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## Ecological context and immigrants' earnings: English ability as a mediator

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### ABSTRACT

Labor economic literature has demonstrated a consistent positive association between immigrants' earnings and their level of proficiency in the host society's language. Sociological literature, on the other hand, has explicated that immigrants' abilities to speak the host society's language are affected by structural/ecological factors which shape the linguistic environment of immigrants. This study proposes a logical extension of the two literatures by suggesting that structural /ecological factors affect immigrants' earnings indirectly by affecting their ability to speak the host society's language. Using individual and aggregate data from the U.S. Census 2000, we found that structural/ecological factors such as group size, segregation, and linguistic heterogeneity affected immigrants' earnings not only directly but also indirectly via their impacts on immigrants' English ability. English ability is a key mediator through which structural forces shape individual immigrant's economic assimilation outcome.

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### 1. Introduction

Among the handful of human capital variables used to predict immigrants' labor market performance in the host society, ability to speak the host society's language has been proven to be one of the most consistent predictors (Carliner, 1981; Chiswick and Miller, 1995; Dustmann and Von Soest, 2002; Grenier, 1984; McManus et al., 1983; Reitz, 1980; Tainer, 1988). Studies done in the United States and in other countries with large immigrant populations have repeatedly shown that immigrants with better mastery of the host society's language are better rewarded in the labor market.

For researchers who are interested in cultural assimilation and social adaptation of immigrants in their host society, ability to speak the host society's language is not a means toward other ends but an end in itself. Indeed, there is a parallel body of literature which has focused on immigrants' abilities to speak the host society's language (Alba et al., 2002; Alba and Nee, 1997; Chiswick and Miller, 1995; Espenshade and Fu, 1997; Espinosa and Massey, 1997; Hwang and Xi, 2008; Portes and Rumbaut, 1996; Portes and Schaufli, 1994; Stevens, 1992). These studies suggest that although a majority of immigrants lose their mother tongue and adopt the host society's language fully in three generations, contextual or ecological factors nonetheless play an important role in affecting the speed at which such language shifts progress. A recent study (Hwang and Xi, 2008), for example, clearly demonstrates that the level of English proficiency among immigrants in the U.S. is affected by the linguistic environment (as defined by the size and segregation of a language group, and the degree of linguistic heterogeneity and the earnings inequality between the better and poor English speakers of the community) in which immigrants are embedded.

Given the known association between immigrants' earnings and their level of proficiency in the host society's language, on one hand; and recent evidence linking language choice and linguistic environment, on the other; it is logical to suggest

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that ecological factors affect immigrants' earnings *indirectly* by affecting their English ability. Unfortunately, there is little theoretical development and empirical inquiry to substantiate the mediation argument. This paper intends to fill the gap by proposing two theoretical mechanisms to link immigrants' earnings to a set of contextual/ecological factors and subject the proposed hypotheses to empirical test.

## 2. Background

The earnings of immigrant workers have long been an important topic of research for labor economists. Studies have repeatedly shown that despite their earnings disadvantage relative to native workers at the time of entry, immigrant workers catch up rapidly and eventually reach parity with their native counterparts (Chiswick, 1978; Dustmann, 1999). Economists attribute the amazing economic achievement of immigrants to positive selection and economic assimilation of immigrants. Chiswick (1978), for example, argues that although new immigrants compare unfavorably to native workers in domestic work experiences, they fare equally well, if not better, in educational attainment and mental ability. Thus, despite their initial competitive disadvantages due mainly to the challenges they face in effectively translating their foreign credentials into currencies recognized by the host society, such disadvantages are erased as they master the language of the host society. Proficiency in host society's language, so to speak, plays the role of catalyst in the economic assimilation process.

While labor economists emphasize the importance of human capital, such as proficiency in host society's language, in the assimilation process, sociologists pay more attention to structural constraints the ecological context imposes on immigrants in learning the language of the host society and in pursuing high-paying jobs. To the latter, the performance of immigrants in the labor market depends on both macro economic climates (Alba and Nee, 1997; Portes and Zhou, 1993) and on the population ecology of the community in which immigrants are embedded (Hwang and Xi, 2008; Nee et al., 1994).

Some of the ecological realities which have attracted the attention of sociologists are the increasing size of immigrant populations and linguistic heterogeneity in American metropolises and their implications for immigrant workers. Although U.S. metropolises are known as the breeding ground for ethnic enclaves and ethnic economy due to the presence of large immigrant populations (Wilson and Portes, 1980; Portes and Bach, 1985), little is known about the effects on immigrant workers of the coexistence of multiple large immigrant groups of diverse origins in the same metropolis. An important article by Nee et al. (1994) argues that the multi-ethnic environment provides a bridge for immigrants to escape from the entrapment of ethnic jobs and allows them to better integrate into the open job market. Highly heterogeneous multi-ethnic communities are said to furnish a terrain wherein members of different ethnic groups cooperate in securing financial resources and other capital. They enhance the opportunities for workers from one country to work for employers from another (Nee et al., 1994). As a result, a high level of heterogeneity promotes intergroup interaction and help immigrants to acquire English ability and work experiences outside ethnic enclaves (Nee et al., 1994).

Contrary to the effect of linguistic heterogeneity, highly segregated ethnic enclaves may entrap immigrant workers in low paying jobs by depriving them of the opportunities to learn English and to be exposed to job opportunities that exist in the better remunerated sectors of the economy (Catanzarite and Aguilera, 2002; Farley, 1996; Nee et al., 1994; Tienda and Lii, 1987; Tienda and Wilson, 1992). Assimilationists suggest that ethnic enclaves constrain the economic achievement of minorities. The earnings penalties associated with ethnic jobs have been found repeatedly in past studies (Catanzarite and Aguilera, 2002; Tienda and Lii, 1987; Tienda and Wilson, 1992). Researchers, including many who oppose the assimilation perspective, generally agree that jobs in ethnic enclaves are usually associated with lower pay, worse work conditions, longer hours and lack of opportunities for promotion when compared to jobs in the main stream economy.

For new immigrants with little English ability, as is the case for many post-1965 immigrants from Latin America and Asia, enclave jobs are more accessible, however. Immigrants employed by co-ethnics in the enclave can easily find a foothold in the U.S. The proponents of ethnic economy theory, for example, argue that ethnic enclaves provide immigrants with otherwise unavailable opportunities or at least an alternative way for economic achievement. Concentration of co-ethnics also benefits immigrant entrepreneurs and smaller business owners because ethnic economies rely extensively on ethnic resources for start-up capital, labor, and clientele. By mobilizing ethnic solidarity, ethnic enclaves often are able to generate ethnic resources and create otherwise unavailable opportunities for their members (Portes and Bach, 1985). In sum, the proponents of ethnic economy see ethnic concentration as beneficial not only to ethnic workers (Bailey and Waldinger, 1991) but also to the self-employed and small business owners (Portes and Zhou, 1996; Zhou, 2004). Clearly, there is little consensus regarding whether ethnic enclaves actually benefit or harm ethnic minority workers economically.

Besides linguistic heterogeneity, group size and segregation, inequality of the community is another structural variable that may affect immigrants' earnings. Inequality has been found to make people more status-conscious (Rytina et al., 1988). Earnings inequality between the better and poorer English speakers in the community is therefore expected to have a positive effect on immigrants' earnings because the perception of it motivates immigrants to improve their English (Chiswick and Miller, 1995; Hwang and Xi, 2008) and which, in turn, can lead to improved earnings (Grenier, 1984; Kossoudji, 1988; McManus et al., 1983; Reitz, 1980; Tainer, 1988).

In short, previous studies have suggested that size and segregation of ethnic group and linguistic heterogeneity and inequality of the community are important factors that affect immigrants' economic livelihood although the exact relationships are still being debated. Some researchers (e.g., Hwang and Xi, 2008; Nee et al., 1994) also suggested that the same factors may also affect immigrants' economic well-being indirectly by restricting their opportunity to acquire essential

human capital such as English language skills so that they can compete squarely in the open labor market. Although previous studies provide the basis for suggesting an intervening role for English language ability, the exact mechanism has yet to be spelled out. In the next few sections, we lay out our arguments suggesting that structural/ecological factors shape individual immigrants' earnings via their impact on immigrants' English language ability, a key human capital factor for immigrant workers in U.S. labor market.

### 2.1. English ability as human capital

Among the human capital assets possessed by immigrants, English ability has been seen as the most important *changeable* factor in immigrants' economic assimilation process. A large number of studies have shown that immigrants who are more fluent in host society's language enjoy higher economic achievement (Carliner, 2000; Dustmann and Van Soest, 2002; Grenier, 1984; Kossoudji, 1988; McManus et al., 1983; Reitz, 1980; Tainer, 1988). However, not all immigrants enter the U.S. speaking English well. In fact, for the majority of post-1965 immigrants who come mainly from non-English speaking countries, a high proportion of them speak little English (Carliner, 2000; Hwang and Xi, 2008). Although the higher economic returns to those workers who can speak English fluently provides an obvious incentive for immigrants to invest in English language skills, the opportunities for them to improve their English vary greatly for immigrants who settle in different areas of the U.S. (Hwang and Xi, 2008). While some researchers are sanguine about the eventual linguistic assimilation of immigrants (Alba et al., 2002), evidence suggests that the process is not always linear. In some conditions, immigrants may not be able to pick up English regardless of the length of their stay in the U.S. Using 1980 and 1990 census data, Carliner (2000) showed that even after 30 or more years in the U.S., over a quarter of Mexican immigrants were still not able to speak English fluently. Besides personal characteristics of individual immigrants such as educational attainment and age at migration, structural factors have been found to play an important role in shaping immigrants' English ability (Chiswick and Miller, 2002; Hwang and Xi, 2008; Lazear, 1999; Stevens, 1992).

A recent study (Hwang and Xi, 2008) shows that the factors which Blau (1977) identified to have important structural implications for intergroup relations (i.e. group size, segregation, heterogeneity, and inequality) also affect immigrants' English language ability. While large group size and high degree of segregation tend to lower immigrants' English language proficiency by reducing the frequency of intergroup interactions, linguistic heterogeneity and inequality enhance immigrants' English proficiency by necessitating intergroup contacts and motivating immigrants to learn English.

Building on past studies on immigrants' earnings and English language proficiency, we propose that group size, segregation, linguistic heterogeneity and inequality constitute the linguistic environment for immigrants, which shapes their level of English proficiency; the latter, in turn, affects immigrants' earnings. English ability is therefore a key mediator through which structural forces shape individual immigrant's economic assimilation outcome.

### 2.2. Size and segregation of ethnic group

Large group size and segregation heighten ethnic boundaries. Researchers term these structural forces *segregating dynamics* with large group size functioning to secure ethnic supplies and high levels of segregation functioning to maintain closed ethnic economic and linguistic boundaries (Nee et al., 1994). When the size of an ethnic group is large in an area, it provides the key ingredient for the development of all sorts of ethnic institutions (Breton, 1964). Immigrants can live in the ethnic community without the need of English in their daily life (Portes and Rumbaut, 1996). Large ethnic group size and high level of segregation thus devalue English as a human capital in an ethnic economy (Hwang et al., 2007). Living in an ethnic enclave also dampens the motivation for immigrants to invest in the acquisition of English skills because the lack of English skills does not necessarily prevent immigrants from getting jobs in such settings. Furthermore, large group size and segregation promote in-group interaction and suppress the use of English and thus prevent immigrants from improving English skills.

Without competitive English skills, however, other human capital that immigrants possess cannot be easily translated into mainstream market value (Grenier, 1984; Kossoudji, 1988; Chiswick, 1991; Chiswick and Miller, 1995, 2002). Therefore, their marketability is limited outside the ethnic economy for immigrants who live in linguistically isolated environments (Borjas, 1990; Portes and Bach, 1985). While ethnic enclaves provide shelter for new immigrants, they can also entrap them into the low paying ethnic jobs by depriving them of the opportunity to acquire English.

### 2.3. Linguistic heterogeneity and earning inequality in work and residential environment

On the contrary, linguistic heterogeneity and earning inequality between the better and poor English speakers of a community promotes intergroup interactions in the community and necessitates the acquisition of English skills (Hwang and Xi, 2008). Researchers have named these structural forces as *blending dynamics* (Nee et al., 1994). In multi-ethnic communities where linguistic heterogeneity is high, the need for English as a *lingua franca* is also high. English is needed not only for business negotiations as workers, entrepreneurs, and consumers pursue higher benefits, but also for daily social interactions between native-born citizens and immigrants of different ethnic origins (Nee et al., 1994). The blending dynamic not only increases the pressure to break down linguistic boundaries, but also provides exposure and opportunities for immigrants to learn English. In addition, earnings inequality between the better and poor English speakers of the community serves as an incentive for immigrants to improve English (Chiswick and Miller, 1995; Hwang and Xi, 2008). The perceived inequality

between English ability groups is likely to encourage immigrants to invest in English. The improved English ability, in turn, can help translate other human capital they possess into greater market rewards and enables immigrants to seek better paying jobs in the mainstream economy. Thus, the blending dynamic works to facilitate economic assimilation processes.

The spatial distribution of non-English language speakers indicates increasing linguistic heterogeneity in US metropolises (Alba and Nee, 1997). In contrast to the closed ethnic boundaries commonly found in small communities containing only one or a few ethnic groups, linguistic heterogeneity that prevails in many of the nation's largest cities facilitates a blending dynamic by increasing chance encounters and associations among people of different cultural backgrounds (Alba and Nee, 1997; Nee et al., 1994).

Despite the theoretical ramifications of linguistic heterogeneity and inequality for immigrants' economic livelihood, past studies of immigrants' labor market performance had focused mainly on group size and segregation (Catanzarite and Aguilera, 2002; Farley, 1996; Tienda and Lii, 1987). Because linguistic heterogeneity and inequality counterbalance the effects of group size and segregation (Hwang and Xi, 2008), past studies can be criticized for model specification errors. By bridging the labor market assimilation literature and the English ability literature together, we hypothesize that group size and segregation have negative effects on immigrants' earnings and linguistic heterogeneity and inequality have a positive effect. However, these effects are mediated by English ability by means of the segregating and blending mechanisms suggested by Nee et al. (1994).

### 3. Data and Methods

The data for this study came from two sources: the 5% Public-Use Micro Data Samples (PUMS) of the 2000 U.S. census, which provided the data for our individual-level variables; and the summary file 3 (SF3) (U.S. Bureau of the Census, 2002), which we used to compute structural variables. Because the dependent variable of primary interest is earnings, our sample includes only foreign born individuals between the ages of 25 and 64 who reported positive earnings in 1999 (Chiswick, 1978; Chiswick and Miller, 1995). We further restricted the sample to members of one of the 20 largest non-English language groups<sup>1</sup> residing in the metropolitan U.S. Membership was defined by the reported language spoken at home. The 20 language groups together represent over 90% of all people who reported speaking a non-English language at home. For those immigrants who spoke only English at home we assigned them to a group based on the dominant language spoken in their country of origin<sup>2</sup>. We used Metropolitan Statistical Areas (MSAs) as our community units. According to Hawley (1950, p. 257), community can be defined from a spatial standpoint as comprising an area where "the resident population of which is interrelated and integrated with reference to its daily requirements." In the U.S., a MSA consists of a population center and its surrounding areas functionally integrated with the center. The average population size of a MSA is 680 thousands with a range from about 50 thousands to over 9 millions. Because MSA takes into considerations the functional integration of a population, it is an appropriate demarcation of an immigrant's realm of activities and interactions (Hwang and Xi, 2008). We identified a total of 297<sup>3</sup> MSAs in SF3. Because not all 20 language groups could be found in all MSAs, our sample included 576,381 individual immigrants who are grouped into 4749 MSA-specific groups in 297 MSAs.

#### 3.1. Measurement

Our dependent variable of interest is the total EARNINGS of the immigrant in 1999. Earnings include both wages and salary incomes and income from self-employment. The variable is log transformed in our analysis to reduce skewness.

English language ability is the mediating factor and thus the variable of primary interest. It is a four-level ordinal variable (i.e., English only or speak English very well, well, not well, and not at all) and we treated it as an interval scale<sup>4</sup>. To test the mediating role of English ability, we would treat it as both independent variable in earnings regression and dependent variable in English ability regression (Baron and Kenny, 1986).

<sup>1</sup> The twenty largest language groups, in order of group size as determined by the 2000 Census, are: Spanish, Chinese, French, German, Tagalog, Vietnamese, Italian, Korean, Russian, Polish, Arabic, Portuguese, Japanese, French Creole, Greek, Hindi, Persian, Urdu, Gujarati, and Armenian. The exclusion of members of small language groups that had been combined with other language speakers from the same region (e.g. "Other Indo-European Languages" in SF3 is a combination of Albanian, Gaelic, Lithuanian, and Rumanian) was necessary because the appropriateness of group-specific measures as predictors depends on homogeneous groupings.

<sup>2</sup> Following Hwang and Xi (2008), we relied on the CIA's (2004) *The World Factbook* to determine the dominant language spoken in a country. Because those from India can be assigned to either Hindi or Gujarati, both are official languages of India. We randomly assign Indian immigrants who speak only English to Hindi and Gujarati using probabilities proportionate to the size of the two groups.

<sup>3</sup> Although there are a total of 331 MSA/PMSAs in the SF3, we were only able to uniquely identify 297 units from the PUMS because many small metropolitan areas have been combined with other metropolitan or non-metropolitan areas to form mixed PUMAs. The metropolitan IDs of those cases in mixed PUMAs are not available.

<sup>4</sup> Because the U.S. Census measures English ability by asking respondents to make subjective judgments of themselves and of other household members (U.S. Bureau of the Census, 2004), the accuracy of such a measure is problematic. It is well documented that measurement error usually leads to downward-biased estimates (Cole and Maxwell, 2003; Hoyle and Kenny, 1999; Dustmann and Von Soest, 2002). Simulation studies indicate that when there is measurement error associated with a mediator in a mediation model, the mediation effect will be under-estimated and the direct effect over-estimated (Cole and Maxwell 2003; Hoyle and Kenny 1999; Roth et al., 2005). Given such findings, the mediation effects reported in this study could be under-estimated. In other words, if we have English ability measured without measurement error, we should have observed a greater indirect effect and a smaller direct effect for the structural variables of interest.

In both English ability and earnings regression, our independent variables at the individual level include those human capital variables used by economists and sociologists (e.g., Chiswick, 1978; Chiswick and Miller, 1995; Hwang and Xi, 2008; Stevens, 1992). They are English language proficiency, years of education, years of experience (not included in English ability regression), age at migration (not included in earnings regression), and years in U.S. Human capital variables are measured following Chiswick (1978). Years of EDUCATION is measured as an interval variable. The census provides no direct measure of years of experience, so we approximate it by the equation: EXPERIENCE = (AGE – EDUCATION – 5) or 0, whichever is bigger (Chiswick, 1978). AGE at migration is equal to (age – (2000 – year of entry)) or 0, whichever is bigger. Years in U.S. (YEARINUS) = (2000 – year of entry). Because earnings are known to vary with gender (MALE), marital status (MARRIED) and self employment (SELFEMPLOY) (Logan et al., 2003; Spener and Bean, 1999), we control for these additional dummy variables in our earnings regression.

To capture the effect of structural forces, we need measures of both minority language group and community characteristics. Different linguistic groups in the same MSA may have different sizes and segregation levels. At the same time, groups who speak the same minority language but reside in different metropolitan communities may also have different group sizes and segregation levels. Therefore, size and segregation are considered as group- and MSA-specific characteristics and they are measured for each group in each MSA instead of using national-level measures which ignore between-MSA variations in group characteristics (Hwang and Xi, 2008).

For each of the language groups in each MSA, a measure of group size and a measure of segregation were obtained. Following Hwang and Xi (2008), the Group size for language group  $j$  is measured by the total number of people who spoke a particular language other than English at home in the MSA. We log transformed SIZE in our analyses to reduce skewness<sup>5</sup>. Of the many possible measures of SEGREGATION (Massey and Denton, 1988), we considered a spatial proximity index the most appropriate because this index captures clustering of minority areas (Hwang and Xi, 2008; White, 1983). The spatial clustering of members of the same language group  $j$  is measured by White's (1983) average proximity index ( $P_{xx}$ ) using tract-level data for language spoken at home:

$$P_{xx} = \sum_{i=1}^N \sum_{j=1}^N \frac{x_i x_j c_{ij}}{X^2} \times 100$$

Where  $x_i$  indicates the number of people belonging to a language group in census tract  $i$ , and  $x_j$  indicates the number of people belonging to the same language group in census tract  $j$ .  $X$  denotes the total number of people belonging to this language group in the MSA. The index measures average proximity between members of the same group  $x$  in different census tracts  $i$  and  $j$  given the total number of  $X$  members in the MSA. The  $c_{ij}$  in the numerator is equal to  $\exp(-d_{ij})$ , the negative exponential function of distance between census tracts  $i$  and  $j$ . We also control for linguistic DISTANCE (Snow, 1998; Van Tubergen and Kalmijn, 2005) to measure the distance between a foreign language and English using a scale developed by Snow (1998). This measure is group- but not MSA-specific.

Unlike size and segregation, linguistic heterogeneity and inequality are characteristics of the community shared by all groups in the same community (Hwang and Xi, 2008). Linguistic HETEROGENEITY is measured by  $1 - \sum P_i^2$ . While  $P_i$  stands for the proportion of the MSA's population who speak language  $i$  for up to 40 language groups (including English) used in Summary File 3. It is a widely used measure of diversity in social science literature (Blau et al., 1982; Greenberg, 1956; Lieberman, 1981; Hwang and Murdock, 1988; Hwang and Xi, 2008). Inequality is measured for each MSA by the ratio of the median earnings for immigrants who speak only English or speak English very well vs. the median for immigrants with inferior English abilities in the MSA (Chiswick and Miller, 1995; Hwang and Xi, 2008). We also control for a labor market variable: MSA's median earnings (MEDEARN), which is expected to affect immigrants' earnings by affecting the overall wage rate and costs of living in a MSA (Hwang and Xi, 2008; Tienda and Wilson, 1992).

### 3.2. Analytic strategy

Our data have a three-level hierarchical structure in which individuals are nested within groups and groups are, in turn, nested within MSAs. Because individual immigrants who belong to the same language group and reside in the same MSA are likely to be more similar to each other than a randomly selected group of immigrants due to shared experience, or other common background characteristics, ignoring the clustering effect will lead to possible false positives in hypothesis testing (Krull and MacKinnon, 2001). As recommended in the literature, we used hierarchical linear modeling (HLM), which has at least three advantages for answering our research questions. First it takes into consideration the *intracluster correlation* between individuals within the same cluster and adjusts for its effect accordingly. Therefore, it produces more appropriate significance tests while simultaneously examine the effects of variables at both individual and group level (Krull and MacKinnon, 2001). Second, the multi-level framework provides an opportunity to examine multi-level mediation effects. Our main interest lies in the mediation role of English ability in linking structural forces and immigrants' earnings, which involve cross-level mediation. In addition, the multi-level framework allows the effect of mediator to vary across group units. This is needed because of the documented variability in economic return to language ability cross group and cross MSA

<sup>5</sup> In a sensitivity analysis, we tried relative size instead of absolute size as the measure of size of a language group. Relative size is measured by the proportion of population in a MSA who speak each of the 20 foreign languages at home. Replacing absolute size with relative size in analysis yields very similar results.

(Chiswick and Miller, 1995, 2002; Hwang and Xi, 2008; Jasso and Rosenzweig, 1990; McManus, 1990; Portes and Bach, 1985; Poston, 1994).

Our cross-level mediation models include three submodels: an *English ability regression*, an *earnings regression including English ability*, and an *earnings regression not including English ability*. Each regression contains a set of individual-, group-, and MSA-level predictors. The English ability regression tests the link between structural variables and English ability. The link between English ability and earnings would be tested in the earnings regression. Changes in the estimated coefficients of the structural variables from the two earnings regressions would then provide an intuitive estimation of the mediation effects<sup>6</sup> (Baron and Kenny, 1986).

To evaluate the mediating role of English ability, we first verify the effects of structural variables on English ability (Krull and MacKinnon, 2001) using English ability as the dependent variable in the *English ability regression*. The model we used is a modified version of English ability model specified by Hwang and Xi (2008)<sup>7</sup>.

$$\text{ENGLISH}_{ijk} = \beta_{000} + \beta_{001} \text{HETEROGENEITY}_k + \beta_{002} \text{INEQUALITY}_k + \beta_{010} \text{SIZE}_{jk} + \beta_{020} \text{SEGREGATION}_{jk} + \beta_{030} \text{DISTANCE}_{jk} + \beta_{100} \text{EDUCATION}_{ijk} + \beta_{200} \text{MALE}_{ijk} + \beta_{300} \text{AGE}_{ijk} + \beta_{400} (\text{AGE}_{ijk})^2 + \beta_{500} \text{YEARINUS}_{ijk} + \beta_{600} (\text{YEARINUS}_{ijk})^2 + u_{00k} + r_{0jk} + e_{ijk}.$$

In this mixed model, the  $y_{ijk}$  is the expected English ability for individual  $i$  in group  $j$  and in MSA  $k$ . The effects of linguistic heterogeneity ( $\beta_{001}$ ) and inequality ( $\beta_{002}$ ) on English ability are estimated at the MSA level, but the effects of group size ( $\beta_{010}$ ) and segregation ( $\beta_{020}$ ) are estimated at the group level.

We then estimate two earnings regressions. The *earnings regression not including English ability* is a mixed model which estimates the total effects of the group- and metropolitan-level structural variables on earnings while controlling for individual-level predictors.

$$\text{LN}(\text{EARNINGS})_{ijk} = \pi_{000} + \pi_{001} \text{HETEROGENEITY}_k + \pi_{002} \text{Inequality}_k + \pi_{003} \text{MEDEARN}_k + \pi_{010} \text{SIZE}_{jk} + \pi_{020} \text{SEGREGATION}_{jk} + \pi_{200} \text{MALE}_{ijk} + \pi_{300} \text{EDUCATION}_{ijk} + \pi_{400} \text{MARRIED}_{ijk} + \pi_{500} \text{SELFEMPLOY}_{ijk} + \pi_{600} \text{EXPERIENCE}_{ijk} + \pi_{700} (\text{EXPERIENCE}_{ijk})^2 + \pi_{800} \text{YEARINUS}_{ijk} + \pi_{900} (\text{YEARINUS}_{ijk})^2 + u_{00k} + r_{0jk} + e_{ijk}.$$

The  $y_{ijk}$  in the equation is the expected log earnings for individual  $i$  in group  $j$  and in MSA  $k$ . The  $\pi_{000}$  is the intercept or the average log earnings for group  $j$  in MSA  $k$  after adjusting for individual-, group- and MSA-level predictors. This interpretation of intercept is justified because all of the independent variables have been grand mean-centered (Hofmann and Gavin, 1998). The remaining  $\pi$  s describes the effects of corresponding predictors. The last three terms in the equation represent random errors at three different levels. The  $u_{00k}$  indicates random deviation of MSA  $k$ 's mean from the grand mean. The  $r_{0jk}$  indicates the random deviation of the mean for Group  $j$  in MSA  $k$  from the mean of MSA  $k$ . The  $e_{ijk}$  represents the random deviation of individual  $i$  in group  $j$  in MSA  $k$  from the mean of group  $j$  in MSA  $k$ .

Our *earnings regression including English ability* is arrived by simply adding ENGLISH into the above mixed model.

$$\text{LN}(\text{EARNINGS})_{ijk} = \pi_{000} + \pi_{001} \text{HETEROGENEITY}_k + \pi_{002} \text{Inequality}_k + \pi_{003} \text{MEDEARN}_k + \pi_{010} \text{SIZE}_{jk} + \pi_{020} \text{SEGREGATION}_{jk} + \pi_{100} \text{ENGLISH}_{ijk} + \pi_{200} \text{MALE}_{ijk} + \pi_{300} \text{EDUCATION}_{ijk} + \pi_{400} \text{MARRIED}_{ijk} + \pi_{500} \text{SELFEMPLOY}_{ijk} + \pi_{600} \text{EXPERIENCE}_{ijk} + \pi_{700} (\text{EXPERIENCE}_{ijk})^2 + \pi_{800} \text{YEARINUS}_{ijk} + \pi_{900} (\text{YEARINUS}_{ijk})^2 + u_{001} \text{ENGLISH}_{ijk} + u_{00k} + r_{010} \text{ENGLISH}_{ijk} + r_{0jk} + e_{ijk}.$$

Because economic returns to English ability are known to vary across group and communities (Chiswick and Miller, 1995, 2002; Jasso and Rosenzweig, 1990; McManus, 1990; Portes and Bach, 1985; Poston, 1994), our model allows the effects of English ability to vary across group ( $r_{010} \text{ENGLISH}$ ) and across MSA ( $u_{001} \text{ENGLISH}$ ).

For the two earnings regressions, our focus is on estimating the parameters of English ability ( $\pi_{100}$ ) and the four structural variables (i.e.  $\pi_{010}$  for group size,  $\pi_{020}$  for segregation,  $\pi_{001}$  for linguistic heterogeneity, and  $\pi_{002}$  for inequality). If the four coefficients in without English ability regression are significant, the mediation effects will then be estimated by computing the percent reductions in the corresponding coefficients for the variables of interest from earnings regression not including English ability to earnings regression including English ability (Baron and Kenny, 1986; Kenny et al., 1998).

#### 4. Results

We first present some descriptive statistics for all the independent variables used in the three sets of models in Table 1. Variables were grouped into three levels (individual-level, group-level, and MSA-level) according to measurement units used. For the sample as a whole, the average respondent spoke English well, had attained 12.6 years of education, immigrated to the U.S. at the age of 22, had lived in the U.S. for a bit more than 17 years, and had about 22 years of work experience. Of all the respondents, 58% were male, 69% were married and 7% were self-employed. The mean and median earnings of respondents were \$31,410 and \$21,600 (not shown in the table), respectively.

There is a considerable variation in both group size and segregation level across MSA-specific language groups. Although the average segregation level was low (2.57), the variable has a large range (0–26.03), indicating a wide variation in the degree of spatial clustering between different groups. The average size for a MSA-specific language group was 8137. However, the extreme group size ranges from three persons on one end and over 3 million on the other.

<sup>6</sup> We also tested the indirect effects using the method suggested by Sobel (1982) which led to the same conclusions.

<sup>7</sup> Our English ability regression is different from the regression used by Hwang and Xi (2008) in two ways: (1) they treated English ability as an ordinal variable and used a multi-level cumulative logit model for estimation. We treated English ability as an interval scale variable to be consistent with other models and used a multi-level linear model for estimation; (2) we dropped the school age child variable from their model because it was not statistically significant in their study and neither was it in our preliminary analysis.

**Table 1**

Descriptive statistics for individual-, group-, and MSA-level variables.

	Mean	SD	Min	Max	n
<i>Individual characteristics</i>					
English ability	3.07	1	1	4	576,381
Education attainment	12.60	5.24	0.00	22.00	576,381
Age at migration	22.67	11.16	0.00	64.00	576,381
Years since migration	17.61	11.16	0.00	64.00	576,381
Experience	22.67	11.32	0.00	59.00	576,381
Male	0.58	0.49	0.00	1.00	576,381
Married	0.69	0.46	0.00	1.00	576,381
Self-employment	0.07	0.25	0.00	1.00	576,381
Earnings	\$31,410	\$39,302	\$4	\$627,000	576,381
<i>Group characteristics</i>					
Segregation	2.57	2.83	0.00	26.03	4749
Group Size	8137	71,100	3	3330,935	4749
Ln (group size)	6.49	1.95	1.10	15.02	4749
Linguistic Distance	5.51	1.64	2.00	7.00	4749
<i>MSA characteristics</i>					
Heterogeneity	0.22	0.14	0.05	0.66	297
Inequality	1.73	0.62	0.39	4.40	297
ln (Inequality)	0.49	0.34	-0.93	1.48	297
Median Earnings	\$22,892	\$3915	\$12,365	\$38,197	297

The average linguistic heterogeneity for the 297 MSAs is 0.22, which means that one out of every five random encounters in an average MSA would involve two speakers of different languages. In an average MSA, the median earnings of those immigrants who speak only English or speak the language very well was 1.73 times as high as the corresponding measure for those in other English ability categories. The median earnings in 1999 for an average MSA was \$22,892.

Our first step in testing the mediation hypothesis is to demonstrate that the structural variables of interest do affect immigrants' English proficiency even after controlling for human capital variables. We present results from the *English ability regression* in Table 2. The results showed that group size and segregation exerted significant negative effects on immigrants' English ability, and the opposite was true for linguistic heterogeneity and inequality. The higher the level of segregation or the larger the group size in the community where immigrants resided, the poorer their English language ability. On the contrary, immigrants living in communities with higher levels of linguistic heterogeneity and greater earnings inequality tended to speak English more fluently. For individual characteristics, those who were men, more educated, younger when immigrated to U.S., or who have stayed a longer time in the U.S. spoke English more fluently.

Table 2 also reports the coefficients from two earnings regressions. The results from the *earnings regression not including English ability* clearly showed that three of the four structural variables of interest were highly significant. While high levels of segregation and large group size suppressed immigrants' earnings, high levels of linguistic heterogeneity in metropolitan areas enhanced their earnings. These findings were consistent with the arguments that the segregating dynamic constrains immigrants' earnings and the blending dynamic works to the advantages of immigrants' earnings. Our results also corroborated the view that, whereas segregation hinders immigrants' economic assimilation, linguistic heterogeneity promotes it. The effect of inequality is not statistically significant<sup>8</sup>.

Adding English ability to the regression allows us not only to test the significance of the link between English ability and earnings, but also to compare the coefficients of the three significant structural variables on immigrants' earnings in the two earnings regressions. As expected, better English ability was significantly associated with higher earnings. Although the effects of segregation, group size and linguistic heterogeneity were still significant, the magnitudes of the effects were smaller in the regression including English ability. For example, there was a 13 percent reduction in the effect of group size, and a 22 percent reduction in the effect of segregation on earnings. The percent reduction for linguistic heterogeneity was 19 percent. In all three cases, the addition of the mediator resulted in a considerable drop in the direct effects of the three structural variables; thus providing some support for the mediation hypothesis. The mediation role of English ability was not trivial<sup>9</sup>. Comparing the mediation effects of English proficiency for the three structural variables, segregation suffers the greatest drop in direct effect compared to the other two. Our results confirmed the mediation hypotheses with regard to group size, segregation, and linguistic heterogeneity. Our results suggested that segregating and blending dynamics not only shaped immigrants' earnings directly, but also affected immigrants' earnings indirectly through their

<sup>8</sup> The bivariate correlation between inequality and earnings was significant. However, controlling for other relevant variables has significantly weakened the association.

<sup>9</sup> We have conducted a sensitivity analysis on the mediation role of English ability by entering English ability as the sole individual-level predictor. We found that without controlling for other individual level covariates, English ability explained away 37.5%, 48.5%, and 33.3% of the effects of group size, segregation, and linguistic heterogeneity, respectively.

**Table 2**  
Multilevel analysis of structural effects on immigrant's English ability and earnings.

	The English Ability Regression		The Earnings Regression	
	Coefficients	Coefficients	Not Including English Ability	Including English Ability
				Coefficients
Fixed effects				
<i>Grand average log earnings/English ability</i>	3.352***	9.924***	9.892***	0
<i>Individual-level predictors from human capital model</i>				
English proficiency			0.112***	
Male	0.016***	0.488***	0.486***	0
Education	0.072***	0.052***	0.046***	-12
Age at migration	-0.028***			
Age at migration <sup>2</sup> /100	0.017***			
Married		0.092***	0.095***	3
Self-employment		-0.236***	-0.232***	-2
Experience		0.010***	0.015***	46
Experience <sup>2</sup> /100		-0.019***	-0.023***	21
Years in U.S.	0.034***	0.035***	0.028***	-20
Years in U.S. <sup>2</sup> /100	-0.052***	-0.044***	-0.038***	-14
<i>Group-level predictors</i>				
Ln (group size)	-0.068***	-0.035***	-0.031***	-13
Segregation	-0.016***	-0.010***	-0.007***	-22
Linguistic distance	-0.036***			
<i>MSA-level predictors</i>				
Heterogeneity	0.320***	0.333***	0.269***	-19
Inequality	0.092***	0.002	-0.012	
Median Earnings		0.032***	0.030***	-6
<i>Random effects</i>				
Individual-level residual	0.589	0.778	0.766	
<i>Variance Components for intercept</i>				
Group-level	0.025***	0.012***	0.012***	
MSA-level	0.002***	0.001***	0.001***	
<i>Variance components for English slope</i>				
Group-level			0.009***	
MSA-level			0.003***	

\*\*\* p < .001.

influence on immigrants' English ability<sup>10</sup>. Because the direct effect of inequality is not significant, there is no need to further discuss its mediation effect (Baron and Kenny, 1986).

Consistent with the literature, men and those possessing more human capital as indicated by better English ability, more education, more experience, and longer U.S. residence reported higher earnings in 1999. The marginal effects of experience and years in U.S., however, diminished with time. It is worth noting that education and years in the U.S. also affected earnings through their effects on English ability. Furthermore, since new immigrants with lower levels of education are more likely to settle in segregated enclaves, it makes sense to suggest that the estimated segregation effect reported here are partially a result of the indirect effects traceable to immigrants' education attainment and the number of years they have lived in the United States.

## 5. Conclusion and discussion

For the past three decades, immigrants' English ability and their economic achievement have been the focuses of research for labor economists and sociologists. While some researchers see immigrants' English language proficiency as a determinant of their economic attainment, others focus on immigrants' English ability as a dependent variable affected by contextual/ecological factors which shape immigrants' language environment. The aim of this study was to connect the two bodies of literature by suggesting that English language proficiency plays a mediating role linking immigrants' earnings on the one hand and contextual/ecological variables on the other. Our findings indicated that while living in a multi-ethnic community enhanced immigrants' earnings by forcing them to improve their English proficiency, living in a mono-ethnic community with

<sup>10</sup> Because Table 2 reported summary information on direct and indirect effects of structural variables on earnings by averaging out variations in coefficients across groups, it is legitimate to question whether such averaging is justified. To address this concern, we conducted group specific multi-level analysis by running the three regressions for each of the 20 language group separately. Although there were expected variations in regression coefficients across groups, the results of group-specific analyses were consistent with those reported in Table 2 for most groups. Generally speaking, both direct and indirect effects of structural variables on earnings were stronger for speakers of Asian languages and weaker for speakers of European languages.

a high degree of segregation from the dominant group suppressed their earnings. Thus, the blending and segregating dynamics suggested by Nee et al. (1994) work together to shape the economic well-being of immigrants in U.S. metropolises.

This study highlights the importance of linguistic heterogeneity as a facilitator of immigrants' economic assimilation. While segregation reinforces ethnic boundaries and an ethnic divide, linguistic heterogeneity works in the opposite direction by blending and uniting different ethnic groups and pooling their resources together for communal uses. Although people prefer to associate with co-ethnics, heterogeneity promotes intergroup interaction and, at times, forces people of diverse backgrounds to communicate with one another. According to Nee et al. (1994), the presence of ethnically diverse work forces in heterogeneous metropolises is a breeding ground for mixed economies. Unlike ethnic economies which often prosper on ethnic solidarity and exploitation, mixed economies unshackle immigrant workers from their co-ethnic employers and offer them more job opportunities and better wages (Weber, [1922] 1978; Nee et al., 1994).

It is well documented that immigrants tend to concentrate in large cities. Because estimates based on smaller MSAs tend to be less stable, we redid the analysis by restricting our sample to the 100 largest MSAs. The results based on a restricted sample were similar to those reported earlier albeit the mediation effects tended to be stronger. It is also well known that migration is selective (Borjas, 1990; Clampet-Lundquist and Massey, 2008; Massey, 1990). If immigrants with poor English and lower earnings are more inclined to settle in communities with certain ecological characteristics (Carliner, 2000), then the observed associations between community characteristics and earnings and English proficiency is no more than a result of selective migration. To address the problem, we used time-lagged measures of the structural variables to replace the contemporaneous ones (Singer and Willett, 2003). Because the lagged metropolitan characteristics cannot be affected by current immigrants even if they might be affected by earlier cohorts of immigrants, using lagged measure of structural variables mitigates problems of reciprocal causality (Singer and Willett, 2003). Our conclusions were confirmed by this sensitivity analysis.

Furthermore, because contextual effects are not immediate but take time to affect residents (Clampet-Lundquist and Massey, 2008), for immigrants who have just moved into the current MSA, the group and community characteristics of current MSA may not be relevant in explaining their English ability and their earnings. One way to make the structural measures more pertinent for the model is to restrict our sample to those immigrant workers who have lived in the current MSA for at least five years. We confirmed our conclusion again by using the restricted sample. This analysis detected much greater mediation effects.

Although these additional analyses lend us greater confidence in the mediation role of English ability in connecting ecological factors and immigrants' earnings, endogeneity remains a concern until we have individual-level panel data. Future studies should seek longitudinal observations for both immigrants as well as group- and community-level measures of ecological characteristics in order to fully understand the interplays between individuals and the structure.

## References

- Alba, Richard, Nee, Victor, 1997. Rethinking assimilation theory for a new era of immigration. *International Migration Review* 31, 826–874.
- Alba, Richard, Logan, John, Lutz, Amy, Stults, Brain, 2002. Only English by the third generation? Loss and preservation of the mother tongue among the grandchildren of contemporary immigrants. *Demography* 39, 467–484.
- Bailey, Thomas, Waldinger, R., 1991. Primary, secondary, and enclave labor markets: a training system approach. *American Sociological Review* 56, 432–445.
- Baron, Reuben M., Kenny, David A., 1986. The moderator–mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology* 51, 1173–1182.
- Blau, Peter M., 1977. *Inequality and Heterogeneity*. Free Press, New York.
- Blau, Peter M., Blum, Terry C., Schwartz, Joseph E., 1982. Heterogeneity and intermarriage. *American Sociological Review* 47, 45–62.
- Borjas, George J., 1990. Assimilation and the earnings of immigrants. In: *Friends or Strangers: The Impact of Immigrants on the US Economy*. Basic Books, New York, Berlin, pp. 97–115.
- Breton, Raymond, 1964. Institutional completeness of ethnic communities and personal relations to immigrants. *American Journal of Sociology* 70, 193–205.
- Catanzarite, Lisa, Aguilera, Michael B., 2002. Working with co-ethnics: earnings penalties for Latino immigrants at Latino jobsites. *Social Problems* 49, 101–127.
- Carliner, Geoffrey, 1981. Wage difference by language group and the market for language skills in Canada. *The Journal of Human Resource* 16, 384–399.
- Carliner, Geoffrey, 2000. The language ability of U.S. immigrants: assimilation and cohort effects. *International Migration Review* 34, 158–182.
- Chiswick, Barry R., 1978. The effect of Americanization on the earnings foreign-born men. *Journal of Political Economy* 86, 897–921.
- Chiswick, Barry R., 1991. Speaking, reading, and earnings among low-skilled immigrants. *Journal of Labor Economics* 9, 149–170.
- Chiswick, Barry R., Miller, Paul W., 1995. The endogeneity between language and earnings: international analyses. *Journal of Labor Economics* 13, 246–288.
- Chiswick, Barry R., Miller, Paul W., 2002. Immigrant earnings: language skills, linguistic concentrations and the business cycle. *Population Economics* 15, 31–57.
- CIA, 2004. *The World Factbook*. Available from: <<http://www.cia.gov/cia/publications/factbook/index.html>>.
- Clampet-Lundquist, Susan, Massey, Douglas S., 2008. Neighborhood effects on economic self-sufficiency: a reconsideration of the moving to opportunity experiment. *American Journal of Sociology* 114, 107–143.
- Cole, David A., Maxwell, Scott E., 2003. Testing mediational models with longitudinal data: questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology* 112, 558–577.
- Dustmann, Christian, 1999. Temporary migration, human capital, and language fluency of migrants. *The Scandinavian Journal of Economics* 101, 297–314.
- Dustmann, Christian, Van Soest, Arthur, 2002. Language and the earnings of immigrants. *Industrial and Labor Relations Review* 55, 473–492.
- Espenshade, Thomas, Fu, Haishan, 1997. An analysis of English-language proficiency among U.S. immigrants. *American Sociological Review* 62, 288–305.
- Espinosa, Kristin, Massey, Douglas, 1997. Determinants of English proficiency among Mexican immigrants to the U.S. *International Migration Review* 31, 28–50.
- Farley, Reynolds, 1996. *The New American Reality: Who We Are? How We Got Here, Where We Are Going*. Russell Sage Foundation, New York.
- Grenier, Gilles., 1984. The effects of language characteristics on the wages of hispanic American males. *Journal of Human Resource* 18, 35–52.
- Greenberg, J.H., 1956. The measurement of linguistic diversity. *Language* 31, 109–115.

- Hawley, Amos H., 1950. *Human Ecology: A Theory of Community Structure*. Ronald Press, New York.
- Hofmann, David A., Gavin, Mark B., 1998. Centering decisions in hierarchical linear models: implications for research in organizations. *Journal of Management* 24, 623–641.
- Hoyle, Rick H., Kenny, David A., 1999. Statistical power and tests of mediation. In: Hoyle, Rick H. (Ed.), *Statistical Strategies for Small Sample Research*. Sage, Newbury Park.
- Hwang, Sean-Shong, Murdock, Steve H., 1988. Population size and residential segregation. *Social Science Quarterly* 69, 818–834.
- Hwang, Sean-Shong, Xi, Juan, 2008. Structural and individual covariates of English language proficiency. *Social Forces* 86, 1079–1104.
- Hwang, Sean-Shong, Xi, Juan, Cao, Yue, 2007. The Conditional Relationship between English Language Proficiency and Earnings among U.S. Immigrants. Annual Meetings of the American Sociological Association, New York.
- Jasso, Guillermina, Rosenzweig, Mark, 1990. *The New Chosen People: Immigrants in the United States*. Russell Sage Foundation, New York.
- Kenny, David A., Kashy, D.A., Bolger, N., 1998. Data analysis in social psychology. In: Gilbert, D., Fiske, S., Lindzey, G. (Eds.), *The Handbook of Social Psychology*, vol. 1, fourth ed. McGraw-Hill, Boston, MA, pp. 233–265.
- Kossoudji, Sherrie A., 1988. English ability and the labor market opportunities of hispanic and East Asian immigrant men. *Journal of Labor Economics* 6, 205–228.
- Krull, Jennifer L., MacKinnon, David P., 2001. Multilevel modeling of individual and group level mediation effects. *Multivariate Behavioral Research* 36, 249–277.
- Lazear, Edward P., 1999. Culture and language. *Journal of Political Economy* 107, S95–S126.
- Liebersohn, Stanley, 1981. *Language Diversity and Language Contact*. Stanford University Press, Stanford, California.
- Logan, John R., Alba, Richard D., Stults, Brian J., 2003. Enclaves and entrepreneurs: assessing the payoff for immigrants and minorities. *International Migration Review* 37, 344–345.
- Massey, Douglas S., 1990. Social structure, household strategies, and the cumulative causation of migration. *Population Index* 56, 3–26.
- Massey, Douglas S., Denton, Nancy, 1988. The dimensions of residential segregation. *Social Forces* 67, 281–315.
- McManus, Walter, 1990. Labor market effects of language enclaves: hispanic men in the United States. *The Journal of Human Resources* 25, 228–252.
- McManus, Walter, Gould, William, Welch, Finis, 1983. Earnings of hispanic men: the role of English language proficiency. *The Journal of Labor Economics* 1, 101–130.
- Nee, Victor, Sander, Jimmy M., Sernau, Scott, 1994. Job transitions in an immigrant metropolis: ethnic boundaries and the mixed economy. *American Sociological Review* 59, 849–872.
- Portes, Alejandro, Schauffler, Richard, 1994. Language and the second generation: bilingualism yesterday and today. *International Migration Review* 28, 640–661.
- Portes, Alejandro, Rumbaut, Ruben, 1996. *Immigrant American: A Portrait*, second ed. University of California Press, Berkeley.
- Portes, Alejandro, Zhou, Min, 1993. The new second generation: segmented assimilation and its variants. *Annals of the American Academy of Political and Social Science* 530, 74–96.
- Portes, Alejandro, Zhou, Min, 1996. Self-employment and the earnings of immigrants. *American Sociological Review* 61, 219–230.
- Portes, Alejandro, Bach, Robert L., 1985. *Latin Journey: Cuban and Mexican Immigrants in the United States*. University of California Press, Berkeley.
- Poston Jr., Dudley L., 1994. Patterns of economic attainment of foreign-born male workers in the United States. *International Migration Review* 28, 478–500.
- Reitz, Jeffrey G., 1980. *The Survival of Ethnic Groups*. McGraw-Hill Ryerson, Toronto, Canada.
- Roth, David L., Mittleman, Mary S., Clay, Olivia J., Madan, Alok, Haley, William, 2005. Changes in social support as mediators of the impact of a psychosocial intervention for spouse caregiver of persons with Alzheimer's disease. *Psychology and Aging* 20, 634–644.
- Rytina, Steven, Blau, Peter M., Blum, Terry, Schwartz, Joseph, 1988. Inequality and intermarriage: a paradox of motive and constraint. *Social Forces* 66, 645–675.
- Singer, Judith, Willett, John, 2003. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. Oxford University Press, New York.
- Snow, Marcellus S., 1998. Economic, statistical, and linguistic factors affecting success on the Test of English as a Foreign Language (TOEFL). *Information Economics and Policy* 10, 159–172.
- Sobel, Michael E., 1982. Asymptotic confidence intervals for indirect effects in structural equation models. In: Leinhardt, S. (Ed.), *Sociological Methodology*. American Sociological Association, Washington, DC, pp. 290–312.
- Spener, David, Bean, Frank D., 1999. Self-employment concentration and earnings among Mexican immigrants in the U.S.. *Social Forces* 77, 1021–1047.
- Stevens, Gillian, 1992. The social and demographic context of language use in the United States. *American Sociological Review* 57, 171–185.
- Tainer, Evelina, 1988. English language proficiency and the determination of earnings among foreign-born men. *The Journal of Human Resources* 23, 108–122.
- Tienda, Marta, Lii, Ding-Tzann, 1987. Minority concentration and earnings inequality: blacks, hispanics, and Asians compared. *The American Journal of Sociology* 93, 141–165.
- Tienda, Marta, Wilson, Franklin D., 1992. Migration and the earnings of hispanic men. *American Sociological Review* 57, 661–678.
- Van Tubergen, Frank, Kalmijn, Matthijs, 2005. Destination-language proficiency in cross-national perspective: a study of immigrant groups in nine western countries. *American Journal of Sociology* 110, 1412–1457.
- U.S. Bureau of the Census, 2002. *Technical Documentation: Census 2000 Summary File 3*. U.S. Government Printing Office, Washington, D.C..
- U.S. Bureau of the Census, 2004. *Content and Data Quality in Census 2000*. U.S. Government Printing Office, Washington, D.C..
- Weber, Max, [1922] 1978. *Economy and Society*, vol. 1. University of California Press, Berkeley, CA.
- Wilson, Kenneth L., Portes, Alejandro, 1980. Immigrant enclave: an analysis of the labor market experience of Cuban in Miami. *American Journal of Sociology* 86, 295–319.
- White, Michael J., 1983. The measurement of spatial segregation. *American Journal of Sociology* 88, 1008–1018.
- Zhou, Min, 2004. Revisiting ethnic entrepreneurship: convergences, controversies, and conceptual advancements. *International Migration Review* 38, 1040–1074.