

A Spatial Analysis of Ethnic Self-Employment in Metropolitan Atlanta

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The increased ethnic and racial diversification in North American cities have offered promising breeding places for new business activities of individuals with various ethnic origins. Using data derived from the 2000 Decennial Census and spatial regression modeling, this study examines the geographic patterns of self-employed labor force in metropolitan Atlanta, a region with increasing population diversity fueled by employment opportunities. Different from most place-based small case studies, this work adopts a comparative framework to investigate spatial effects on entrepreneurship across ethnic groups from the geography of both ethnic residence and local business concentrations in a rapidly diversifying metropolis in the U.S. South.

La creciente diversificación étnica y racial en las ciudades norteamericanas ofrece lugares prometedores para el desarrollo de nuevas actividades empresariales entre personas con diversos orígenes étnicos. Utilizando los datos derivados del Censo del año 2000 y un modelo de regresión espacial, este estudio examina los patrones geográficos de la fuerza laboral auto-empleada en el área metropolitana de Atlanta, una región con una diversidad poblacional cada vez mayor impulsada por las oportunidades de empleo. A diferencia de la mayoría de los estudios de casos basados en un lugar específico, este trabajo

adopta un marco comparativo para investigar los efectos espaciales sobre el espíritu empresarial a través de grupos étnicos tanto desde la geografía de la residencia étnica como también de las concentraciones de empresas locales en una metrópoli en el Sur de los EE.UU. que se está diversificando rápidamente.

KEY WORDS: self-employment, ethnic concentration, workplace, Atlanta

INTRODUCTION

Over the last two decades the U.S. South has experienced—and continues to experience—a tremendous increase in ethnic diversity largely based on immigration, with the growth rate of the foreign-born in many Southern states topping national lists (Singer 2004; Winder 2005). For instance, according to the U.S. census data from 1980 to 2000, the foreign-born populations surged by as much as 817 percent in Atlanta, Georgia and 709 percent in Raleigh-Durham, North Carolina. With arrivals coming mainly from Asia and Latin America, cities receiving the largest number of immigrants are being transformed from a largely white-black biracial society into a multiracial and multi-ethnic society. As shown in Table 1, the ethnic composi-

tion has changed significantly during the past two decades in the Atlanta metropolitan area.

These cities with increasing ethnic diversity have provided promising opportunities for newcomers to start businesses (Waldinger et al. 1990; Masurel et al. 2004; Wang and Li 2007). A number of cases studies in these cities have argued that ethnic neighborhoods and communities can provide important ethnic resources, such as low-cost labor and markets for ethnic goods and services, to assist co-ethnic members to start new businesses (Park and Kim 1998; Kaplan and Li 2006; Teixeira et al. 2007). However, most of these place-based works are small-scale case studies with predominant emphases on local residential neighborhoods (See Barrett et al. 1996 for a review). At the same time, economic geographers have argued that agglomeration of local business is important for developing new businesses (Marshall 1890; Scott 1988; Storper 1997; Kenney and Patton 2005). Nevertheless, ethnicity is seldom explicitly discussed in this literature of agglomeration economies. But, interestingly enough, economic geographer Susan Hanson (Hanson 2009, p 263) calls for future research that “. . . should analyze place not just as the site of firms or clusters of firms but place as habitat,” while arguing for the inclusion of gender into entrepreneurship study.

Several recent studies at a fine scale argue that both the geography of work and home have significant impacts on ethnic minority and immigrants' labor market outcomes (Wyly 1999; Ellis et al. 2004, 2007; Wang 2010). Although not specific on ethnic entrepreneurship, they include ethnicity, gender, and culture into the

framework of labor market studies while examining the role of geographies of residence and workplace. By integrating the above literature with different emphasis, we hypothesize that both the geography of ethnic residential neighborhoods and spatial concentration of economic sectors play important roles in the spatial distribution of ethnic-owned businesses. In demonstrating such integrated effects from both geographies of work and home, this study is to investigate the geography of ethnic businesses and how they are contingent on local residential composition and economic structure. It extends knowledge of ethnic entrepreneurship, currently based on traditional gateway metropolitan areas with large ethnic populations such as Los Angeles, Miami, and New York City, by examining a newer immigration destination: the Atlanta metropolitan region. Through a comparative perspective across ethnic groups, this research examines the spatial relationship between both local residence by ethnicity and industry by sector, revealing how geography plays a role in ethnic entrepreneurship under multi-ethnic and multi-racial urban contexts in a rapidly diversifying gateway metropolis.

RESEARCH RATIONALE: THE GEOGRAPHY OF ETHNIC BUSINESSES

Examination of ethnic businesses often emphasizes ethnic residential neighborhood or community. These ethnically-concentrated areas create an interdependent pool of special resources, providing prospective ethnic entrepreneurs with a ready source of lower-cost labor, credit, a market with well understood consumer

preferences, and various other tangible and intangible resources (Kaplan 1998; Park and Kim 1998; Teixeira et al. 2007). For example, Lee's (1995) case study of Korean small firms in Los Angeles suggests that both the development of Korea Town and the presence of ethnic neighborhoods are important for Korean businesses to start up and grow. A study on eminent black entrepreneurs specifically suggests that a large black population in a major center of commerce is a significant condition for the success of black business owners in the South (Boyd 2009).

Local economic geography can exert significant impacts on the spatial presence of ethnic businesses as well. Related economic activities often concentrate within particular locales as "clusters" that are then sustained by "untraded interdependencies", e.g. advantages such as ease of information sharing that does not have an explicit cost (Scott 1988, Storper 1997). Clustering of firms is often associated with the formation of a unique local milieu based on social-cultural similarity and interwoven social relations, allowing firms to take advantage of the labor supply and provision of common business and social services (Florida 1995; Kenney 2000; Glaeser et al. 2010). Business within the cluster have an advantage over rivals located outside the clusters because information about entrepreneurial opportunities tends to flow within localized networks and the strength of diffusion decreases when distance increases (Audia et al. 2006). While this strand of literature has provided valuable insights, it seldom explicitly discusses ethnicity.

Such neglect could come from the fact that, in the layman's eyes, the term "eth-

nic entrepreneur" often is associated with small businesses such as restaurants, sweatshops, laundries, and nail salons (Instone and Roberts 2006). However, in recent years immigrants, most of whom are ethnic minorities, have become a significant driving force in the creation of new businesses in a variety of sectors (Wadhwa et al. 2007). These changes raise questions as to what extent ethnic enterprises follow the spatial agglomeration process of the mainstream economy, and how ethnic residential geography and economic geography interact.

In particular, many ethnic businesses can also reach beyond the boundary of their co-ethnic residential neighborhoods. For example, many Koreans, Indians, Arabs, and Chinese have adapted their business locations to residential concentrations of blacks and Hispanics (Waldinger et al. 1990). Park and Kim (1998) demonstrated that Korean businesses on the southside of Chicago served African-American and a limited number of Hispanic customers when white merchants, big corporations, and major chain stores withdrew from these minority markets. At the same time, ethnic businesses may seek co-location with other businesses beyond ethnic boundaries to enjoy the benefits from "economic clustering" and spill-over effects. For example, along Atlanta's Buford Highway—the "International Corridor"—businesses owned by different ethnic groups are located in the same shopping center to cater to multi-ethnic customers. Rather than simply serving local ethnic groups, the size of the concentration in Atlanta relative to that in the larger multi-state region draws customers from several states to this cluster (Walcott

2002). A similar pattern is found in Birmingham, Alabama, a middle-tier metropolitan area in the South (McDaniel and Drever 2009).

In Atlanta, an emerging immigration gateway in the South, we therefore want to address the following three research questions:

1. What are the spatial patterns of the self-employed labor force across ethnic groups by their place of work?

2. How does local geography—both ethnic composition by residence and industrial structure—influence the spatial patterns of ethnic self-employment?

3. How does the spatial dependency of self-employment vary across ethnic groups?

STUDY AREA

The self-employed labor force in the Atlanta Metropolitan Statistical Area (MSA) will be used as our case study to address these research questions. Typical of many cities in the South, the Atlanta metropolitan area was historically biracial white and black (Sjoquist 2004). During the 1980s and 1990s this region quickly climbed to the top of the immigrant destination list in the United States, labeled as “emerging immigrant gateways” characterized by a “hypergrowth” of Latinos (Singer 2004). For example, the number of immigrants in Atlanta was 46,000 in 1980, increasing by 817 percent to 423,000 in 2000. In particular, the 24,550 Latinos counted in 1980 represented only 1 percent of the metro population. By the year 2000, Atlanta’s Latino population reached 268,851—or 7 percent of the total (see Table 1). Atlanta now represents a new society with

a greater ethnic range than the biracial world of the past (Hull 2002). Along Atlanta’s Buford Highway ethnic retail strip shops increasingly come under Latino ownership, supplanting different Asian segments in certain locations. The constantly renegotiated retail landscape reflects the shifts of immigration (Walcott 2005).

In the time period covered in this research, Atlanta experienced an increase of high-technology and related businesses, particularly database companies, Internet services, telecommunications, and biotechnology (Cortright and Mayer 2001; Walcott 2005). Many highly educated immigrant ethnic entrepreneurs play a key role in creating new, high paying jobs and transforming a wide range of traditional economic sectors. The diversity of population and labor market in this area provides distinctive social, cultural, economic, and political environments for the growth and development of ethnic minority-owned enterprises, and thus a natural laboratory to investigate the geography of ethnic entrepreneurship in newly diversifying cities.

DATA AND METHOD

Census data do not permit investigation of how ethnic resources and general social capital at the workplace function specifically for each ethnic group. The self-employment variable is likely picking up the self-employed labor force with a small number of employees (Bregger 1996). With better data, further comparison by sub-ethnic groups, by foreign-born status, by economic sector, and by gender will significantly improve understanding of spatial effects from local economic geography.

Table 1. Ethnic population concentration percent in Atlanta MSA and Georgia, 1980–2000.

	1980	1990	2000
	GA/ATL MSA	GA/ATL MSA	GA/ATL MSA
NH White	72.3/73.9	71/71	65.1/59.8
NH Black	26.8/24	27/25.1	28.7/29.2
Hispanic	1.1/1.1	1.7/2	5.3/6.5
Asian	0.4/.6	1.2/1.7	2.1/3.6

Additionally, large categories such as “Hispanic” and “Asian” obscure significant diversity among origin countries for a variety of occupational concentrations as previously demonstrated in Atlanta (Walcott 2006). Despite such limitations, this study uses three datasets to provide a quantitative analysis. First, the year 2000 Census Transportation Planning Package (CTPP) provides the place of work for the self-employed labor force at the census tract level by four groups: Non-Hispanic Whites, Non-Hispanic Blacks, Hispanics, and Non-Hispanic Asian. The CTPP also contains local economic geography information on the percentage of labor force working in different sectors for each census tract. The workplace of the employed labor force will be used to examine the spatial concentration of economic activities and ethnic businesses. The second set of data from the year 2000 U.S. Census Summary File 3 provides residential geography by ethnic group. Finally, the year 2000 5 percent Public Use Microdata Sample (PUMS) provides information on personal and household level characteristics for each ethnic group.

To examine the spatial effects of local geography on self-employment at the census tract level, linear regression was conducted as given by:

$$Y = \alpha + X\beta \quad (1)$$

where Y is the number of self-employed labor force (in natural logarithms form) working in each census tract, X represents local residential and economic geographic characteristics expected to influence the spatial patterns of self-employment, with associated parameter β .

The distribution of the self-employed labor force by their workplace demonstrates a significant spatial dependence across the census tracts. The values of Moran's I , a statistical indicator of spatial autocorrelation of self-employment for each group, significantly suggest the existence of such spatial dependency (the Moran's I is provided by Table 4). The classification into four categories of spatial association is illustrated by Figure 1(a)—maps of the local indicators of spatial association (LISA, Anselin 1988). The High-High category indicates the census tracts as well as their neighbors with high clustering of self-employment. The Low-Low category indicates the census tracts as well as their neighbors with low concentration of the self-employed. The Low-High category indicates the census tracts with low clustering of the self-employed, but their neighbors with high concentration. The High-Low category indicates the census

tracts with high clustering of the self-employed, but their neighbors with low concentration.

The existence of spatial dependence or spatial autocorrelation violates the assumptions of OLS regression. Indeed, the diagnostic statistics clearly indicate the inefficiency and bias from the above (1) OLS model due to spatial dependence. To deal with spatial autocorrelation, a spatial lag model¹ is constructed for each of the four groups, which is specified as follows:

$$y = \lambda W y + X\beta + \epsilon \quad (2)$$

where y is the dependent variable, the (log form) number of self-employed labor force working in each census tract. Using the 2000 U.S. Census data, the self-employed refer to those who are self-employed in either incorporated or unincorporated businesses. Due to the unavailability of public data on ethnic minority-owned enterprises, the workplaces of the ethnic self-employed thus approximate the locations of ethnic businesses. Similarly, the workplace of the employed labor force is used to represent the local industrial/economic geography.

$W y$ is a $n \times 1$ vector of spatial lags of the dependent variable y , and λ is a spatial lag parameter to be estimated explicitly indicating the spatial dependency. Under this specification, the terms of vector $W y$ represent the weighted average of the dependent variable for neighboring locations. The specification assumes the existence of structured interaction among neighbors such that values of the dependent variable in one census tract are directly dependent, through some function (defined by λW), on the values of the dependent variable in neighboring tracts.

First-order rook weighting strategy is adopted in this study². $X\beta$ represents the direct effects on y of the attribute values, X , in a census tract. That is, y and X are attribute values drawn from the same tract. The independent variables, X , represent the local residential and economic geography at the census tract level described as following (refer to Table 5 for a list).

(1) *Local Residential Geography*: Ethnically concentrated residential areas are hypothesized to provide more resources for ethnic entrepreneurs, e.g., potential financial capital, low-cost labor, and ethnic consumer markets. Therefore, whether each census tract is concentrated for non-Hispanic whites, blacks, Asians, and Hispanics, measured by Odds Ratio, is included³. The distance from the CBD, total number of residents, and average household income (in natural log form) at the census tract level represent the effects of suburbanization and the general capacity of the consumer market and potential purchasing power.

(2) *Local Economic Geography*: The percentage of the labor force in different sectors for all the labor force working in each census tract are included: manufacturing, trade (wholesale and retail), high-status industries (information, FIRE [finance, insurance and real estate], professional, management), personal services, and public administration). We hypothesize that different economic activities at the workplace have distinctive impacts on ethnic businesses of different types. The more integrated with the main stream market, i.e., less dependent on ethnic population, the more likely for the enterprises to be co-located with other enterprises related to either supplier inputs or markets.

RESULTS AND DISCUSSIONS

1) Profile of the self-employed labor force and their spatial patterns by workplace

Table 2 uses the 2000 Public Use Microdata Sample (PUMS) for the Atlanta metropolitan area to clarify the relative self-employment rates for each of the four major groups examined in this study. Consistent with most studies at the national and metropolitan scale, Whites and Asian have a much higher self-employment rate than do Blacks and Hispanics. Table 3 shows the socioeconomic characteristics of the self-employed versus non-self-employed labor force across these four groups. Compared to their non-self-employed co-ethnic counterparts, the self-employed labor force is older, male, has a higher percentage of college graduates, is more likely to be married, and has higher job earnings with much longer working hours. Among the foreign-born, better English proficiency and longer stay in the US are positively related to self-employment. Of the self-employed labor force, Whites and Asians are older, with a higher percentage of college graduates, greater likelihood of being married, and higher job earnings than the other two groups. The average working hours for Blacks are the shortest, and Asians work the longest hours. Possibly due to smaller size of foreign-born non-Hispanic white and black, the differences of English proficiency and length of stay in the U.S. (by different year cohorts) are not statistically significant between the self-employed and non-self-employed labor force. English proficiency does not make much difference between the two groups for Asian as well.

Table 2. Self-employment rate across groups.

Group	% Self-Employed w/in Group	% of Atlanta Self-Employed
NH White	11.02	72.1
NH Black	5.47	16.6
Hispanic	7.08	5.5
Asian	10.29	4.0

For all other characteristics, the division by self-employment is statistically robust.

The LISA maps (Figure 1) show spatial grouping of the self-employed labor force by their workplace for the four groups. Due to larger number of total population, self-employed Non-Hispanic whites are more spread-out than all other groups; but, still, they demonstrate a very high concentration towards the northern and northeastern suburbs. In contrast, blacks show significantly low spatial clustering in these areas, but are more concentrated south of downtown. Both Hispanic and Asian self-employment at workplace exhibit a distinctive concentration from the core northward along the I-75/85 and GA-400 expressways, reflecting the intense level of business activity clustering along these radial corridors (Henderson 2004).

Spatial dependence is suggestive of a possible diffusion process—events in one place predict an increased likelihood of similar events in neighboring places. This is compatible with our hypotheses that ethnic businesses are not randomly located across urban space. Rather, ethnic businesses in one place increase the likelihood of ethnic businesses in nearby locales. Any diffusion process ultimately requires “vectors of transmission,” i.e., mechanisms

Table 3. Social economic characteristics of the labor force by self-employment.

Variable	White		Black		Hispanic		Asian	
	Self	NonSelf	Self	NonSelf	Self	NonSelf	Self	NonSelf
Age	45.6 (12.8)	35.2 (21.4)	41.6 (12.0)	29.2 (19.1)	35.1 (10.9)	25.2 (15.9)	42.5 (10.3)	30.5 (17.8)
Female %	33.7	52.1	37.5	54.0	28.7	41.8	43.8	50.00
Married %	71.0	45.1	52.2	23.7	54.0	30.6	82.1	43.5
College								
Degree %	44.2	29.5	30.0	17.3	17.6	10.9	41.6	35.2
Family	105641	87588	86944	61768	67689	55575	82650	70681
Income	(120428)	(106102)	(164717)	(119875)	(102254)	(85424)	(68970)	(71428)
Hours	39.3	23.6	37.0	21.5	40.1	22.5	43.5	23.03
worked	(18.8)	(22.3)	(20.4)	(21.3)	(19.0)	(22.0)	(21.4)	(21.9)
Job	53146	24131	32539	14791	29522	12333	42232	18286
Earnings	(74400)	(41042)	(50726)	(23432)	(45789)	(23321)	(54960)	(31122)
Poor								
English %	7.1*	7.8*	0.6	4.6	45.5	55.0	25.4*	23.6*
Yrs in US	23.4 (15.5)	18.3 (16.8)	15.6 (8.5)	12.8 (10.3)	12.0 (10.3)	8.0 (8.8)	15.5 (8.1)	11.2 (8.7)
>20 Yrs %	56.1	40.3	30.5*	24.4*	21.9	10.1	29.9	17.2
10-20 Yrs %	19.2*	15.7*	45.8	30.1	27.3	19.9	44.4	31.5
<10 Yrs %	28.2	46.5	26.3	49.5	54.5	74.2	30.5	56.6
N	165454	2175893	38003	1127049	12659	246459	9229	120805

a). Numbers in the parentheses are the standard deviation; b). Based on ANOVA test; * represents the variables that are not statistically significant between the self-employed and non-self-employed in each ethnic group; All other variables are significantly different between the two groups at the confidence level of 99 percent and above.

through which events in a given place at a given time influence events in another place at a later time. The spatial dependency of the location of self-employment is heightened by social, economic, cultural, and historical forces which are also spatially contingent.

The spatial clustering of self-employment for self-employment reveal two types of correlations. First, the pattern of His-

panic and Asian self-employment by workplace coincides with their residential concentration. By residence, non-Hispanic whites are concentrated in the northern part of Atlanta, non-Hispanic blacks live largely in the core area, with Hispanics and Asians principally in the northeast between the I-85 and Route 400 corridors (Duchon et al. 2003). The correlation between ethnic residential concentration

and self-employment spatial clustering suggests that ethnic communities may provide certain resources such as ethnic market, labor and even capital to the development of ethnic businesses.

At the same time, certain groups demonstrate overlapping in their business concentration which indicates that, more than just benefiting from ethnic resources abundant in ethnic neighborhoods, co-locating with other businesses regardless of ethnicity is also important for the growth and development of ethnic businesses. Table 4 gives the bivariate Moran's I between each pair of ethnic groups. While white-Hispanic and Hispanic-Asian indicate certain level of spatial correlation, white and black business are much more distant (with negative values). Such co-location among ethnic groups is not surprising. During the past several decades, a combination of racism, white flight, suburbanization, and economic restructuring resulted in the decline in power of the Atlanta traditional downtown, with many corporate offices relocating to Atlanta's northern suburbs known as the "Favored Quarter" (Leinberger 1997; Keating 2001), on an axis provided by the I-85 freeway, such as the Perimeter Center/GA400 and Cumberland/I-75. As agglomeration effects suggest, these business concentrated areas as workplace may provide more advantages with larger consumer markets, cheaper supplies, information on market opportunities, and other enabling infrastructure. Therefore, the spatial patterns of the self-employed labor force by their workplace suggest the importance to examine the spatial effects from surrounding areas not only as a residential neighborhood but also as a work place—that is, both

the geography of ethnic residence and the geography of local industry.

2) Local geography and spatial concentration of the self-employed

Regression results from the spatial lag model are given by Table 5. The spatial lag parameter is significant for each ethnic group. This is consistent with our expectation that ethnic self-employment is a social-spatial phenomenon dependent on local contextual forces in each census tract. As expected, the total number of residents in each census tract, which indicates the potential consumer markets and purchasing power, has significant influence on the presence of a self-employed labor force for all ethnic groups. The further away from the Atlanta CBD, the lower the predicted number of the self-employed labor force working in each census tract for blacks, Hispanics, and Asians since they are residentially concentrated close to the CBD. This pattern indicates that the traditional downtown area and central city are very important for the operation of ethnic minority businesses. The situation is different for whites whose suburbanization and decentralization rule out the positive influence of decreased distance to the downtown. Another economic status indicator for each census tract, the average household income at the residential areas, does not create significant variation in the spatial presence of the self-employed except for a negative effect on blacks. This indicates that, certain number of customers, but not necessarily high household incomes, is crucial for most ethnic businesses.

Although Hispanic and Asian residen-

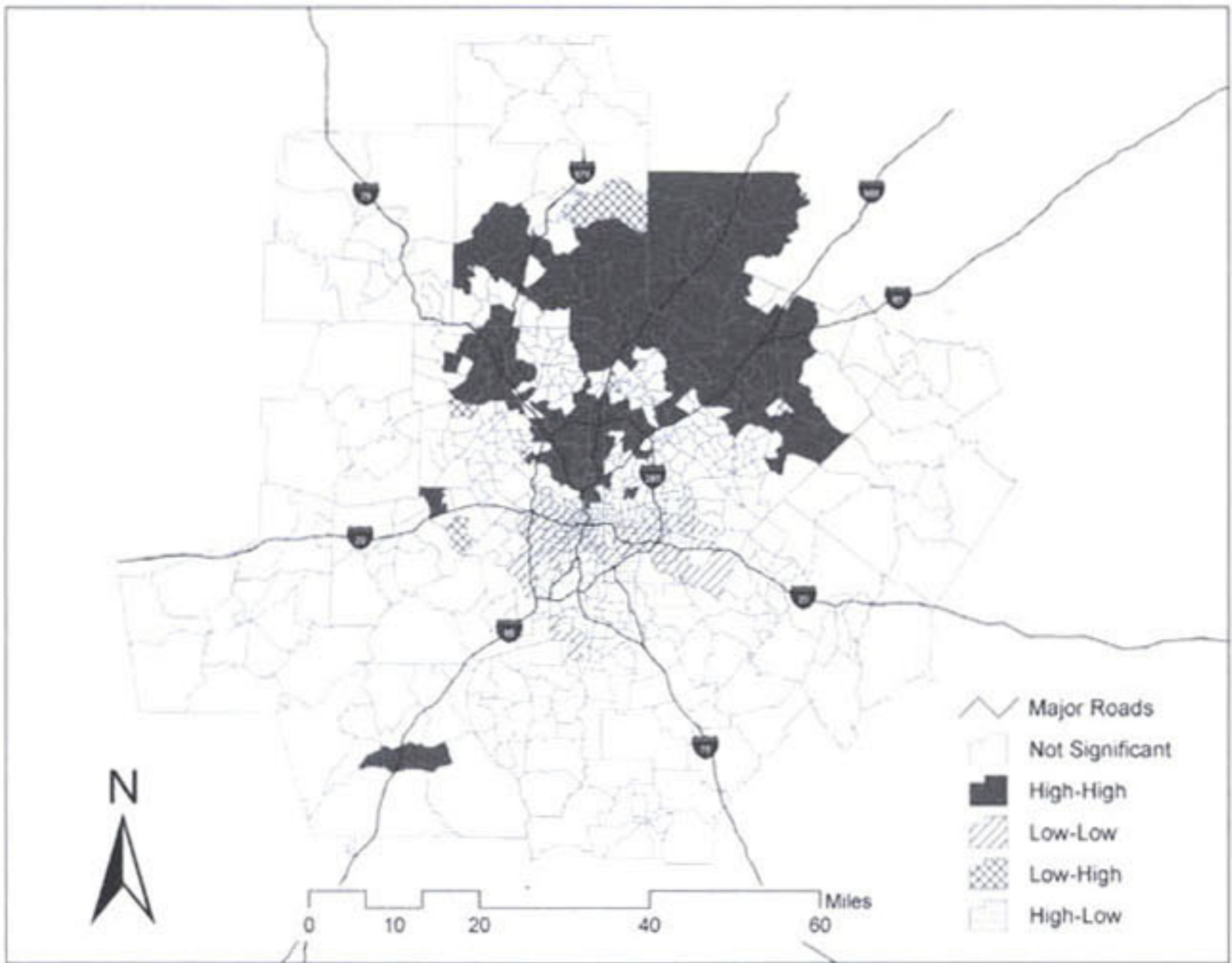


Figure 1(a). Spatial Clustering of Self-Employed Non-Hispanic Whites by Workplace.

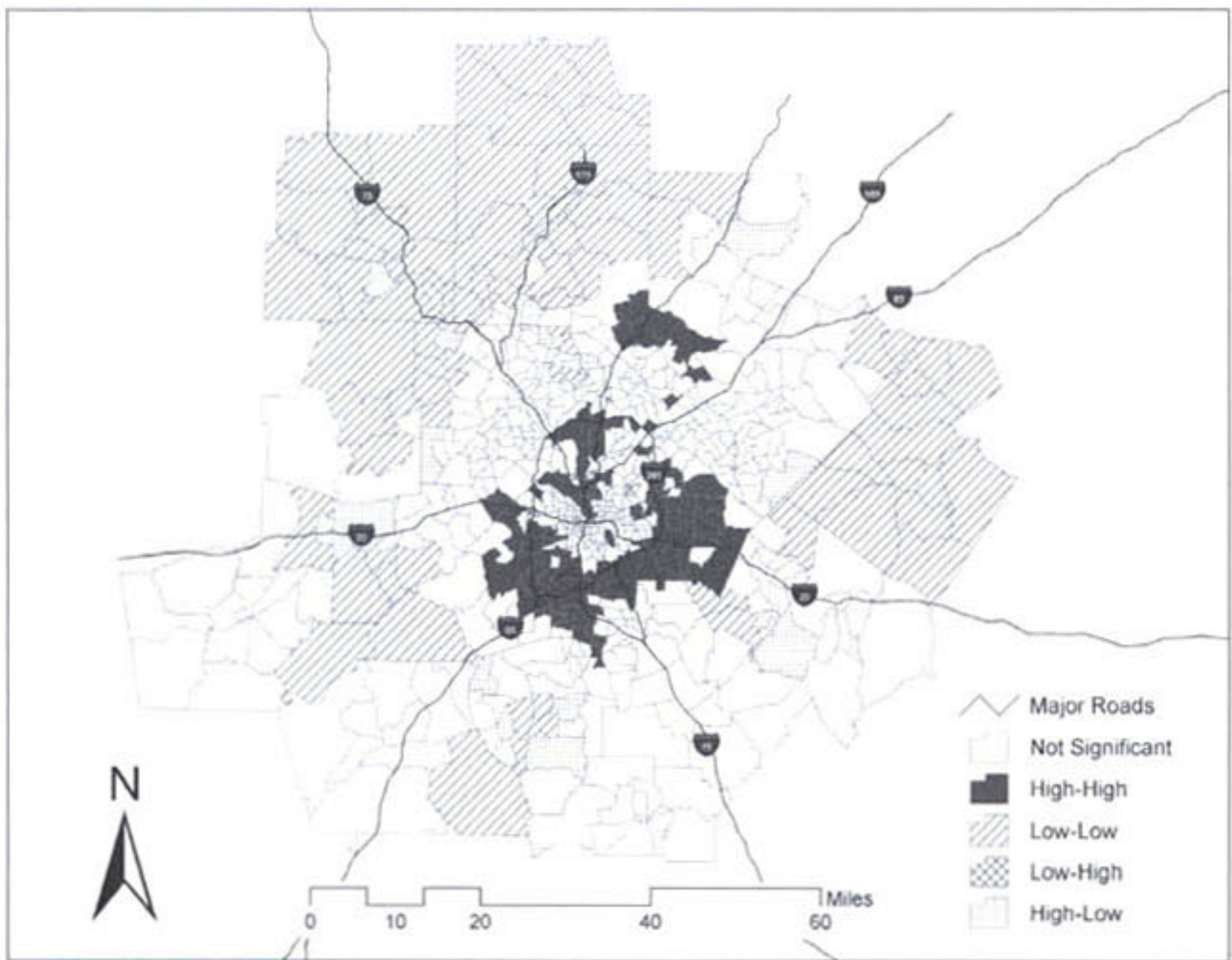


Figure 1(b). Spatial Clustering of Self-Employed Non-Hispanic Blacks by Workplace.

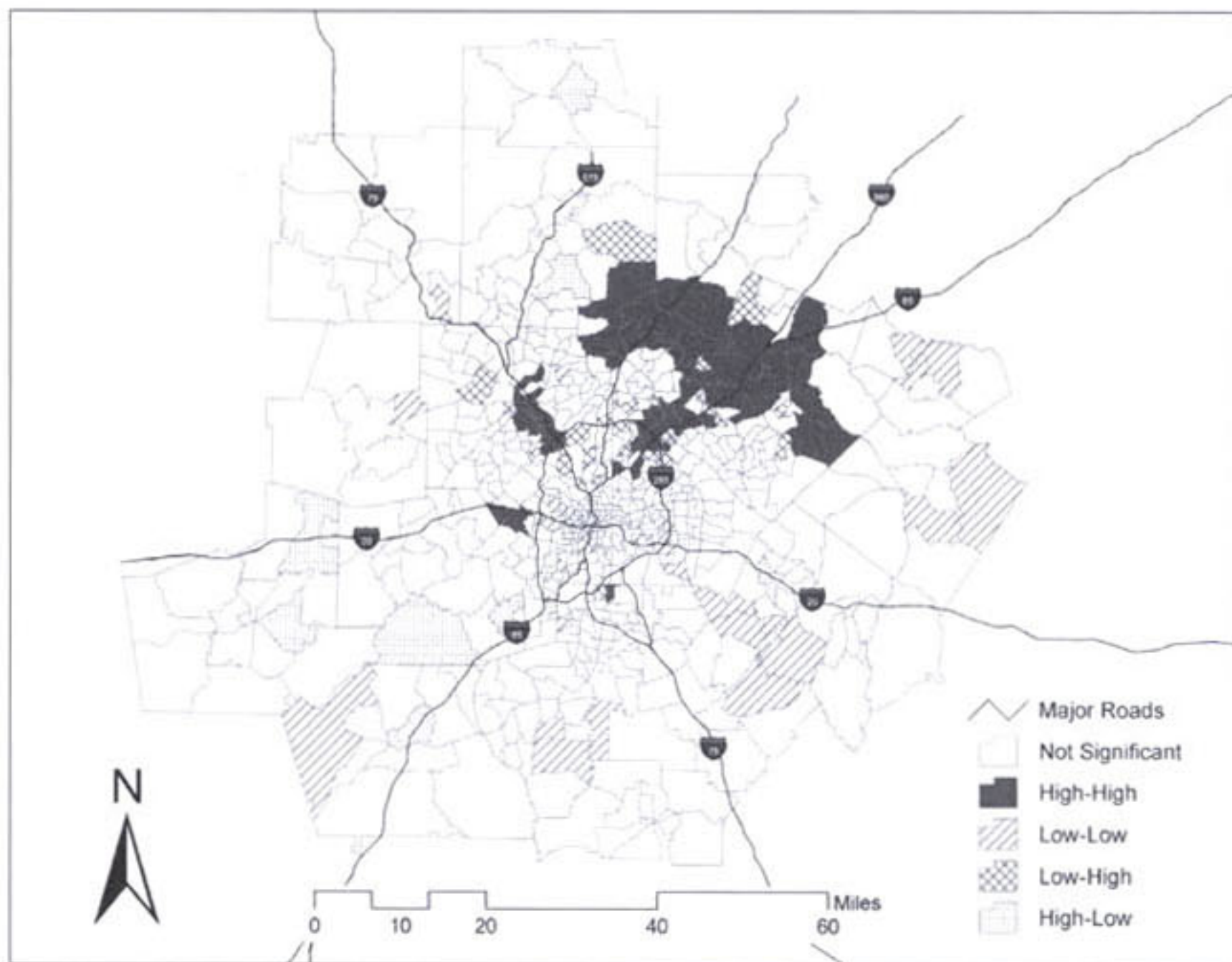


Figure 1(c). Spatial Clustering of Self-Employed Hispanics by Workplace.

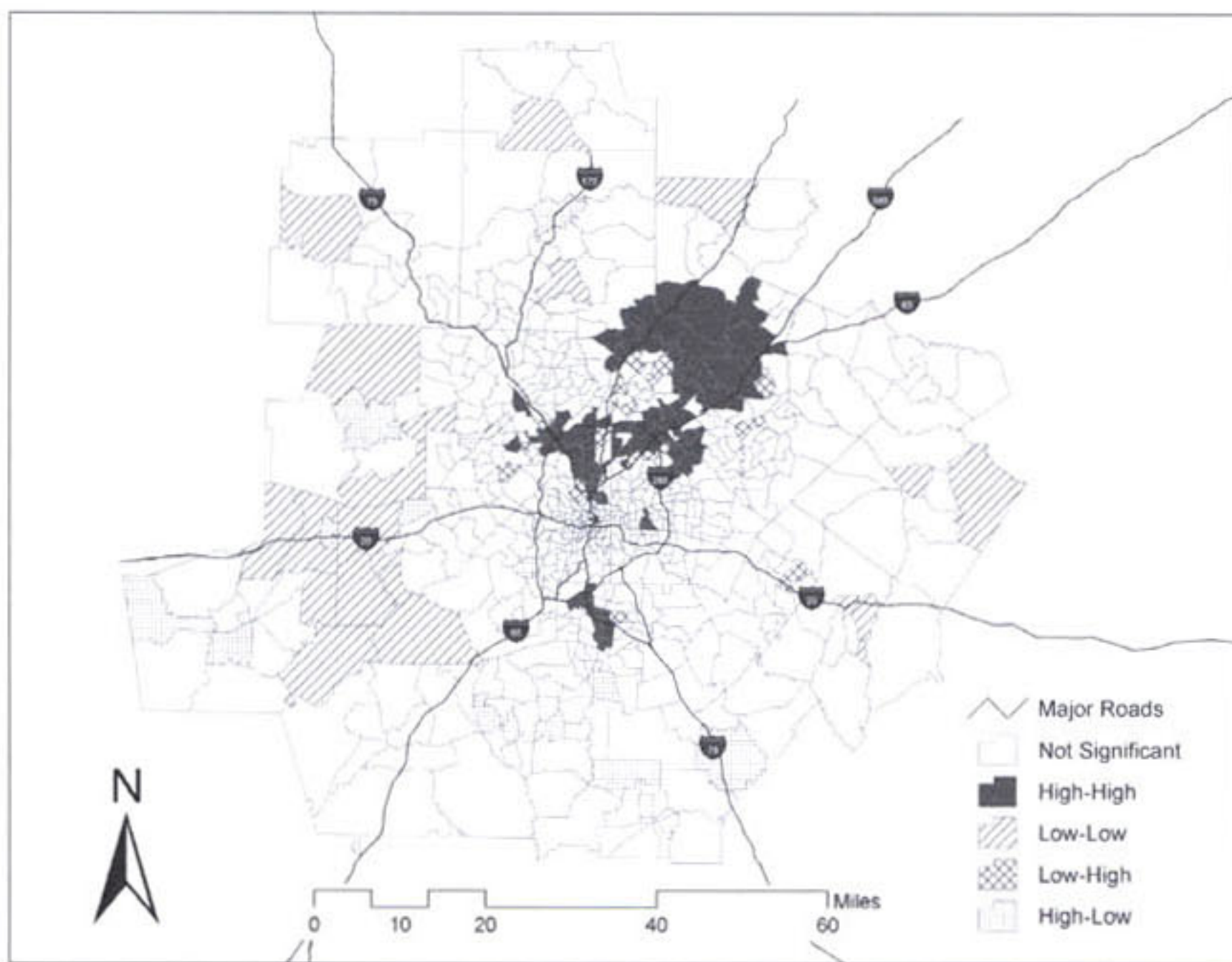


Figure 1(d). Spatial Clustering of Self-Employed Asians by Workplace.

Table 4. Bivariate Moran's I of the Self-employed labor Force by Workplace.

	White	Black	Hispanic	Asian
White	0.5960	-0.1551	0.2965	0.1864
Black	-0.1371	0.4138	0.0800	0.1529
Hispanic	0.2813	0.0900	0.2709	0.2432
Asian	0.1864	0.1516	0.2377	0.2509

Table 5. Regression results from the spatial lag model.

	White	Black	Hispanic	Asian
Variable				
Intercept	-0.8236	5.3083***	-0.0629	0.8910
White concentration	0.0135	-0.0997***	-0.0062	-0.0162
Black concentration	-0.0052***	-0.0036*	-0.0031	-0.0034*
Hispanic concentration	0.0178	-0.0004	0.1083***	0.0514*
Asian concentration	0.0027	-0.0677	0.0814	0.2130***
Residents (1,000)	0.0748***	0.1178***	0.0977***	0.0865***
Income (ln)	0.1656	-0.3063*	0.0200	-0.0731
Distance-CBD	-0.0004	-0.0399***	-0.0154**	-0.0207***
% High-Status	0.0108***	0.0043	0.0123**	0.0147
% Manufacture	0.0123***	0.0059	0.0130**	0.0053
% Trade	0.0111**	0.0055	0.0097	0.0242***
% Personal Service	-0.0235***	-0.0059	-0.0183	-0.0056
% Pub Administration	0.0030	-0.0102	0.0025	0.0028
Lag Parameter	0.6077***	0.3504***	0.2374***	0.1583**
R-squared	0.63	0.44	0.27	0.28
Log likelihood	-891.526	-1068.06	-1115.55	-1104.11
AIC	1811.05	2164.13	2259.1	2236.22

* p<0.05; ** p<0.01; *** p<0.001

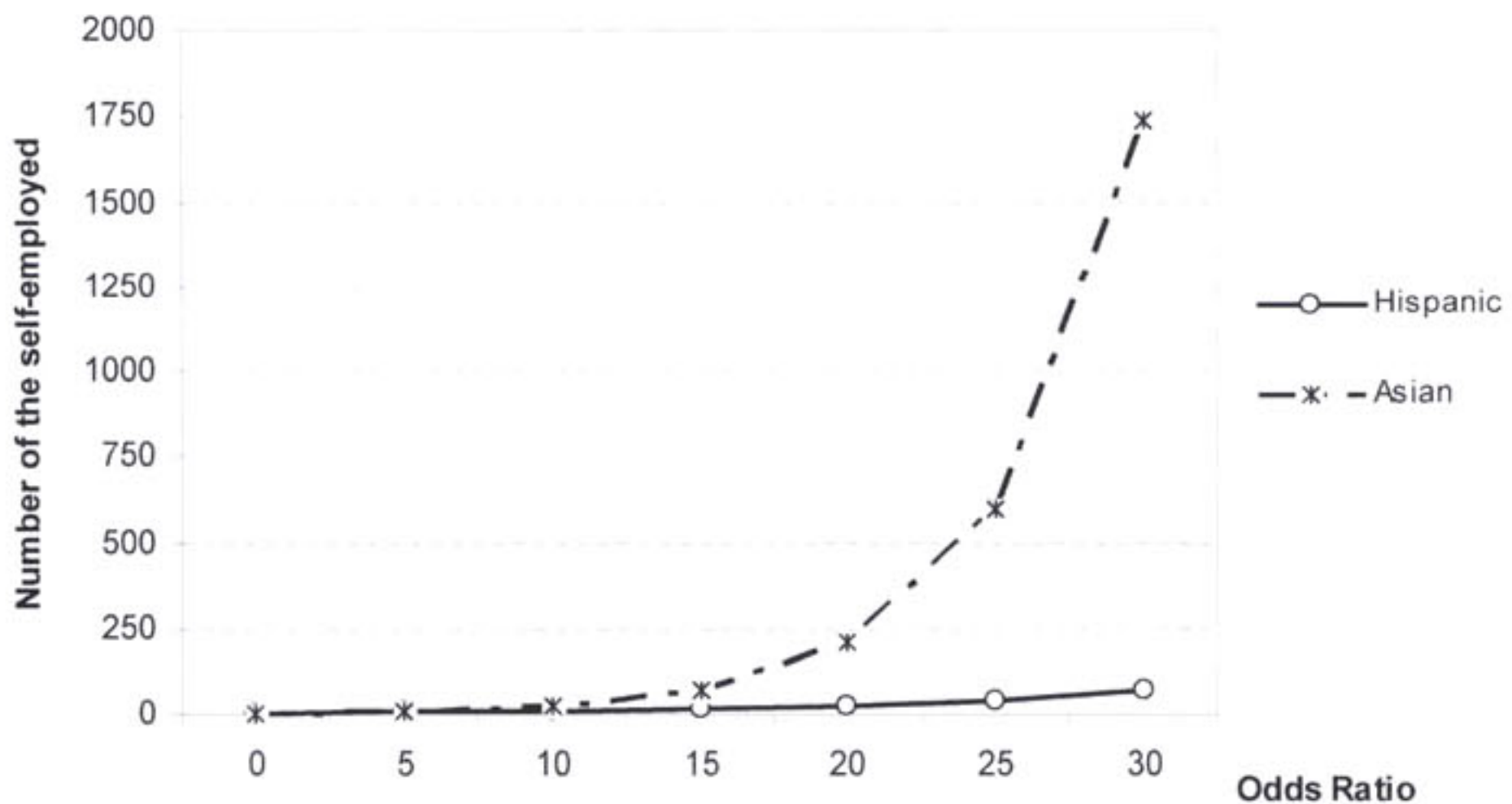


Figure 2. The predicted number of the self-employed Hispanic and Asian labor force changes with the change of their co-ethnic residential concentration measured by odds ratio.

tial concentration at the census tract level do not significantly impact the spatial distribution of white and black self-employed labor force, they both impact the number of their co-ethnic self-employment in each census tract (Table 5). The maximum value of odds ratio for Asian and Hispanic population in the Atlanta metropolitan area was 8 and 36 in the year 2000, respectively. Figure 2 depicts how the predicted number of the self-employed Hispanic and Asian labor force increases with the change of their co-ethnic residential concentration measure by odds ratio, holding other variables at their mean values. As shown, when the odds ratio of Asian residents in a census tract change from 0 to 30, the total number of the self-employed Asian labor force changes from 3 to 1,733! Although the effect for Hispanic self-employment is less dramatic, the total number of Hispanic self-employed labor force still changes from 3 to 67 when the odds ratio of Hispanic con-

centration changes from 0 to 30. As suggested by previous studies (Kaplan 1998; Barrett et al. 2001), ethnic concentration in specific places can provide potential capital, finance, and ethnic consumer markets. The pattern from Asian and Hispanic self-employment indicates a close relationship between ethnic businesses and co-ethnic residential neighborhoods⁴.

In contrast to the Hispanic and Asian population, the black concentrated residential areas are negatively related to the presence of black self-employment. Moreover, the negative relationship exists between black neighborhoods and all other ethnic groups. Due to the higher residential concentration, the odds ratio (indicating concentration in each census tract) of black residence ranges from 0 to 482 in the study area (noticeably larger than Asians, Hispanics and whites). Figure 3 shows how the predicted number of self-employed labor force declines with the increase of black residential concentration.

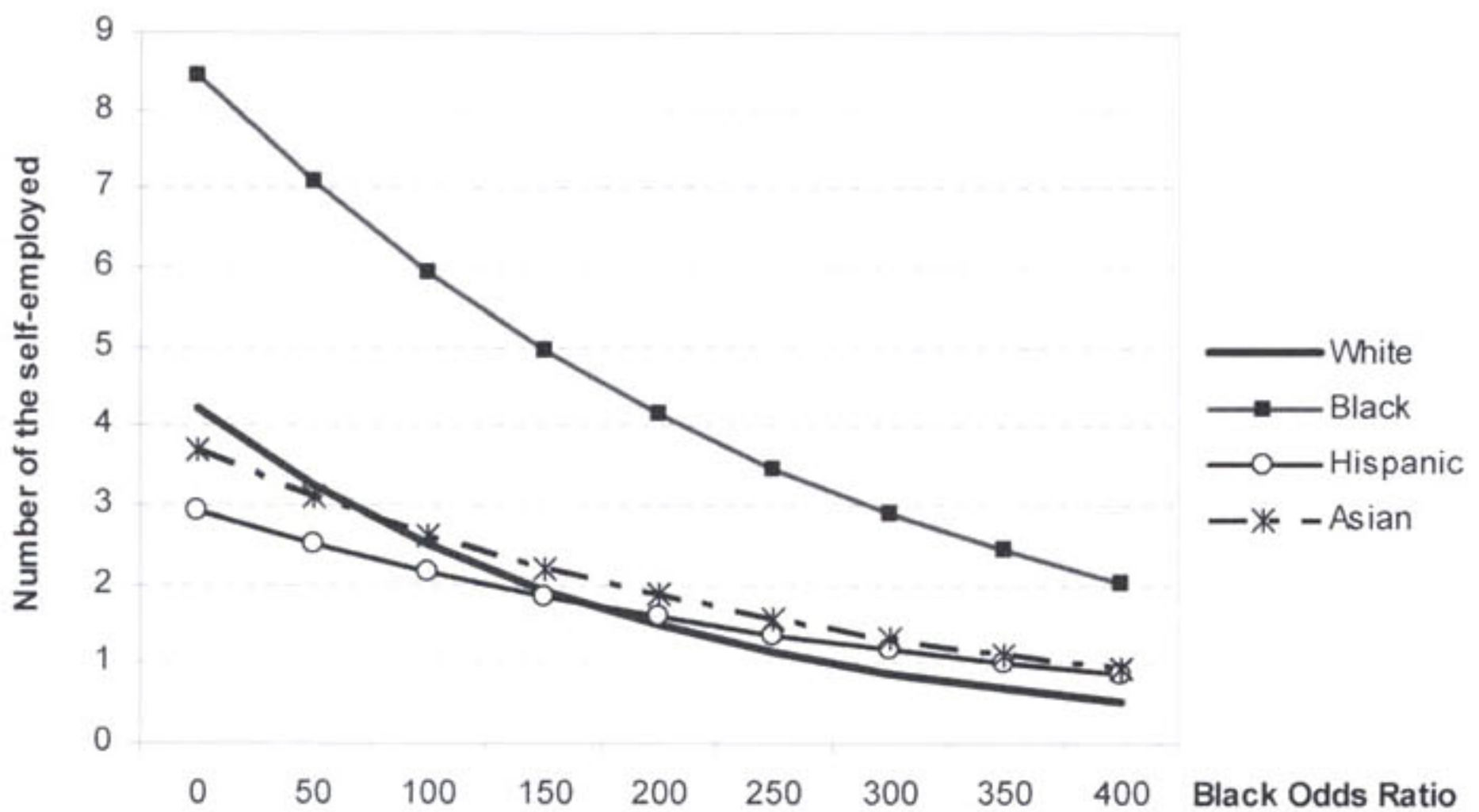


Figure 3. The predicted number of the self-employed labor force decreases with the change of black residential concentration measure by odds ratio.

The decline is the most dramatic for black themselves.

The disadvantage of black self-employment is reinforced by the relationship between white neighborhoods and black self-employment. Residential concentration of whites is not significantly related to the geography of their co-ethnic self-employment. This indicates that white self-employment does not necessarily depend on residential neighborhood resources, given access to other human and institutional capital. However, without any significant influence on other ethnic groups, white residential concentration significantly lowers the number of self-employed blacks working in the same census tract. For example, when the odds ratio of white residential concentration increases from 0 to 5 (the maximum odds ratio for white is 33 in the study area), the predicted number of self-employed black working in the same census tract decreases from 11 to 2. The negative effect

only exists between white residential concentration and black self-employment, not with other ethnic groups.

Compared to Hispanic and Asian residential concentration, obviously, both residential concentration by itself (the negative effect of black odds ratio) and segregation from whites (the negative effect of white odds ratio) significantly lower the probability of spatial presence of black self-employment. The difference indicates that, whereas possibly social capital and social resources are abundant in Hispanic and Asian ethnic neighborhoods, black residential neighborhoods may not provide favorable ethnic resources for their co-ethnic businesses. This finding is consistent with previous studies (Min and Jaret 1985). For example, Bates (1989) demonstrated how black owned enterprises are severely undermined by their location in impoverished neighborhoods that frequently lack capital, a market, and entrepreneurial talent.

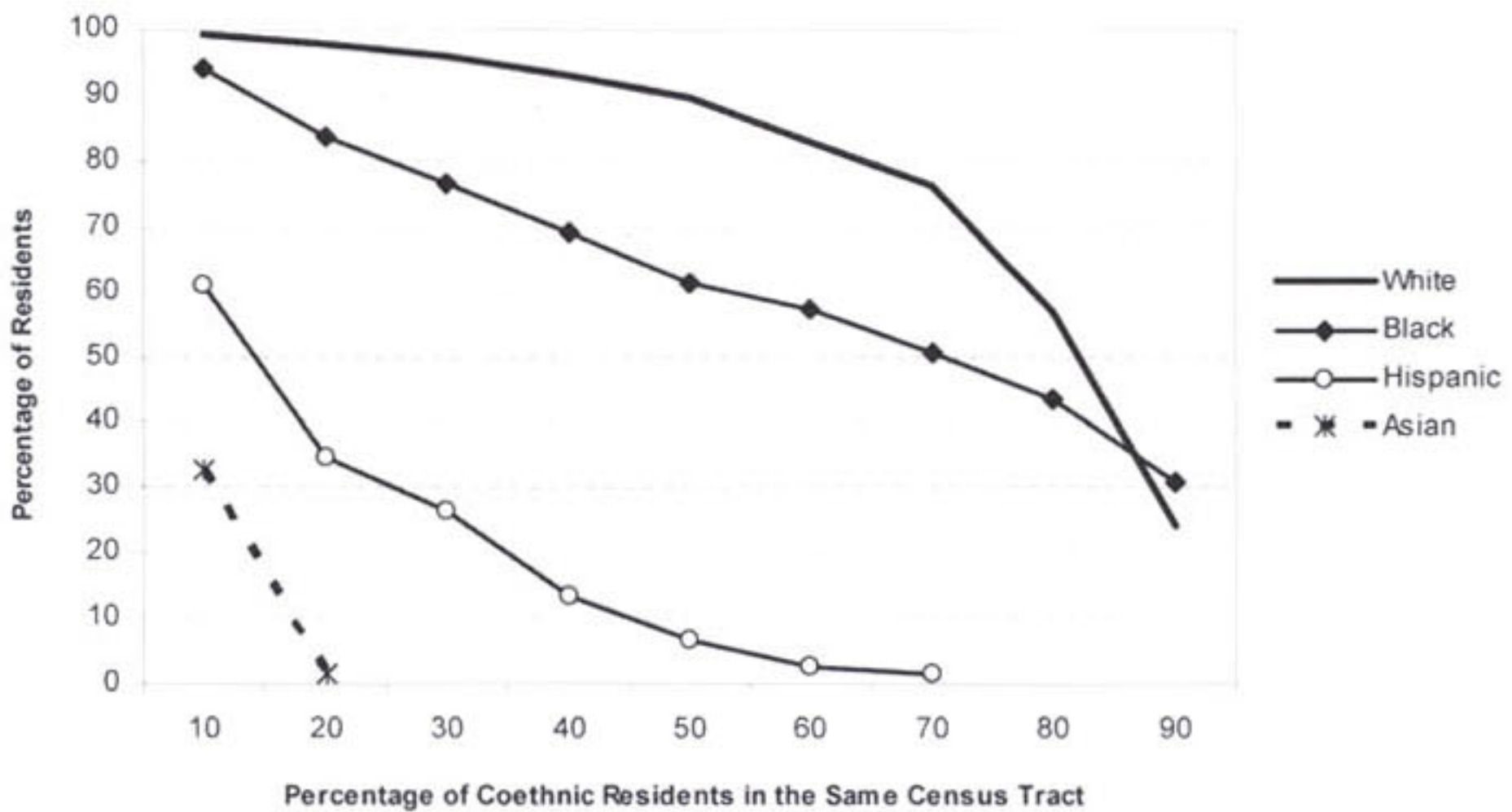


Figure 4. Spatial Distribution of Ethnic Groups by Residence.

If self-employment can help ethnic minorities move upward in the socioeconomic ladder, as many previous studies argued, the finding here suggests one more mechanism through which residential and housing market inequity diminish the socioeconomic upward mobility of blacks. This finding has a particularly significant policy implication for Atlanta where the segregation of whites and blacks has long historic roots. Even today, 90 percent of whites live in census tracts where at least 50 percent of the population is white, and 24 percent of whites live in census tracts with at least 90 percent white population. Compared to whites, 62 percent of blacks live in census tracts where at least 50 percent of the total populations is black, and 31 percent of blacks live in census tracts where 90 percent of the population is black. The trend is shown by Figure 4 (Asian and Hispanics are displayed for comparison purposes).

After considering the characteristics of

each census tract as place of residence, overall the economic structure in each census tract has the most significant effect on the spatial distribution of self-employed whites. All the economic structure variables are significant parameters except for public administration. Figure 5 illustrates the effects of local economic structure on the spatial presence of self-employed whites working in each census tract. The percentage of labor force working in manufacturing, trade, and high-status are all positively related to the increase of self-employed whites at the census tract level. Meanwhile, the predicted number of self-employed whites decreases with the relative size of personal service increases in the tract.

For other ethnic groups, the percentage of labor force working in high-status positions (i.e., FIRE, information, and professional and management) and in manufacturing industries are positively related to the number of self-employed labor force

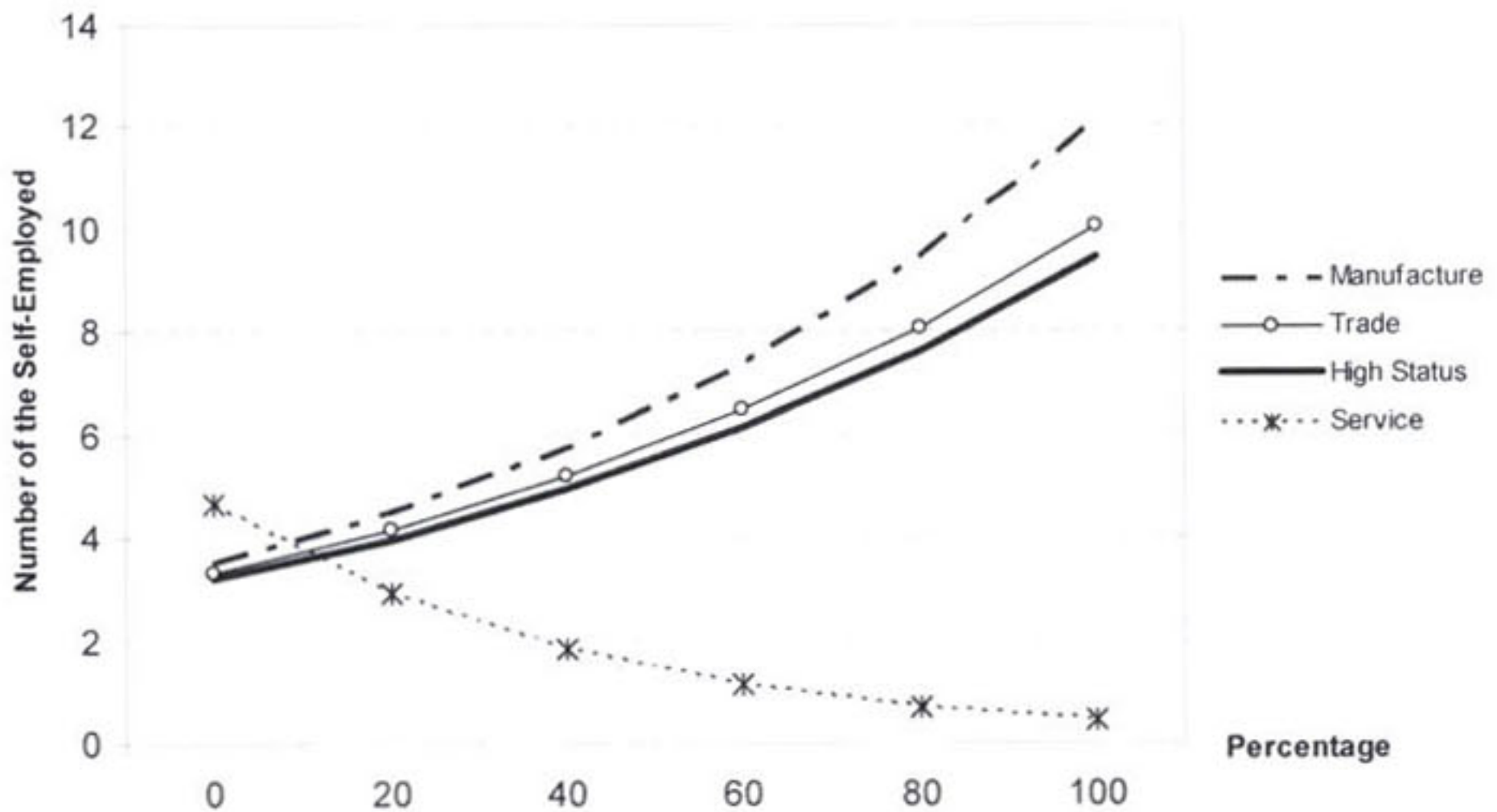


Figure 5. The predicted number of the Self-employed whites changes with the changes of Local Industrial Geography.

working in each census tract for Hispanics. The share of labor force working in trade (both wholesale and retail) is positively related to the spatial distribution of self-employed Asian labor force. No significant effects from local industrial geography exist for black self-employment.

The different effects of local economic geography on the spatial patterns of ethnic self-employment are closely related to the different types of businesses in which each ethnic group is concentrated. Table 6 shows the industrial distribution of self-employment across four groups by their percentage and odds ratio (similar to ethnic concentration by census tract, odds ratio for each industrial sector indicates the degrees of industrial concentration with the higher odds ratio representing higher concentration in each of the industrial sectors). Compared to other groups, self-employed whites are much more diversely and evenly distributed across industrial sectors, especially in manufactur-

ing, wholesale trade, FIRE, and education, health and social services areas. In particular, more than 20 percent of the self-employed whites are highly concentrated in professional and management industries (odds ratio is 2.1).

There are not many black concentrated industrial niches, but more than 20 percent of self-employed blacks are concentrated in transportation and warehouse industries, with an extremely high odds ratio of 10.2. Blacks tend to be far more concentrated in public sector employment than are whites. The agriculture related sector is a self-employment niche exclusively held by Hispanics, although it shares only 1.7 percent of the total self-employed. In particular, more than 40 percent of the self-employed Hispanics are concentration in construction, with an odds ratio as high as 6.2. While ethnic concentration in these sectors are not reliant on ethnically delineated markets, Hispanics and Asians do fill a number of eth-

Table 6. Industrial concentration of self-employment for each ethnic group, by percentage and odds ratio.

	White	Black	Hispanic	Asian
Agriculture, Fishing, Hunting, Mining	0.0 (0.0)	0.0 (0.0)	1.7 (Infinite)	0.0 (0.0)
Construction	16.9 (1.0)	13.6 (0.8)	41.0 (6.2)	4.4 (0.2)
Manufacturing	3.7 (1.5)	1.8 (0.6)	1.8 (0.5)	3.8 (1.6)
Wholesale	3.6 (1.3)	2.3 (0.8)	1.9 (0.6)	3.9 (1.5)
Retail	7.6 (0.6)	11.4 (1.0)	4.6 (0.3)	25.3 (4.8)
Transport, Warehouse	3.0 (0.5)	21.5 (10.2)	3.7 (0.6)	1.4 (0.2)
Information & Communication	1.4 (1.5)	0.0 (0.0)	1.8 (2.4)	0.6 (0.4)
FIRE	6.7 (2.2)	7.1 (2.0)	2.2 (0.5)	2.5 (0.5)
Professionals & Management	22.7 (2.1)	15.5 (1.1)	15.5 (1.1)	12.0 (0.7)
Education, Health, Social Services	11.4 (2.0)	12.2 (2.0)	5.0 (0.6)	4.7 (0.6)
Accommodation / Food / Recreation	10.2 (1.0)	2.9 (0.3)	5.0 (0.4)	20.9 (4.0)
Personal Service	12.9 (0.9)	11.6 (0.8)	15.8 (1.2)	20.6 (1.9)

Note: the numbers in the parentheses are odds ratios with higher value indicating higher concentration in the specific sector. "Infinite" means infinitely large.

nically delineated labor niches related to economically dynamic demand, such as personal services (15.8 percent of Hispanic and 20.6 percent of Asian self-employed labor force working in these sectors). Among Asian self-employed, 25.3 percent are concentrated in retail trade and 20.9 percent in accommodation, food services, and recreation.

Many of these sectors have lower bar-

riers of entry and depend on large consumer markets composed largely by same-ethnic populations. This is the reason why a large ethnic residential concentration is particularly important for Hispanic and Asian businesses. However, for white-owned businesses, linkages with local businesses providing for common operational needs and social services are more important than locating within ethnic-

affiliated neighborhoods, echoing the negligible effects of white-residential-concentration on their self-employment. Similarly, a large concentration in manufacturing for Hispanics and in trade for Asian self-employment makes the share of local businesses in these two sectors particularly important for each of the two groups. Results from this study suggest that the dependency of ethnic neighborhoods can help ethnic minorities to start their own businesses; however, location in ethnic neighborhoods may not be sufficient for further development, integration and expansion.

CONCLUSION

Ethnic residential segregation constitutes a longstanding issue in urban studies. Much less is known about ethnic spatial distribution by workplace, particularly of the businesses. This study of the Atlanta metropolis, a rapidly diversifying area over the past two decades, demonstrates that the self-employed labor force exhibits distinct spatial patterns by workplace across ethnic groups. While historically separate patterns reflecting preferences for residence and work locations largely remain the same for white and black populations in Atlanta, new economic opportunities open up new spaces. Increasingly similar levels of affluence, aversion to commuting, and avoidance of the poorly performing Atlanta school system, work to increase the core city population of whites and suburbanization of affluent blacks. The inter-mixing of Hispanic and Asian businesses on the northeast side of Atlanta in DeKalb and Gwinnett counties pull these demographics and businesses to-

gether, although perhaps for different reasons. Accordingly, there is a strong spatial dependency among the locations of ethnic businesses, suggesting that they do not randomly choose their locations; instead, the process is dependent on local urban contexts of both residential neighborhoods and business communities.

Most previous small-scale case studies based on individual ethnic group suggest the existence of significant impacts from local ethnic residential neighborhoods acting as an incubator of ethnic businesses. Consistent with these studies, ethnic residential concentration demonstrates significant positive effects of generating more opportunities or providing more resources for co-ethnic population in starting their own businesses. In particular, such a positive relationship exists strongly for ethnic minority groups with a large proportion of the foreign-born (i.e., Hispanic and Asian labor force), although they have different types of businesses. This research thus supports the possible existence of ethnic resources and social capital in ethnic neighborhoods in promoting ethnic businesses.

Whereas the Hispanic and Asian businesses benefit from their co-ethnic neighborhood and mingling with each other, black businesses are located farthest away from non-Hispanic whites, Asians, and even their co-ethnic concentrated areas. Such separation may result from the lack of significant beneficial resources from their co-ethnic residential concentration or the concentration of any other ethnic groups at the census tract level for blacks. Since blacks have a much lower percentage of the foreign-born, the variation among ethnic groups suggests that resi-

dential neighborhoods play distinct roles between the U.S.-born and foreign-born labor force in the process of ethnic entrepreneurship. Indeed, previous studies argue that, for blacks, the lack of community resources and social capital may result from historical political system and cultural legacy which has profoundly destructive and lasting implications (Barret et al. 1996; Bogan and Darity 2008). Our findings reinforce the idea that concentration of co-ethnic population could have distinct impacts on entrepreneurial experiences across race and ethnicity, dependent on discriminatory practices, institutions, and legislation in each local labor market.

Economic geographers have documented spatial agglomeration effects on entrepreneurship; however, it is unclear how such effects interact with race/ethnicity and ethnic residential geography. The current study finds that the spatial effect of local industrial geography is contingent on businesses' industrial concentration of each ethnic group in a local labor market. The more diversified, like majority whites, the more impacts from local business structure. Although ethnic networks between ethnic neighborhoods/communities and ethnic businesses play a significant role in shaping the geography of Hispanic and Asian businesses, they are still under the impacts of local industrial structure, depending upon their own business types. In fact, such industrial linkages are very important for the development of ethnic businesses in a long run. Previous studies argue that co-ethnic ties may be useful at the early stage of setting up a business; with development of the business, however, ethnic entrepreneurs need to diversify their networks with certain types of

institutions and organizations and the general labor market, because these linkages could provide ethnic entrepreneurs with more opportunities beyond the traditional choice of industries available to them, and further develop their businesses (Assudani et al. 2009). It is quite likely that many ethnic entrepreneurs face formidable environmental and institutional barriers, such as limitations on class resources, lack of awareness of government support programs and benefits for new venture, and insufficient capitalization (Ahmadi 2003; Johnson et al. 2007). In this sense, our findings suggest that previous studies may have overly emphasized the effects of ethnically concentrated residential areas and overlooked the linkages beyond that. Examination of the effects from diversified ties still needs further research, particularly about how these ties play out in different types of businesses and how are contingent on geography. As discussed earlier, an incipient convergence of theorized new factors for entrepreneurial success such as clusters, niche markets and ethnically tied social capital indicate areas of convergence between researchers in business schools, sociologists, and geographers. Such approaches could enrich multidisciplinary examinations combining a mixed methods approach with the shared language of statistics. The contribution of ethnic businesses to an increasingly diverse and vibrant urban entrepreneurship merits continued exploration in multiple areas and disciplines.

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NOTES

1. A spatial error model is also experimented for each of the four groups. By acknowledging that there are no clear-cut rules to choose between these two strategies, we chose the spatial lag model because (1) we hypothesize that the ethnic economic activities represent a spatial "diffusion" process, with neighboring places more similar to each other in their socioeconomic and urban development contexts; and (2) diagnostic statistics perform better for spatial lag models. However, the significance and the direction of the effect for each parameter in the four groups do not demonstrate significant difference between the two modeling strategies. The regression results from the spatial error models are available upon request.

2. Due to the size of census tracts in the study area varying significantly and irregularly shaped, too much arbitrary classification would be introduced if we construct the weight matrix using distance. Further more, the size of each ethnic group varies significantly across census tracts. Under these conditions, 30 miles may not be a great deal for the distribution of white-owned businesses; however, 10 miles could make a great difference for Hispanic businesses. If we set up different threshold values of distance for each group to construct the weight matrix, it is then hard to make the comparison more difficult across ethnic groups. Thus, we choose to use spatial contiguity instead of distance for weighting scheme. There is no significant difference in regression results between Queen Weight and Rook Weight; however, spatial dependency is slightly higher with Rook weight and the model's fitness is slightly better as well. Therefore, a first-order spatial contiguity (Rook Weight) is used in the weight matrix.

3. The ethnic concentration is measured by

odds ratio (OR) that is given by $OR = (E_i / E_{t-i}) / (O_i / O_{t-i})$. The numerator represents the odds of Hispanic population living in census tract i , and the denominator represents the odds of all other groups (O) living in the same census tract i . The higher the value, the more concentrated for ethnic group E in the census tract i . For example, if E_i is the number of Hispanics in Census tract i , E_{t-i} represents Hispanics in all other census tracts; O_i is the number of all other group members except for Hispanics in the census tract i , and O_{t-i} represents all other group members in all other census tracts. A representation index or location quotient is commonly used in previous studies. Compared to the representation index and location quotient, the odds ratio is more sensitive to the change of spatial distribution, although their implications are similar. See Wang and Pandit (2007) for more discussion of the detailed differences.

4. As one referee suggested, there should be a distinction between Hispanic and Asian businesses in their correlation with co-ethnic neighborhoods. Table 6 indicates that Hispanics are strongly concentrated in construction and agriculture while more Asian self-employment is in retail, accommodation, food, and recreation. Co-ethnic neighborhoods may provide more co-ethnic labor for Hispanic businesses, and Asian residents are more likely to be consumers of local co-ethnic businesses. While the data do not allow further investigations, future research by detailed industrial sectors, particularly the ethnic concentrated sectors, will provide much insight in understanding the spatial correlation.

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