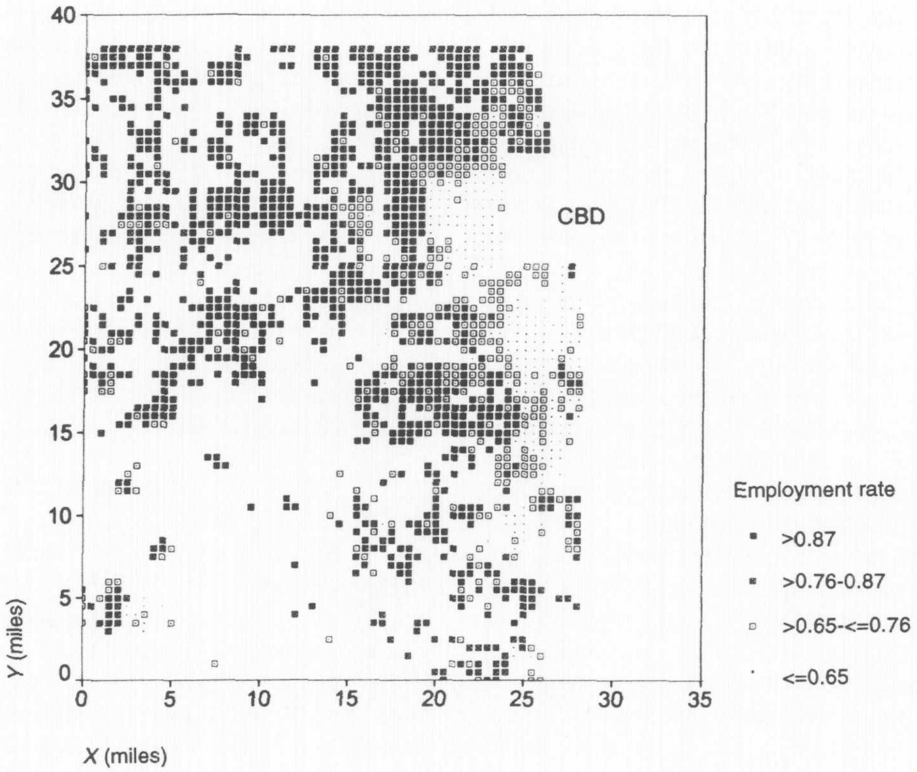

Figure 1. Employment rates for residential zones, March 1990.

data set was constructed for a large, central-portion of the Chicago metropolitan area, including most of the older parts of the region as well as a substantial number of newer suburbs. For every residential zone in the study area, variables describing jobs and residents within two miles are calculated. After excluding observations in which there was insufficient population to calculate variables of concern (for example, employment rate, occupational mix), those which were within two miles of the central business district, and a small number of pairs with identical locations (split quartersections), the resulting data set consists of 1629 cases. The data set includes variables describing residential characteristics for each of the zones, as well as variables describing jobs and residents in the labour force within two miles of the zone. Residents of these zones who are in the labour force constitute approximately 80 per cent of the labour force in the study area and 50 per cent of the labour force in the nine-county Chicago metropolitan area.

Table 1 provides descriptive statistics for the dependent variable and the independent variables used to estimate equation (2). Figure 1 illustrates employment rates across the study area. Many of the zones with low employment rates, below the mean of 0.76 per cent plus one standard deviation (0.65 per cent total), are clustered on the west ($X = 19$–23 miles; $Y = 26$–28 miles) and south ($X = 23$–28 miles; $Y = 14$–24 miles) sides of the central city, which are predominantly black, low- and moderate-income neighbourhoods.[3]

The independent variable of primary interest is the nearby jobs–labour force ratio, J_{LM}/R_{LM} in equation (2). This is equal to the number of low- and moderate-skilled jobs within two miles of the zone divided by the number of persons in the labour force who live within two miles of the zone and are not

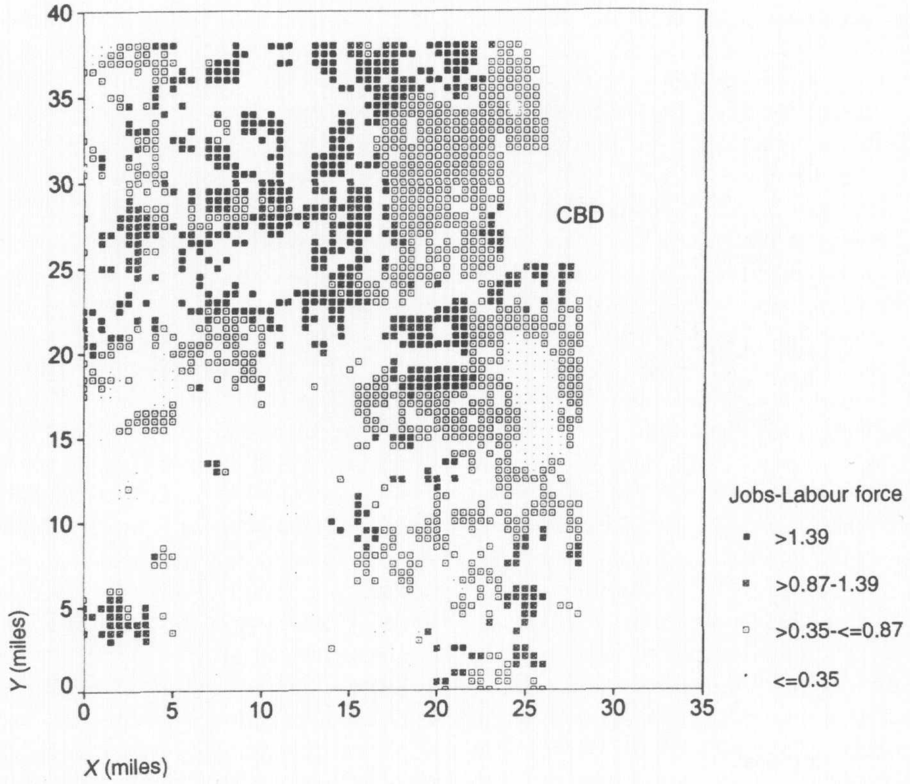

Figure 2. Jobs–labour force ratios for zones.

employed in high-skilled jobs. This ratio is the principal measure of spatial access to nearby jobs. It does not, however, measure the occupational level of the jobs in the surrounding area, nor does it measure the differences between the occupations of nearby jobs and the occupations of zone residents. These characteristics are addressed through separate independent variables discussed below. Figure 2 illustrates the jobs–labour force ratios for zones in the data set. High jobs–labour force levels are found in the north-west suburbs surrounding O'Hare Airport ($X = 6$–14; $Y = 31$–38), many western Cook and DuPage County suburbs ($X = 5$–15; $Y = 23$–27) and a cluster of north suburban zones ($X = 18$–22; $Y = 36$–38). In the case of some of these areas, such as most of DuPage County, nearby job densities are not as high as in many central-city zones, but relatively low population densities combined with the relatively high skill levels of local residents in these newer areas result in much higher jobs–labour force ratios than in the central city.

The correlation between employment and the jobs–labour force ratio is positive, as expected by the model in equation (2), but the magnitude is modest, with a coefficient of 0.2704. Low and very low values of nearby jobs–labour force on the central city's south side generally correspond to quite low employment rates in many of these zones. But many clear exceptions to this pattern exist. One example is a small cluster of predominantly black western Cook County suburbs ($X = 15$; $Y = 28$) that exhibit low employment rates and yet have large nearby jobs–labour force ratios.

5. Results

Table 2 presents the results of the two-stage least squares regression (2SLS) for estimating equation (2), as well as some modifications of this specification, with lagged independent variables used as instruments. In all results, the autoregressive coefficient is found to be positive and significant at the 0.05 level.

The first column shows results for equation (2), except that the jobs–labour force variable is excluded. All independent variables are significant at $p = 0.01$, except resident occupation level, which is not significant. The second column shows results after including the jobs–labour force variable. Note that the magnitude of coefficient on proportion black falls slightly, as the lower jobs–labour force levels of black zones are accounted for directly; overall, the addition of the jobs–labour force variable has only a modest impact on the results, including a small effect on the other coefficients. Moreover, the measures of fit improve only minimally. Thus, adding the jobs–labour force variable does not substantially alter the large effects of race and skill on employment rates; the magnitude of the proportion black coefficient falls by less than 6 per cent and the magnitude of the high-school education variable coefficient actually increases slightly.

To guard against dominant effects of observations with extremely low or extremely high jobs–labour force levels, the data set was trimmed to omit 28 outliers. The third column gives the results of estimating equation (2) for the remaining 1601 observations. The major impact of removing the outliers is a substantial increase in the autoregressive coefficient.

The results of the first three columns are quite similar. Jobs–labour force is found to have a positive effect on zone employment rate, but the size of the effect, as revealed in the standardised coefficient or 'beta value', is quite modest. A standard deviation increase results in an increase in the zone employment rate of 0.06 standard deviation, or seven-tenths of a percentage point. The jobs–labour force-ratio, however, is not the only variable that describes job proximity. Two variables characterise the nature of nearby jobs and their occupational match to neighbourhood residents: the occupational level of nearby jobs and the occupational dissimilarity between nearby jobs and employed residents. If nearby jobs are, on average, high-skill, they are expected to have less of an impact on resident employment. Thus, higher job occupation level is expected to have a negative effect on zone employment rates. Even after accounting for the average level of nearby jobs, the precise mix of occupations may differ significantly from the occupational experience of residents. Even if skill levels are measured to be roughly the same, those who tend to work in administrative support occupations may not benefit much from an abundance of nearby blue-collar jobs. It is important to consider the average occupational level of residents, the average level of nearby jobs and the differences in the occupational mixes. The results in Table 2 suggest that occupational level of nearby jobs and occupational dissimilarity are more important than the jobs–labour force ratio. A standard deviation increase in the jobs–labour force ratio occurring in conjunction with standard deviation decreases in job occupation level and occupational dissimilarity would result in a predicted increase in the zone employment rate of 0.22 standard deviation, or 2.4 percentage points.

The two most important determinants of the zone employment rate are the high-school education and proportion black variables. A standard deviation increase in the proportion of 18-year-olds with a high-school diploma or equivalent results in an increase in predicted employment of 0.39 standard deviation, or approximately 4.5 percentage points. The proportion of residents who are black has approximately the same size effect, with a standard deviation increase resulting in a decrease in the zone employment rate of approximately 4.8 percentage points. Due to racial segregation, the distribution of proportion black is largely bimodal, with modes near zero and one. Going from an all-white zone to an equivalent, all-black zone is equal to a three standard deviation change and results in a decrease in predicted

Table 2. Employment rate: 2SLS results for alternative specifications and data sets

	Specification/Observations					
	No jobs–labour force ratio	Add jobs–labour force		Omit outliers[a]	Only ≥90 per cent black zones	
Independent variable	Coefficient	Coefficient	β-value[b]	Coefficient	Coefficient	β-value[b]
Spatially lagged dependent variable[c]	0.0828***	0.0805***		0.1580***	0.1920**	
	(0.0252)	(0.0253)		(0.0301)	(0.0960)	
Jobs–labour force ratio		0.0131***	0.0612	0.0134***	0.0122	0.0291
		(0.0030)		(0.0038)	(0.0173)	
Job occupation level	− 0.0223***	− 0.0276***	− 0.0647	− 0.0253***	− 0.0438	− 0.0675
	(0.0060)	(0.0061)		(0.0066)	(0.0267)	
Occupational dissimilarity	− 0.1602***	− 0.1640***	− 0.0909	− 0.1644***	− 0.1024	− 0.0458
	(0.0247)	(0.0246)		(0.0257)	(0.1036)	
Resident occupation level	0.0010	0.0014	0.0112	0.0035	0.0343***	0.1741
	(0.0029)	(0.0029)		(0.0030)	(0.0112)	
High-school education	0.4288***	0.4341***	0.3916	0.3817***	0.6249***	0.5011
	(0.0231)	(0.0231)		(0.0260)	(0.0935)	
Proportion black	− 0.1512***	− 0.1427***	− 0.4198	− 0.1314***		
	(0.0294)	(0.0078)		(0.0081)		
Proportion Hispanic	0.0866***	0.0929***	0.1228	0.0999***	0.0920	0.0073
	(0.0152)	(0.0152)		(0.0151)	(0.4943)	
Female labour force	0.4657***	0.4608***	0.1947	0.4494***	0.0787	0.0255
	(0.0371)	(0.0369)		(0.0367)	(0.1202)	
Proportion under 25	− 0.2770***	− 0.2763***	− 0.1429	− 0.2693***	− 0.4723***	− 0.1683
	(0.0294)	(0.0294)		(0.0293)	(0.1281)	
Constant	0.4988***	0.5320***		0.4659***	0.2899	
	(0.0671)	(0.0674)		(0.0731)	(0.3289)	
Measures of fit[d]						
Pseudo R^2	0.7294	0.7336		0.7380	0.7454	
Correlation squared	0.7296	0.7335		0.7373	0.7386	
n	1629	1629		1601	186	

***Significant at below 0.01; **significant at below 0.05; *significant at below 0.10.

[a] Observations with jobs–labour force values less than 0.20 or more than 3.10 were omitted, based on frequency plot showing these values to be outliers.

[b] β-values are standardised coefficients, which are calculated by multiplying parameter coefficients by the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable.

[c] Instruments are all spatially lagged independent variables. Lagged values are averages of variable values for all nearby observations—i.e. those within 2 miles of the current observation.

[d] A traditional R^2 is not applicable to this instrumental variables approach (Anselin, 1988, 1992). The pseudo R^2 is equal to the ratio of the variance of predicted values of the dependent variable to the observed values of the dependent variable. Also shown is the square of the correlation between the predicted and observed values.

employment rate of approximately 14 percentage points. Other determinants of the zone employment rate with more modest impacts include the gender of the zone labour force, with more women leading to substantially higher employment rates, and the proportion under 25. Interestingly, proportion Hispanic is positive and significant, with a standard deviation increase resulting in an increase in the employment rate of approximately 1.4 percentage points. This is consistent with the literature finding that Hispanics experience relatively high hiring rates compared to other minorities (Holzer, 1996) and that some employers prefer some Hispanic ethnic groups even to white workers (Kirschenman and Neckerman, 1991).

The fourth column of Table 2 provides results for estimating equation (2) only for those 186 zones whose populations are at least 90 per cent black. Proportion black is not used as an independent variable here. In these results, only high-school education and proportion under 25 remain statistically significant, although resident occupation level becomes significant in contrast to previous results. Thus, when analysing only predominantly black zones, job proximity is not found to be a significant determinant of the zone employment rate, and age and skill factors become even more important. The stronger, negative effect of proportion under 25 on employment rate is consistent with the documentation of employment problems among young blacks.

Table 3 repeats the analysis in Table 2 for regressions of the zone unemployment rate, rather than the employment rate. The employment rate is affected both by unemployment and by labour force participation. Job proximity may increase the zone employment rate by reducing unemployment or increasing labour force participation, or both. The most noticeable difference between the results in Tables 2 and 3 is that resident occupation level is highly significant in the unemployment regression, but is insignificant in the employment rate regression. It is most likely that this is due to more households in higher-income, higher-skilled areas that have one adult, often female, who is not in the labour force and who would not be expected to be drawn into the labour force by better access to jobs.

As in the employment rate results, the jobs–labour force variable, by itself, has only a modest impact on unemployment, with a standardised coefficient smaller than that of any other variable. Again, however, job occupation level and occupational dissimilarity both have significant effects on unemployment, so that simultaneous standard deviation changes in all three variables could result in a decrease in unemployment of 0.21 standard deviation or 1.3 percentage points. But again, the largest single determinants of zone unemployment are race and skills. Proportion black is the largest single factor affecting unemployment, with a standardised coefficient of 0.44 and the predicted positive effect. High-school education is the next largest factor with a standardised coefficient of 0.39 and the predicted negative effect. In the unemployment results, however, resident occupation level also has a negative, significant effect. Proportion Hispanic and female labour force are negative and significant on unemployment, and proportion under 25 is positive and significant. The results for the analysis of predominantly black zones are presented in the fourth column of Table 3 and are generally consistent with those in Table 2. One difference is that occupational dissimilarity is found to be significant in the unemployment results.

These results suggest that job creation and retention in and around the zone will tend to increase employment of zone residents modestly. They also indicate that the degree to which the particular occupational mix of nearby jobs matches the occupational mix of zone residents affects zone employment rates. Finally, the impact of nearby jobs will be greater if the average occupational levels of the jobs is relatively low. Low-skilled jobs, such as handlers and labourers, for example, will increase employment rates more than moderate-skilled jobs such as administrative support or machine operator jobs.

Table 3. Unemployment rate: 2SLS results for alternative specifications and data sets

	Specification/Observations					
	No jobs–labour force ratio	Add jobs–labour force		Omit outliers[a]	Only ≥90 per cent black zones	
Independent variable	Coefficient	Coefficient	β-value[b]	Coefficient	Coefficient	β-value[b]
Spatially lagged dependent variable[c]	0.0893*** (0.0304)	0.0901*** (0.0305)		0.1663*** (0.0440)	0.2184* (0.1273)	
Jobs–labour force ratio		−0.0053*** (0.0016)	−0.0425	−0.0056*** (0.0020)	−0.0087 (0.0132)	−0.0329
Job occupation level	0.0200*** (0.0032)	0.0219*** (0.0033)	0.0885	0.0207*** (0.0036)	0.0211 (0.0203)	0.0514
Occupational dissimilarity	0.0837*** (0.0131)	0.0851*** (0.0130)	0.0815	0.0837*** (0.0138)	0.1620** (0.0788)	0.1146
Resident occupation level	−0.0078*** (0.0016)	−00080*** (0.0016)	−0.1090	−0.0092*** (0.0016)	−0.0280** (0.0085)	−0.2251
High-school education	−0.2052*** (0.0126)	−0.2070*** (0.0126)	−0.3963	−0.1760*** (0.0163)	−0.2892*** (0.0702)	−0.3669
Proportion black	0.0911*** (0.0045)	0.0874*** (0.0045)	0.4442	0.08373*** (0.0138)		
Proportion Hispanic	−0.0287*** (0.0081)	−0.0312*** (0.0081)	−0.0712	−0.0355*** (0.0081)	−0.2260 (0.3766)	−0.0283
Female labour force	−0.0531*** (0.0197)	−0.0510*** (0.0197)	−0.0372	−0.0474** (0.0196)	0.0438 (0.0915)	0.0224
Proportion under 25	0.0814*** (0.0157)	0.0810*** (0.0157)	0.0724	0.0767*** (0.0157)	0.2829*** (0.0976)	0.1594
Constant	0.0641* (0.0347)	0.0513 (0.0348)		0.0494*** (0.0367)	0.2600 (0.2516)	
Measures of fit[d]						
Pseudo R^2	0.7733	0.7756		0.7782	0.6383	
Correlation squared	0.7737	0.7757		0.7764	0.6290	
n	1629	1629		1601	186	

***Significant at below 0.01; **significant at below 0.05; *significant at below 0.10.

[a] Observations with jobs–labour force values less than 0.20 or more than 3.10 were omitted, based on frequency plot showing these values to be outliers.

[b] β-values are standardised coefficients, which are calculated by multiplying parameter coefficients by the ratio of the standard deviation of the independent variable to the standard deviation of the dependent variable.

[c] Instruments are all spatially lagged independent variables. Lagged values are averages of variable values for all nearby observations—i.e. those within 2 miles of the current observation.

[d] A traditional R^2 is not applicable to this instrumental variables approach (Anselin, 1988, 1992). The pseudo R^2 is equal to the ratio of the variance of predicted values of the dependent variable to the observed values of the dependent variable. Also shown is the square of the correlation between the predicted and observed values.

The results in Tables 2 and 3 show that a number of other resident characteristics, in addition to nearby labour demand, are significant determinants of employment rates. Two variables, proportion black and high-school education, have a major impact on employment rates, with standard deviation changes in these independent variables resulting in changes in the predicted employment rate of more than four percentage points and in the predicted unemployment rate of more than two percentage points. The other variables, including proportion under 25, female labour force and proportion Hispanic, also have significant, but somewhat more modest, effects.

Several employment barriers may underlie the effect of the proportion black variable on unemployment, including employment discrimination, a lack of job networks and unmeasured skill or educational differences. Blacks continue to be victims of employment discrimination (Turner *et al.*, 1991; Kirschenman and Neckerman, 1991). Wilson argues that the increasing concentration of poverty in, and the exodus of middle-class blacks from, black zones have left many blacks with few personal connections to working adults (Wilson, 1987). The social isolation of many highly segregated, lower-income black zones leads to a disconnection from job networks, especially for lower-skilled residents. Orfield (1990, 1991) argues that the educational segregation and the inferior schooling of blacks and central-city students have led to large differentials between black and white student achievement as well as between the achievement of central-city and suburban students. Given the large impact of race on employment and the literature on the effects of education, networks and discrimination on black employment prospects, it is plausible that all three factors are significant contributors to the race effect found here. It might be argued that unmeasured differences in educational resources and achievement are more responsible for the race effect found here than either employment discrimination or poor access to job networks. The high-school education variable and the occupational level variables may not fully control for differences in basic skills and educational achievement. Those graduating from predominantly inner-city public schools may not have received as good an education as those graduating from predominantly white and often suburban schools, for example. Because Hispanics in Chicago are more likely to attend inner-city schools than whites are, the fact that the proportion of zone residents who are Hispanic actually has a positive effect on employment rates suggests that unmeasured skill differences are not the principal cause of the poor employment rates in black neighbourhoods. This is corroborated by Holzer (1996), who finds that Hispanics fare better than blacks in obtaining employment despite lower educational attainment and less facility with English.

The finding that educational attainment is a key determinant of neighbourhood employment rates corroborates Kasarda's thesis that the low skills of many urban residents explain a good deal of employment problems in an increasingly technological economy (Kasarda, 1993). The strength of this variable *vis-à-vis* the jobs–labour force variable suggests that skill mismatch may explain more of the urban neighbourhood employment problem than spatial mismatch, although both are significant. Moreover, the significance of the occupational dissimilarity variable demonstrates that local skill mismatch, in which the jobs near a neighbourhood are poorly matched to the occupational mix of neighbourhood residents, is also a significant barrier to employment.

6. Conclusion

The empirical results above show that the effect of nearby jobs on neighbourhood employment depends not only on the ratio of nearby jobs to nearby labour force, but also on the occupational levels of the nearby jobs and the match of residents' skills with those occupations. Combined, these three nearby labour demand characteristics can have a substantial effect on neighbourhood employment rates. By itself, however, two-mile jobs–labour force ratio has a very modest effect on neighbourhood employment. This suggests that efforts that seek solely to increase the aggregate number of jobs very near high-unemployment neighbourhoods are not likely to improve resident employment rates in these areas substantially. Job creation and retention efforts should favour occupations similar to those of residents and efforts should be geared toward lower-skilled jobs. While low-skilled jobs are likely to pay less than moderate-skilled ones, the moderate-skilled jobs may be accessible only to a small fraction of the unemployed—those who are more likely to find employment without development intervention. Moreover, ongoing spatial mismatch studies should pay more attention to the occupational details of job location patterns and be less hasty to aggregate job types.

The analysis here does not consider jobs that fall within some larger radius of a neighbourhood zone, say 2–10 miles. It is possible that a jobs–labour force ratio measuring this somewhat less proximate labour demand could prove more significant, although a recent spatial mismatch analysis of the Chicago area using a 20-minute commute distance also finds very modest effects of job levels on earnings (Carlson and Theodore, 1997). More research is also needed to identify appropriate spatial job access measures. Is spatial labour demand best measured by job levels, such as those utilised here, or by changes in levels, or some combination of the two? More theoretical and empirical work that directly addresses how demand should be specified is needed.

The other major conclusion is that reducing employment discrimination against blacks, improving blacks' access to employment networks, and improving the skills of residents are likely to produce relatively large improvements in employment rates in high-unemployment neighbourhoods. Spatial mismatch, while significant, appears to be somewhat less important than race- or skill-based barriers. The magnitude of the race effect suggests that race-neutral employment and economic development approaches will not be sufficient for the problem at hand. Black neighbourhoods suffer from much lower employment rates even after controlling for educational attainment, occupation level, age distribution, gender, the number of nearby jobs and the occupational similarity of residents to those jobs. An all-black neighbourhood in the Chicago area is predicted to have an employment rate that is 13 percentage points lower, and an unemployment rate that is approximately 8 percentage points higher, than a similar all-white neighbourhood. Compounding the direct effect of race on employment is the fact that black neighbourhoods also suffer from other conditions that lead to higher unemployment, including lower average occupational levels, higher ratios of unemployment-prone youth, and lower nearby jobs–labour force ratios. The result is that the *unadjusted* mean unemployment rate for neighbourhoods that are all-black (more than 90 per cent black) is 20 per cent, while the mean unemployment rate among neighbourhoods with no black residents is 4 per cent—a 16 percentage point difference. It is unlikely that any one single policy initiative will substantially reduce the problem of highly concentrated neighbourhood unemployment, but more attention to race and the occupational match between job-creation efforts and targeted residents appears to be in order.

Notes

1. Based on unemployment insurance data from the Illinois Department of Employment Security, covering zip codes 60608, 60612, 60622–24, 60635, 60639, 60644, 60647 and 60651.
2. Because square, one-half-mile-by-one-half-mile quartersections are the minimum aggregation level of the data set used here, the 'circular' job catchment area is actually an approximately circular group of 49 quartersections including and surrounding the residential quartersection used as the residential zone. All quartersections whose centres are within a euclidean distance of two miles of the residential quartersection centre are included in the catchment area.

3. Figures 1 and 2 plot variable values for all observations in the final data set. White areas, with no data points shown, are either zones with no population or were screened out as described above. *X* is the east–west co-ordinate, in miles, for a residential zone, and *Y*, also in miles, is the north–south co-ordinate. The origin (0,0) is the south-west corner of the study area, a residential zone in north-western Will County, so that all co-ordinates are non-negative.

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