Travel Behavior among Latino Immigrants:
The Role of Ethnic Neighborhoods and Ethnic Employment

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ABSTRACT

This paper examines evidence concerning Latino immigrants' travel mode choices among auto alone, carpool, transit and other from six different immigrant gateways: Atlanta, Chicago, Denver, Los Angeles, Seattle and Washington D.C. Particular emphasis is placed on the role of living in ethnically-concentrated locations and working in ethnically-concentrated employment sectors in shaping their transit choices. The results demonstrate that living in ethnic neighborhoods increases both the likelihood of carpooling and of taking public transit. Further, working in an ethnic niche is a strong predictor of carpooling versus driving alone in five metropolitan areas, and of taking transit versus driving alone in four metropolitan areas.

Keywords: Travel mode, Latino immigrants, Ethnic neighborhood, Ethnic niche

INTRODUCTION

The rapid increase in the immigrant population, particularly in the gateway and the emerging gateway metropolitan areas, has important implications for urban policy and planning. The successful economic and social integration of immigrants and their children into urban areas represents one of the significant challenges of the 21st century. While a growing volume of literature has focused on immigrants' assimilation in the urban housing market (e.g. Myers and Liu 2005; Painter and Yu 2008; Painter and Yu 2010) and urban labor market (e.g., Aponte 1996; Borjas 2001), studies on immigrants' travel patterns and behavior remain relatively limited. Understanding this group's travel behavior, especially commuting mode choice, and how it is shaped by the urban spatial structure has far-reaching implications for planning our cities for the future.

Most of the existing literature on immigrants' travel patterns has focused on their reliance on the public transit as compared to native-born residents, especially native-born whites (Myers 2001; Heisz and Schellenberg 2004; Blumenberg and Shiki 2007). It is found that public transit dependence is most evident among Latino immigrants, especially among those who have recently arrived. Evidence from California indicates that in 1990, compact commuters – those who travel to work by public transit, bicycle or walking – comprise 13.1% of all Latino commuters, as compared to only 7.2% of non-Latinos. The highest rate of compact commuting is observed among newest Latino immigrants (24.2%), and declines among the more established immigrants (Myers 2001). In 2000, foreign-born Latinos in California also record the highest average transit usage rates among all groups (10.7%), with 23% of immigrants who arrived

within the last five years using transit to get to work (Blumenberg and Shiki 2007). Similar commuting patterns are documented among immigrants in Canadian cities, with recent immigrants born in the Caribbean and Central and South America topping the list of public transit users (Heisz and Schellenberg 2004).

While these studies emphasized the importance of transit usage among immigrants in general, and Latino immigrants in particular, auto usage is generally considered as one single mode choice. The distinction between carpooling and driving alone is not adequately addressed, especially in the context of immigrants' travel behavior (Kim 2009 is a recent exception). While public transit is important for immigrants, transit riders only make up a small proportion among all immigrant commuters. Access to reliable private automobile transport has been recognized as an effective way to overcome employment barriers and achieve economic objectives among low-income workers (Taylor and Ong 1995; Raphael and Rice 2002; Ong and Miller 2005), welfare-recipients (Cervero, Sandoval, and Landis 2002; Ong 2002), as well as immigrants (Blumenberg 2008; Bohon, Stamps, and Atiles 2008). Past studies suggest that ridesharing is generally associated with lower incomes, less access to private automobiles, and larger household size (Hwang and Giuliano 1990). Thus, for immigrant households with limited resources, carpooling can provide a viable and less costly alternative to solo driving where users can also enjoy greater flexibility and mobility in travel. Based on the limited research on carpooling among immigrants, foreign-born Latinos have the highest rate of carpooling among all racial/ethnic groups (27% in California in 2000), though the prevalence of carpooling declines with their longer stay in the United States and gives way to solo driving (Myers 1997; Purvis 2003; Blumenberg and Shiki 2008).

Most of the aforementioned studies are either national in scale or are constrained to a specific locale, especially focused on the traditional immigrant-receiving state of California. Another issue that is neglected in the current discussion of immigrants' travel behavior is the role of urban spatial structure, residential and employment contexts, as well as policy environment in shaping their transit mode choice. Commuting behavior is determined by both spatial and social conditions. Past studies have found that living in dense urban environments, with proximity to public transportation infrastructure and easy accessibility to employment opportunities, enhances transit use (Shen 2000; Giuliano 2003; Zhang 2006). Thus, we would expect more transit usage closer to the center of metropolitan areas.

At present, very little research has directly tested whether living near other co-ethnics could influence the likelihood of carpooling or taking public transit. We would expect that residence in ethnically-concentrated neighborhoods and participation in ethnically-concentrated employment niches both put Latino immigrants in close contact with co-ethnics and could facilitate the process of ridesharing, among other resource-sharing. For example, Charles and Kline (2006) find that individuals are more likely to carpool with someone of one's own race. At the same time, it is less clear how residence in areas with higher ethnic concentrations should influence rates of riding public transit. In terms of travel time, research in the framework of spatial mismatch hypothesis (Kain 1968) suggests that immigrants living in the central city and suburban ethnic enclaves have longer commutes in three cities (Liu, 2009) while ethnic enclave residence shortens commute times to different extent for six immigrant groups in Los Angeles area (Parks, 2004).

This study fills these gaps by providing a comparative analysis of six different types of immigrant receiving metropolitan areas, aiming at providing a more systematic view of the

various factors that play a role in immigrants' travel mode choice. These metropolitan areas are Atlanta, Chicago, Denver, Los Angeles, Seattle and Washington, D.C. These areas differ in their urban form, transportation system, and immigrant population. These six metros were also chosen because they represent a continuum of types of immigrant contexts: Atlanta and Washington, D.C. are classified as "emerging gateways", Denver and Seattle are considered "re-emerging gateways", and Chicago and Los Angeles are viewed as "continuous gateway" and "post-WWII gateway," respectively, according to Singer (2004). By using variation in immigrant transit mode choice across these areas, we will be able to test what are the common drivers and unique factors influencing immigrants travel choices. In addition to testing the impacts of the demographic and socioeconomic characteristics of Latino immigrants, this analysis is particularly interested in their spatial location and employment context. Particular emphasis is placed on the role of living in ethnic enclaves in different parts of the metropolitan area: central city, inner-ring suburbs and outer-ring suburbs. In addition, it also tests whether being employed in ethnic niches has an effect on the commute choices of immigrants, thus linking their transportation behavior to the larger urban housing market and labor market. Finally, other factors that account for public transit accessibility, the cost of auto ownership (Ong 2002; Raphael and Rice 2002), and driver's license regulation for immigrants are also included as they would be expected to impact the choice of an immigrant worker to carpool or take public transit.

THEORY AND PREVIOUS RESEARCH

Immigrants' Travel Behavior

While the literature on travel mode choice is fairly substantial, the literature on the travel mode choice of immigrants is relatively limited. Past studies have found that immigrants tend to use public transit and carpooling at a higher rate in their journey to work than native-born residents (Myers 1997, 2001; Purvis 2003; Blumenberg and Shiki 2007, 2008). Much of these differences in travel behavior are attributed to the demographic and economic characteristics of the workers and their households. Arrival cohort is a strong indicator of their mode choice, with the newly arrived immigrants relying most heavily on non-auto-alone means of transport to work (Kim 2009). As their time in the United States increases, the usage rate of both public transit and carpooling declines substantively, though still higher than their native-born counterparts. Part of the explanation lies in the fact that upon first arrival, many Latino immigrants lack the economic resources and institutional knowledge of owning a car. Culturally, car access might be less prevalent in their countries of origin and therefore some immigrants may not have driving skills upon entering the country (United Nations 2002). But as immigrants find jobs and become more economically secure and socially familiar with the new environment, they also assimilate into the car culture, a process referred to as "transportation assimilation" (Blumenberg and Shiki 2007).

Sharing resources through carpooling can be a cost-effective alternative to solo driving for households with limited incomes. It is suggested that higher rate of carpooling occurs in households of larger sizes (Hwang and Giuliano 1990) as more than 70% of all carpool trips happen within the households (Ferguson 1997). There are a number of reasons we might expect higher rates of carpooling among Latino immigrants than other households. First, as Latino immigrants on average have relatively large household sizes, we would expect more carpooling than among other households with smaller household sizes. Second, a large portion of international migration is based on networks (Massey et al 1993). To the extent that this occurs

among immigrants, we might expect close social networks among co-ethnics, who share the same language and cultural background, to facilitate carpooling. Charles and Kline (2006) provide more recent evidence that carpooling is higher among those of one's own race, which suggests that carpooling would be higher in parts of a metropolitan area that have greater concentrations of one's co-ethnics. Kim (2009) also confirms the hypothesis that immigrants carpool more in a recent paper.

Another unique characteristic of the policy environment facing Latino immigrants is the local rules and regulations regarding obtaining driver's license for immigrants. As of 2009, all but four states have lawful presence requirement for driver's license applicants. Thirty-seven states require that the driver's license expire with an immigrant's visa or authorized stay in the U.S. (National Immigration Law Center 2009). These regulations present challenges for Latino immigrants without legal documents to own automobiles, and increase their likelihood of using public transit and carpooling.

Residential Location of Immigrants and Travel Behavior

Residential location and neighborhood characteristics have also been identified as determinants of travel mode choice, though the direction and magnitude of such effect remain contentious in the empirical literature. Several neighborhood characteristics are expected to impact workers' commuting pattern. First of all, we would expect employment accessibility to be important. The spatial mismatch hypothesis states that with the suburbanized employment opportunities, minority residents in the central cities suffer from dim employment prospects and lengthy commutes to access suburban job sites (Kain 1968). A later study however found that the longer commute times of central city minority residents is attributable to their reliance on the

lower-speed public transit instead of longer commuting distance, asserting it is more a automobile mismatch than spatial mismatch (Taylor and Ong 1995). In the case of immigrants, researchers have noted the generally longer commute times of central city immigrants as well (Preston, McLafferty, and Liu 1998; Liu 2009), but it is unclear whether it is due to their reliance on public transit. A recent study (Beckman and Goulias, 2008) used cluster analysis framework to document the importance of residential location in determining immigrants' travel behavior in terms of travel time, mode choice, and departure time to work

The clustering of immigrants in the urban housing market and labor market is a well-known phenomenon. Immigrants heavily concentrate in certain residential neighborhoods and certain industrial sectors of the economy, forming "ethnic enclaves" (Wilson and Portes 1980) and "ethnic niches" (Waldinger 1994). Both forms of ethnic concentration evolve as a result of repeated actions of social networks and information flow that connect new-comers to housing and employment opportunities close to their settled co-ethnics. Ethnic enclaves are neighborhoods with dense ethnic businesses, services, and institutions and a high percentage of residents of the same race/ethnicity. Ethnic enclaves have usually formed first in central city locations, but more suburban enclave communities have emerged recently with the decentralization of metropolitan population and employment (Logan, Alba, and Zhang 2002).

The effect of residing in an ethnic community in different parts of the metropolitan area on immigrants' travel mode choice has not been studied before. Commuting time studies reveal that immigrants living in ethnic enclaves incur longer commutes than their non-enclave counterparts (Liu 2009), but it is uncertain whether the higher commuting premium is a result of public transit reliance or longer work journeys. If these areas are well served by the public transportation system, and if nearby ethnic businesses provide ample employment opportunities

and thus shorter work trips are required, it can be expected that solo driving might not be essential. Carpooling rates might also be higher, given the fact that carpool partners may be found through ethnic network contacts. This is especially true if workers are employed at the same or nearby job sites. The fact that Latino immigrants tend to cluster in certain occupations and industries, or ethnic niches, might further facilitate the process of carpooling. This paper places particular emphasis on these important housing and labor market contexts in shaping immigrants' travel mode choice, thus linking their transportation demand and behavior to the broader discussion of urban development and immigrants' economic assimilation.

RESEARCH METHODOLOGY

Data and Sample

The primary dataset for this study is the 2000 Census Public Use Microdata Sample (PUMS). These data files feature a very detailed list of demographic, socioeconomic and commuting variables for households and individuals that are crucial for the research questions. The smallest geographic identifier given in PUMS is Public Use Microdata Area (PUMA): statistical areas with at least 100,000 residents. PUMA is the basic geographic unit in this study, on which locational variations are measured and locational factors calculated. The primary sample used in this research is Latino immigrants between the ages of 16 and 65 in these six metropolitan areas who worked outside home last year and have a positive commute time. Those people who live in group quarters or are non-relatives of the household heads are also excluded from the sample. The sample is further restricted to low-skilled and semi-skilled Latino immigrants (those with less than a college degree) as they are more likely than high-skilled

professional workers to look for housing and jobs opportunities through ethnic networks instead of on the open housing and labor market. Thus, their travel behavior may be constrained by their limited residential and employment choices.

The six study areas of Atlanta, Chicago, Denver, Los Angeles, Seattle and Washington D.C. are representative of America's urban scene in numerous ways. Representative of their respective geographical areas, these six metropolises all have relatively large populations and employment bases. They differ however, in their spatial structure, industrial composition, and size of immigrant population. As mentioned previously, these six study areas represent a continuum of immigrant gateways (Singer 2004), and one might expect different travel behavior in the more established gateways than in the more recently emerging gateways.[1]

This paper partitions the urban geography into three areas: central city, inner ring suburbs and outer ring suburbs.[2] This design captures different transit accessibility and the various levels of job opportunities and the possibly different effects these locations have on the travel mode choice of their residents. In partitioning the urban geography, the designation of central cities follows the "principal cities" definition by the Office of Management and Budget (OMB) in 1999 and includes the City of Atlanta, City of Chicago, City of Denver, City of Los Angeles, City of Seattle and District of Columbia respectively. The determination of inner ring suburban counties draws upon the "first suburbs" methodology developed in Puentes and Warren (2006) which base their identification on age, location and population of counties. Specifically, those counties that were part of the census-identified 1950 Standard Metropolitan Area (SMA) and

[1] In this paper, these six metropolitan areas refer to Atlanta, GA MSA, Chicago-Gary-Kenosha, IL-IN-WI CMSA, Denver-Boulder-Greeley, CO CMSA, Los Angeles-Riverside-Orange County, CA CMSA, Seattle-Tacoma-Bremerton, WA CMSA, and Washington, DC-MD-VA-WV PMSA.

[2] Various authors (Stoll 1999; Pastor 2001;, McConville and Ong 2003; Painter, Liu, and Zhuang, 2008) have used this partition in their studies of the spatial mismatch hypothesis.

either contain or are adjacent to one of the primary cities are termed as first suburbs. In this paper, Cook County, IL, Lake County, IN, Los Angeles County, CA, Montgomery County and Prince George County, MD, as well as Arlington County, VA are coded inner ring suburbs. The exceptions are Atlanta, Denver and Seattle: certain PUMAs are selected to comprise the inner ring suburbs based on their proximity to the central city as well as age of housing stock. This is because of the irregular shapes of the counties that contain the central cities. These PUMAs are in Fulton, Dekalb, Cobb, and Clayton counties for Atlanta, Adams, Jefferson, Arapahoe, and Douglas counties for Denver, and King, Island, Kitsap, and Snohomish counties for Seattle. The rest of counties (areas) that make up the metropolitan areas are considered outer ring suburbs.

Model Specification and Variables

To determine how socioeconomic characteristics, residential location and niche status impacts transit mode choice, we employ a multinomial logit model (Greene 1997). The multinomial logit model assumes that households choose to commute to work among four alternatives – drive alone, carpool, take public transit, and other means of commuting including walking and biking.[3] Demographic and socioeconomic characteristics are often identified as attributable to the variation in travel mode choices. Personal and household socioeconomic characteristics include age, gender, having children in the household, marital status, immigration

[3] In the multinomial logit model, it is assumed that $P_{ij} = \frac{\exp(\beta_j X_{ij})}{\sum_{l=1}^{M} \exp(\beta_l X_{il})}$, where *j* signifies the choices: drive alone, carpool, take public transit, and other means to work. We use auto alone as the base category, so all of the estimates are compared to driving auto alone.

period, and experience in the labor market. As discussed earlier, these variables have been found in the literature to be closely linked to immigrants' travel mode choice. Two variables are used as proxies for household wealth: homeownership and total non-wage income. We use non-wage income because wage income depends on the employment status of household members, which could be circumscribed by auto ownership itself, causing issues of simultaneity. Industries of employment are included as these jobs are distributed unevenly across the urban space, and such variations in accessibility might necessarily affect travel mode choice. Hwang and Giuliano (1990) also found that carpooling is less likely among professional workers than among labor workers.

As mentioned previously, this study is particularly interested in whether residence in an immigrant enclave or employment in an immigrant niche industry influences choice of commute mode. To that end, immigrant enclave dummies are constructed on the PUMA level, based on calculations of residential concentration quotient (RCQ) as expressed by

$$RCQ = \frac{P_{ij}}{P_j} \Big/ \frac{P_{im}}{P_m} \ , \quad (1)$$

where j= (1,….n) and refers to the PUMA. Pij is the number of Latino immigrants in a PUMA and Pj is the total population in that PUMA. Pim is the number of Latino immigrants in a metro and Pm is the total population for that metro. A RCQ of 1 means that Latino immigrant concentration in a certain PUMA is on par with that of the metropolitan area as a whole whereas a RCQ of greater than 1 signifies a greater level of Latino immigrant concentration. Though the sample is restricted to low-skilled and semi-skilled workers, all Latino immigrants are included in the calculation of ethnic enclaves.

This paper uses the threshold of RCQ>1.5 to define a Latino immigrant enclaves in each of the study areas. By this definition, the cut-off level of Latino immigrant share in a PUMA is 8% in Atlanta, 16% in Chicago, 12% in Denver, 42% in Los Angeles, 4% in Seattle and 12% in Washington, D.C.[4] In 2000, 9 out of 33 PUMAs in Atlanta, 10 out of 61 PUMAs in Chicago, 5 out of 23 PUMAs in Denver, 17 out of 110 PUMAs in Los Angeles, 5 out of 30 PUMAs in Seattle, and 6 out of 32 PUMAs in Washington, D.C. are considered Latino immigrant enclaves. While defining ethnic enclaves in a comparative framework, some use an absolute threshold across cities with similar immigrant presence (e.g., Allen, & Turner, 2009, on New York, Los Angeles and San Francisco), others maintain that a lower threshold should be applied to cities with smaller ethnic populations (e.g., Chung, & Brown, 2007, on Columbus, Ohio). As this study examines six cities with different immigrant population and concentration levels, a uniform threshold would not be appropriate. Therefore a relative concentration index is used to defining ethnic enclave in the context of this study. Ethnic enclave status is interacted with spatial rings to create six types of neighborhoods: ethnic enclaves and non-enclaves in central city, inner ring suburbs and outer ring suburbs respectively. The resulting geographic area delineation and enclave designations are presented in Figure 1.

[Figure 1 about here]

Ethnic niches are defined in a similar fashion as ethnic enclaves, using 2000 Census detailed 3-digits industrial codes. Consistent with the literature, employment niches need to meet two criteria: over-representation and minimum restriction. Industrial Concentration Quotient (ICQ) is adopted for the over-representation criterion, and can be expressed as:

[4] We also used the cutoff RCQ = 2. The results are substantively the same, but there are very few PUMAs that meet this threshold in Atlanta and Denver, so we used the threshold of 1.5 in the paper.

$$ICQ = \frac{E_{ij}}{E_j} \Big/ \frac{E_{im}}{E_m}, \quad (2)$$

where j = (1,… n) and refers to industries. Eij is the number of a certain group employed in an industry, and Ej is the total employment in that industry. Eim is the employment of a certain group in metropolitan area and Em is total employment in metro. Similar to the Residential Concentration Quotient, a ratio of larger than 1 means that Latino immigrants' concentration in a certain industry is greater than the metropolitan employment in that industry. The minimum restriction criterion requires that the industry has above-minimum number of workers to make a meaningful presence in the urban economy. In this paper, an industrial sector is defined as an ethnic niche if its Industry Concentration Quotient is larger than 3 and employs over 100 workers. As a result, 6 industries in Atlanta, 21 industries in Chicago, 8 industries in Denver, 22 industries in Los Angeles, 7 industries in Seattle and 9 industries in Washington, D.C. are identified as Latino niches. It is worth noting that the newer/emerging gateways have much smaller numbers of niches than the more established gateways of Chicago and Los Angeles, indicating that ethnic niching might be more pronounced among newly arrived immigrants.

Next, we would expect the urban transportation system directly shapes workers' travel mode decisions. Extensive public transit coverage and easy access to public transportation service sites enhances the transit use among community residents (Zhang 2006). Such neighborhoods are usually located in the inner cities. This paper further codes whether there exists light rail stations in the PUMA as light rail is a faster and more reliable form of public transportation than buses, and usually serves more suburban employment centers.

The cost of owning and operating an automobile differs across different residential locations as well, mostly evidenced by the variations in automobile insurance premium. Several

studies used automobile insurance premiums as an instrument variable for car ownership in estimating the effects of car ownership on employment in a two-stage-least-squares model design (Ong 2002; Raphael and Rice 2002; Ong and Miller 2005). The explanatory power of locational variation in insurance premium on auto ownership is quite strong and thus we add PUMA level minimum auto insurance premium to the model as well.[5] Finally, a policy variable indicating whether illegal immigrants can obtain driver's license in their state of residence is included. Most of the states that we include in this paper require that driver's license expires with an immigrant's visa or authorized stay in the U.S. (National Immigration Law Center 2009). The only exception is the State of Washington which does not have lawful presence requirement. Seattle is thus coded as granting license to illegal immigrants. The ease of obtaining driver's license differs according to these institutional and administrative environments.

The effect of residing in an ethnic community in different parts of the metropolitan area on immigrants' travel mode choice is not clear. If immigrants have chosen to reside in these locations because they are well served by public transportation system and nearby ethnic businesses provide ample employment opportunities, it would be expected that solo driving might be less prevalent in these areas. This could be especially true for central city enclaves as compared to suburban enclaves as dense transit networks are usually found in central cities. Even though we control for access to light rail in a PUMA, we conduct two additional tests to

[5] Following these previous studies, we use the website www.realquote.com to obtain the PUMA level minimum auto insurance premium. Geographic variation in minimum auto insurance quote is obtained by putting in the characteristics of a same hypothetical applicant across all zip codes, taking the average of quotes from several insurance agencies on the zip-code level, and then aggregating to the PUMA level using GIS techniques. This hypothetical applicant is a twenty-five-year-old employed non-smoking single mother who has a driving record of 7 years with no accidents. Her car is a 1990 Ford Escort LX, two-door hatchback with no antitheft devices, no antilock brakes, no airbags, and is parked on the street. She has only the minimum insurance required ($15,000/30,000 bodily liability and $5,000 property liability) with no deductibles.

provide insight into the importance of the potential endogeneity of residential location. First, we compare the estimate of the impact of living in a Latino enclave for a comparable sample of African-Americans. If these areas simply have better transit networks, then one would expect a similar "enclave effect" for African-Americans. If not, then it suggests that transit system access is not the driver of this effect. Second, we use a measure of average commute times in each PUMA in some models as a proxy for the locational variation in transportation infrastructure. This measure is not ideal because it already accounts for the choices that people are making, but does provide additional context for the choices that potential residents will face.

It is not clear how the potential endogeneity of location choice might impact our estimates of carpooling. If these locations are near work sites that employ a lot of low wage workers, then carpooling might be higher because of the location attributes. Once again, estimating similar models for an African American should help us distinguish between any locational effects and the unique ethnic network and resources that immigrants might have.

RESULTS

Descriptive Statistics

[Table 1 about here]

Table 1 demonstrates distinct differences in the travel mode to work between Latino immigrants and African Americans. In all six study areas, immigrants are less likely to drive alone than are African Americans. In all six of the metropolitan areas, carpooling rates among Latino immigrants are higher than are the rates for African-Americans, but in some places the propensity to use public transit is higher among African-Americans than among Latino immigrants. As expected, there is a higher propensity of driving in the outer ring suburbs than in

the central city. This is not surprising because of the better access to public transit in the central city.

Based on the extant literature, we can expect that immigrants would carpool more if living in an ethnic enclave. This may be mitigated, in part, by strong public transportation systems that exist in central cities. It is found that in the majority of the study areas, immigrants are more likely to carpool if living in an ethnic enclave. Carpooling rates within the central city are much higher in immigrant enclaves in Seattle (31.5% vs. 17.8%), Denver (37.4% vs. 32.9%), and Chicago (29.6% vs. 22.8%).[6] In Los Angeles, carpooling rates are similar in both enclaves and non-enclave areas. Finally, carpooling rates in the central city in Washington, D. C. are low for Latino immigrants relative to the other study areas, and there is slightly higher carpooling rate in non-enclaves. It is interesting to note that the central cities which had the highest disparity between carpooling rates in enclaves and non-enclaves had the opposite disparity in rates of transit usage. In Seattle, Denver, and Chicago, immigrants were more likely to use transit in enclaves than non-enclaves, while in Los Angeles and Washington, DC, the opposite was true.

There exist similar patterns in the inner ring and outer ring suburbs. In all but inner ring suburbs of Seattle and Chicago and the outer ring suburbs of Washington, D. C., we observe higher rates of carpooling in enclaves than in non-enclaves. In some places, like the inner ring suburbs of Atlanta, the differences can be quite large (45.8% vs. 29.8%), while in others the differences are smaller. Transit usage by Latino immigrants is usually more prevalent in enclaves than non-enclaves. The exceptions are the places which have the highest differentials in carpooling between enclaves and non-enclaves. In inner ring suburbs of Atlanta and Denver,

[6] Atlanta does not have a central city enclave, but has very high rates of carpooling among Latino immigrants (39.9%).

there are higher rates of transit usage if living in non-enclaves. This suggests that there may be some tradeoffs between carpooling and transit usage for immigrants, which may be due to the availability of transit in certain areas.

[Table 2 about here]

As shown in Table 2, the rates of carpooling are clearly impacted by working in an ethnic niche industry in each of the six study areas. As would be expected, there are almost always higher rates of carpooling when immigrants are working in an ethnic niche. While we cannot directly note in the data whether an immigrant is carpooling to the same work site, these correlations are strong. In the emerging gateway metropolitan areas of Atlanta and Denver, the differences are striking. In Atlanta, immigrants have carpooling rates of over 60% in all regions of the metropolitan area if working in an ethnic niche industry. In Denver, the rates of carpooling are over 50% in the central city and inner ring suburbs if working in an ethnic niche, and 37% in the outer ring suburbs. The lone exception to the pattern is found in Seattle, where there is less carpooling (14.6% vs. 26.7%) in the central city, but greater rates of transit usage (41.5% vs. 20.4%) when working in an ethnic niche. Also in the outer ring suburbs of Seattle, we find less carpooling (27.7% vs. 31.5%) when working in an ethnic niche, but much greater rates of using alternative means (10.8% vs. 1.6%) to get to work. In all parts of these six metropolitan areas, workers in an ethnic niche industry are less likely to drive alone.

Model Results

While the above summary statistics suggest that the part of a city that an immigrant lives in will affect their commuting behavior, we estimate multinomial logit models to account for differences in socioeconomic characteristics and locational attributes that determine the

importance of residing in different parts of the city on commuting behavior. Table 3 presents results for low skilled Latino immigrants. Among socioeconomic characteristics, older workers, male workers, married households with children, and homeowners are more likely to drive alone. Surprisingly, more experienced workers are more likely to take public transit after controlling for other characteristics (notably the age of the worker). We also find that new immigrants are less likely to drive alone, with much higher likelihoods of taking public transit and carpooling than immigrants who have been in the US for more than 10 years. With respect to the industry that an immigrant works in, workers are most likely to carpool vs. driving alone if working in construction (omitted category). There are certain industries (Manufacturing, Services, and Trade) for which there is a greater likelihood of taking transit vs. driving alone when compared to the construction industry. This probably has to do with the fact that these industries are located more ubiquitously across the urban space as compared to construction jobs, making transit use more likely.

[Table 3 about here]

Table 3 also demonstrates that the presence of rail stations in the PUMA of residence increases the likelihood of taking public transit.[7] Also, as expected, higher auto insurance premiums increase the likelihood of taking public transit (as well as taking other modes to get to work). Finally, we do not find significant effects for living in a state that allows undocumented immigrants to get licenses on the likelihood of carpooling or taking public transit. Instead, we find that living in a state that allows licenses to undocumented workers lowers the probability of taking other means of transit to work vs. driving alone.

[7] The presence of rail stations curiously predicts more carpooling. In some cities, workers can get picked up at rail stations for carpooling purposes. This may account for part of this result.

Of particular interest to this study are the role of location characteristics and the place of residence within a metropolitan area. We first note that there are large differences among the study areas in the likelihood of carpooling or taking public transit. Atlanta is the outlier with respect to higher rates of carpooling vs. driving alone. We also find that immigrant workers in Washington, D.C. are more likely than a worker in Atlanta to take public transit vs. drive alone, and that workers in Denver are less likely to take transit than workers in Atlanta. Across the study areas, the only place to have a higher likelihood than Atlanta to use alternative means of traveling to work is Los Angeles.

Next we note that the highest likelihood of carpooling is in enclaves of the outer ring suburbs, and the highest rates of taking public transit are in the central city. While these are rather crude geographic delineations, they are suggestive of better transportation infrastructure in the central city and inner ring suburbs. Results also demonstrate that living in an enclave in the central city increases the likelihood of carpooling and taking public transit. Further, these effects are significantly stronger than residence in a central city non-enclave. We further find that while residence in an inner ring suburb does not impact the likelihood of carpooling, workers are significantly more likely to carpool in inner ring enclaves than comparable households outside the enclave. We also find that transit usage is higher in the inner ring enclaves than in the inner ring non-enclave areas. Finally, we find that immigrants that reside within an enclave in an outer ring suburb are more likely to carpool than residents in a non-enclave, but less likely to take public transit than residents in a non-enclave area. In sum, these results suggest very different travel behavior within enclaves and outside of enclaves. Finally, results in Table 3 confirm our hypotheses concerning the potential role of immigrant networks. We find that working in an ethnic niche industry increases the likelihood of carpooling, taking public transit, or getting to

work via other means. The strongest effects are on the likelihood of taking public transit, but all are sizeable effects.

Finally, we added an average commute time variable to test whether the consistent enclave effect might be due to unmeasured differences in transportation infrastructure (Appendix 1). Overall, the results are consistent with the results in Table 3. Living in an enclave is a consistent predictor of a higher incidence of taking public transit in all areas of the city and of carpooling in the inner ring and outer ring suburbs. The lone difference between these results and those in Table 3 concerns the likelihood of carpooling from the central city. In Appendix 1, there is no significant effect of living in a central city enclave on carpooling, but we also find that higher average commute times are strong predictors of carpooling. Interestingly, average commute times have no impact on taking public transit.

Individual Metropolitan Areas

We next analyze the choices of Latino immigrants in each of the individual metropolitan areas to determine whether the estimated travel behavior relationships in the pooled data are consistent across each type of immigrant gateway. This also enables us to test any differential effect of enclave residence across a range of immigrant-receiving contexts. We first examine travel behavior in the emerging gateways that have the highest percentage of new immigrants (Painter and Zhou 2008). We note that in Seattle, Denver, and Atlanta, immigrant enclaves do not exist in all regions of the metropolitan area. In Atlanta, there are no immigrant enclaves in the central city, and in Seattle and Denver, there are no outer ring immigrant enclaves. In these metropolitan areas, there is less consistent evidence of working in ethnic niches and living in

ethnic enclaves. This may be due to the fact that these immigrant residential and employment concentrations are less developed in emerging destinations or that they are harder to measure.

In Atlanta and Denver, we find that working in an ethnic niche industry increases the likelihood of carpooling. In Atlanta, we also find that working in an ethnic niche increases the likelihood of taking public transit. In Seattle, working in an ethnic niche has no effect on travel behavior. With respect to living in an ethnic enclave area, there is some evidence that living in an enclave significantly impacts the likelihood of taking transit or carpooling, but many of these differences are not significant. In the central city of Seattle, we find that enclave residents are more likely to take transit (differences not significant). In the central city and inner ring suburbs of Denver, we find that enclave residents are more likely to carpool, but again these differences are not significant. The only place where we find significant differences is in the outer ring enclaves of Atlanta, where we find that immigrants are more likely to take transit than non-enclave residents.

[Table 4 about here]

As Table 4 shows, in the metropolitan areas of Los Angeles, Chicago, and Washington, DC, we find that working in an ethnic niche increases the probability of alternative means of commuting other than driving alone. In Los Angeles, living in an enclave area increases the likelihood of taking public transit in all regions of the metropolitan area. Within Los Angeles, living in an enclave in the inner ring or outer ring suburbs increases the likelihood of carpooling, while there is no effect on carpooling in the central city. In Washington, D.C., there is no effect of living in an enclave on carpooling. At the same time, living in an ethnic enclave increases the likelihood of taking public transit across all regions of the city. In Chicago, residents of enclave

areas in the central city and the outer ring suburbs are significantly more likely to carpool, while residents in the central city and inner ring suburbs are significantly more likely to take public transit. This is an indication of the strong ethnic networks developed among Latino immigrants in these long-established gateway metros, evidenced by high rate of carpooling trips between home and work. It is also interesting that such resource sharing is more evident in suburban ethnic communities than central city ones. The lower coverage of public transit in suburban areas might be one explanation, and the higher economic status and social cohesion of these communities might be another (Logan, Alba, and Zhang 2002).

Other Comparisons

Previous analyses have noted differences between the transit mode choice of men and women, although results to date have been mixed; Heisz and Schellenberg (2004) find women take public transit more, and Kim (2009) find that they use public transit less frequently. Table 5 notes that women are more likely to both carpool and to take public transit in our sample. However, no study has tested whether women or men are more likely to take either public transit to work or to carpool across the different metropolitan geographies. Table 5 first demonstrates that women are more likely to carpool if living in ethnic enclaves in any part of the metropolitan area. This is different from the results for men, as there are no differences in the likelihood of carpooling in the central city when they live in an enclave or a non-enclave area. There are similar results for carpooling for men and women in the enclaves in inner ring and outer ring suburbs, but the results are stronger for women. Table 5 also demonstrates that while men and women have similarly higher likelihoods of taking public transit when living in an enclave area, the results concerning spatial differences are strongest for women. Part of this is likely due to

the fact that within families, men may be more likely to drive alone when the family owns only one vehicle.

[Table 5 about here]

While the theoretical discussion clearly predicts that immigrants are more likely to carpool when living in close proximity, theory does not explain a clear reason why immigrants would be more likely to take public transit when living in an immigrant enclave area. One possibility is that immigrants move to areas with better transportation infrastructures. The results in Table 4 suggest that the newer ethnic communities formed in newer immigrant destinations did not have higher public transit usage among immigrant in enclaves than non-enclaves, suggesting this is not the case. In order to test this potentiality in an additional way, we compared the likelihood of carpooling and taking public transit for a similarly skilled sample of African Americans to see if their transit mode choices were similar across these different geographies. As shown in Appendix 2, we found no differences in carpooling rates among African Americans whether the person lived in a Latino enclave area or not, except in the outer ring suburbs. There, we find that there actually exist higher rates of carpooling in the areas that are not Latino enclaves. With respect to taking public transit, the results clearly show that African Americans living in the central city and inner ring suburbs are more likely to take public transit, there are no differences across areas that are Latino enclaves and those that are not. This suggests that differences in transportation infrastructure are not the likely reason for the higher rates of public transit usage for immigrants living in enclaves.

Next, we estimated separate models for immigrants who have been in the country for 10 years or less and those who have been in the country more than 10 years. This enables us to test

if ethnic communities are more important for new immigrants. In results not shown, we find that while new immigrants are more likely to take public transit overall, the impact of living in an enclave is very similar for new and old immigrants. The only surprising result is that carpooling is less prevalent among new immigrants, and the impact of living in an enclave is smaller. Overall, there is no evidence that residence in an ethnic community is more important for new immigrants.

Finally, we conducted additional tests to see if the results on the role of living in an ethnic enclave or working in an ethnic niche on transit mode choice were robust to adding additional variables. First, we investigated whether the inclusion of the income of households would alter the results because it may be the case that residents of ethnic enclaves may be poorer. We did not include it in the main models because of our concern that income and car ownership may be co-determined, and therefore might bias the results. However, when income is included in the analysis, the results for ethnic enclaves and ethnic niches do not change. We also tested whether including a variable for car ownership or the number of vehicles owned by the household would change the main results. While income, car ownership, and the number of vehicles in the household are significant predictors of carpooling and taking public transit, they do not change the results concerning the role of residential location. Finally, we tested for interactions between living in an ethnic enclave and working in an ethnic niche. The only interaction that was significantly related to transit mode choice was a higher likelihood of taking public transit if working in an ethnic niche industry and living in an ethnic enclave in the central city. This provides only a partial explanation for the connection between living in an enclave and taking public transit, but future work is needed to explore this more fully.

CONCLUSION

Results from this research have provided a better understanding of the commuting behavior of Latino immigrants in metropolitan areas, and also shed light on how urban land use pattern, economic structure, and policy environment influence immigrants' travel choices. The results of this analysis demonstrate that transit accessibility, employment in an ethnic niche, and residential location influences immigrants' commuting behavior. We find that the presence of a rail station and higher auto insurance premiums increase the likelihood of taking public transit. Working in an ethnic niche industry increases the likelihood of commute to work via means other than driving alone. We find that living in the central city or inner ring suburbs increases the likelihood of taking public transit, as would be expected, and we find that immigrants are more likely to carpool if living in the outer ring suburbs. While African Americans exhibit similar likelihoods of taking public transit in the central city and inner ring suburbs, they are not more likely to carpool than to drive alone if living in the outer ring suburbs.

These findings on residential location mask some important differences in travel behavior among immigrants. When we identify the areas with greater immigrant concentrations (ethnic enclaves), we find that immigrants are significantly more likely to carpool within the ethnic enclave of central city, inner ring suburbs, or outer ring suburbs than their nonenclave counterparts. We also find similar increased likelihoods of taking public transit within immigrant enclaves when compared to the non-enclave areas. These results are true for both men and women, but they are strongest for women. Overall, these results strongly suggest that immigrant networks are facilitating the use of means of commuting that do not involve driving alone.

The results also suggest that ethnic resources may be smaller in the metropolitan areas that have smaller immigrant populations, and whose immigrant populations are more recently arrived. For example, we found that in Seattle, working in an ethnic niche does not impact commuting behavior. In Atlanta, living in an immigrant enclave area in the outer ring suburbs affects transit usage, but not carpooling. On the other hand, evidence is much more consistent in Chicago and Los Angeles that living in immigrant enclave areas and working in ethnic niche industries increases the likelihood of carpooling and taking public transit, attesting to the stronger networks established in these established gateway metros. It further suggests the importance of the context of reception on immigrants' transportation assimilation and labor market assimilation (Lim, 2001).

As Latino immigrants continue to settle in U.S. urban areas, it is imperative to evaluate the impact such demographic changes bring to the urban transportation system in order to plan for the future. While immigrants are more likely to carpool, the results were even stronger that they are more likely to take public transit if they live in an immigrant enclave. While some may argue that immigrants may be moving to places that already have transit, the fact that we do not find such strong results in the newer immigrant gateway metropolitan areas and among other minority populations suggests this is not the case. Given Latinos' transit mode patterns associated with enclave residence, it is suggested that transit plans that account for immigrant concentrations in cities may better serve the needs of this group. Such strategies as providing more frequent and targeted services between clustered Latino-concentrated areas and concentrated work sites, as well as providing Spanish-language service on these routes would encourage transit ridership for this population and increase their employment accessibility.

At the same time, the home-work pattern of Latino immigrants in ethnic communities encourages carpooling. While local driver's license regulations and insurance premium costs might create barriers to auto ownership, Latino immigrants are able to share resources in their journey to work. Many have argued that access to reliable automobiles is very important to the employment accessibility and economic mobility of disadvantaged groups (Ong 2002; Raphael and Rice 2002). Promoting targeted auto loan programs and formalized carpooling services that link immigrants from residence to work can be expected to considerably improve their mobility. These services can be paired with job centers and services that channel immigrants to employment. Carpooling is more flexible than transit and would enhance the mobility and work sphere of this population. Urban planners have been concerned with the prevalence of solo driving commuting trips in our cities, and the air quality and traffic congestion problems it brings. Given the importance of such alternative travel modes as transit and carpooling among Latino immigrants and the growth of this population in the U.S., urban planners and policy makers should aim at facilitating their use of these compact commuting modes. Transportation planning that takes into account their residential and employment pattern will not only better plan our cities for the transportation needs of the future, but also help the immigrants in their economic assimilation process.

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Figure 1. Ring and Ethnic Enclave Delineation by PUMA for Six Metropolitan Areas

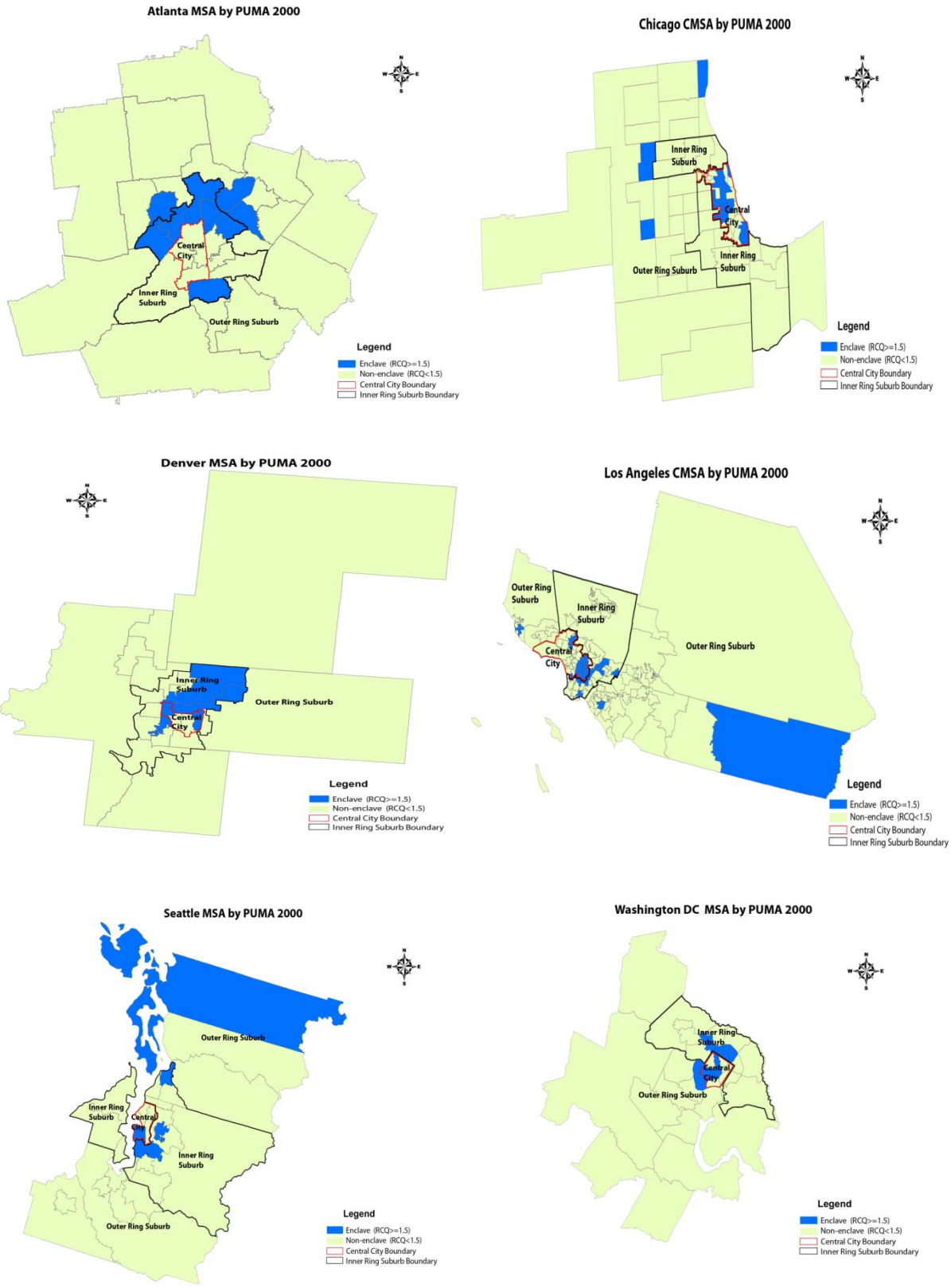

Table 1. Travel Mode Choice by Residential Location for African Americans and Latino Immigrants by City

City	Mode Choice	Central City				Inner Ring Suburbs				Outer Ring Suburbs			
		African Americans	Latino Immigrants			African Americans	Latino Immigrants			African Americans	Latino Immigrants		
			All	Enclave	Non-enclave		All	Enclave	Non-enclave		All	Enclave	Non-enclave
Atlanta	Auto Alone	58.0%	31.0%		31.0%	73.2%	38.4%	37.2%	51.2%	86.2%	51.8%	47.0%	55.1%
	Carpool	15.9%	39.9%		39.9%	16.5%	44.4%	45.8%	29.8%	10.8%	43.3%	44.7%	42.3%
	Transit	22.6%	21.5%		21.5%	8.7%	10.3%	9.8%	15.5%	1.7%	1.6%	2.9%	0.6%
	Other	3.6%	7.6%		7.6%	1.7%	6.8%	7.1%	3.6%	1.3%	3.3%	5.4%	1.9%
	N	**2626**	**158**		**158**	**7298**	**967**	**883**	**84**	**6674**	**1079**	**447**	**632**
Seattle	Auto Alone	52.0%	45.8%	42.6%	47.8%	69.9%	58.1%	57.3%	58.9%	73.3%	61.4%		61.4%
	Carpool	13.4%	22.9%	31.5%	17.8%	16.0%	27.3%	25.8%	28.7%	14.7%	30.3%		30.3%
	Transit	28.0%	26.4%	24.1%	27.8%	10.8%	8.0%	8.9%	7.1%	8.5%	3.7%		3.7%
	Other	6.6%	4.9%	1.9%	6.7%	3.3%	6.6%	8.0%	5.3%	3.5%	4.5%		4.5%
	N	**655**	**144**	**54**	**90**	**957**	**652**	**314**	**338**	**918**	**267**		**267**
Denver	Auto Alone	67.6%	47.3%	46.6%	50.7%	76.3%	53.6%	49.5%	58.3%	78.7%	63.0%		63.0%
	Carpool	13.6%	36.6%	37.4%	32.9%	13.4%	36.6%	40.8%	31.9%	17.6%	27.2%		27.2%
	Transit	13.9%	10.4%	10.1%	11.8%	7.8%	7.1%	6.9%	7.4%	2.3%	2.4%		2.4%
	Other	4.9%	5.7%	5.9%	4.6%	2.5%	2.7%	2.8%	2.5%	1.4%	7.4%		7.4%
	N	**771**	**882**	**730**	**152**	**653**	**789**	**422**	**367**	**232**	**458**		**458**
Chicago	Auto Alone	51.7%	44.6%	45.2%	42.8%	71.2%	58.4%	57.2%	58.9%	76.7%	56.1%	52.2%	58.9%
	Carpool	13.4%	28.0%	29.6%	22.8%	14.0%	29.0%	28.4%	29.2%	14.1%	34.7%	41.3%	30.0%
	Transit	31.2%	19.7%	17.6%	26.5%	11.4%	5.7%	8.5%	4.8%	5.8%	2.5%	1.9%	2.9%
	Other	3.8%	7.6%	7.6%	7.8%	3.4%	6.8%	5.8%	7.1%	3.4%	6.7%	4.6%	8.1%
	N	**11748**	**6380**	**5728**	**652**	**8294**	**3607**	**890**	**2717**	**2708**	**3962**	**1653**	**2309**
Los Angeles	Auto Alone	72.7%	48.7%	44.9%	54.6%	75.1%	59.8%	56.7%	64.6%	75.2%	56.6%	50.2%	58.9%
	Carpool	13.2%	22.5%	22.6%	22.5%	15.3%	24.4%	26.0%	22.0%	17.2%	30.1%	34.9%	28.4%
	Transit	11.1%	21.5%	25.1%	15.9%	7.0%	8.9%	10.3%	6.9%	4.2%	6.3%	8.7%	5.4%
	Other	3.0%	7.2%	7.4%	7.0%	2.7%	6.8%	7.0%	6.5%	3.4%	7.0%	6.2%	7.3%
	N	**7714**	**21588**	**13100**	**8489**	**7160**	**24525**	**14790**	**9735**	**5003**	**23046**	**6185**	**16861**
Washington, D.C.	Auto Alone	45.0%	25.4%	21.3%	40.9%	66.3%	49.1%	44.1%	57.3%	72.8%	57.3%	52.3%	59.1%
	Carpool	12.8%	17.4%	17.0%	18.8%	14.8%	27.6%	29.6%	24.4%	17.9%	30.0%	29.4%	30.2%
	Transit	36.5%	41.7%	44.3%	31.8%	16.7%	17.9%	19.7%	14.9%	6.6%	6.7%	12.8%	4.6%
	Other	5.7%	15.6%	17.5%	8.4%	2.3%	5.4%	6.6%	3.5%	2.7%	6.0%	5.5%	6.1%
	N	**5970**	**737**	**583**	**154**	**13392**	**3674**	**2287**	**1387**	**5145**	**2728**	**704**	**2024**

Source: Author's calculation of Census PUMS 2000 unweighted sample.

Notes: "Other" includes bicycle, walk, and other means of transportation to work.

Table 2. Travel Mode Choice by Residential Location and Niche Status for Latino Immigrants by City

City	Mode Choice	Central City			Inner Ring Suburbs			Outer Ring Suburbs		
		All	Niche	Non-niche	All	Niche	Non-niche	All	Niche	Non-niche
Atlanta	Auto Alone	31.0%	18.9%	37.1%	38.4%	25.0%	50.8%	51.8%	32.4%	65.3%
	Carpool	39.9%	64.2%	27.6%	44.4%	61.0%	29.2%	43.3%	63.1%	29.6%
	Transit	21.5%	11.3%	26.7%	10.3%	8.6%	11.9%	1.6%	1.4%	1.7%
	Other	7.6%	5.7%	8.6%	6.8%	5.4%	8.1%	3.3%	3.2%	3.5%
	N	**158**	**53**	**105**	**967**	**463**	**504**	**1079**	**443**	**636**
Seattle	Auto Alone	45.8%	39.0%	48.5%	58.1%	50.7%	61.5%	61.4%	57.8%	63.0%
	Carpool	22.9%	14.6%	26.2%	27.3%	29.1%	26.5%	30.3%	27.7%	31.5%
	Transit	26.4%	41.5%	20.4%	8.0%	10.8%	6.7%	3.7%	3.6%	3.8%
	Other	4.9%	4.9%	4.9%	6.6%	9.4%	5.3%	4.5%	10.8%	1.6%
	N	**144**	**41**	**103**	**652**	**203**	**449**	**267**	**83**	**184**
Denver	Auto Alone	47.3%	38.8%	53.7%	53.6%	40.7%	62.5%	63.0%	55.2%	68.1%
	Carpool	36.6%	50.4%	26.1%	36.6%	52.8%	25.5%	27.2%	37.0%	20.8%
	Transit	10.4%	7.6%	12.6%	7.1%	5.6%	8.1%	2.4%	0.6%	3.6%
	Other	5.7%	3.1%	7.6%	2.7%	0.9%	3.9%	7.4%	7.2%	7.5%
	N	**882**	**381**	**501**	**789**	**322**	**467**	**458**	**180**	**278**
Chicago	Auto Alone	44.6%	43.2%	45.0%	58.4%	52.3%	59.9%	56.1%	45.7%	59.3%
	Carpool	28.0%	36.3%	25.9%	29.0%	38.2%	26.8%	34.7%	45.7%	31.3%
	Transit	19.7%	14.7%	21.1%	5.7%	3.6%	6.2%	2.5%	2.5%	2.5%
	Other	7.6%	5.9%	8.1%	6.8%	5.9%	7.0%	6.7%	6.1%	6.8%
	N	**6380**	**1310**	**5070**	**3607**	**692**	**2915**	**3962**	**934**	**3028**
Los Angeles	Auto Alone	48.7%	31.5%	51.9%	59.8%	47.6%	61.9%	56.6%	42.4%	59.2%
	Carpool	22.5%	26.4%	21.8%	24.4%	30.3%	23.4%	30.1%	43.0%	27.7%
	Transit	21.5%	33.7%	19.2%	8.9%	12.0%	8.4%	6.3%	5.7%	6.4%
	Other	7.2%	8.4%	7.0%	6.8%	10.0%	6.3%	7.0%	8.8%	6.7%
	N	**21588**	**3354**	**18234**	**24525**	**3518**	**21007**	**23046**	**3638**	**19408**
Washington, D.C.	Auto Alone	25.4%	19.8%	32.9%	49.1%	39.8%	60.1%	57.3%	46.4%	69.9%
	Carpool	17.4%	17.9%	16.6%	27.6%	35.2%	18.6%	30.0%	37.6%	21.2%
	Transit	41.7%	46.7%	34.8%	17.9%	18.3%	17.4%	6.7%	8.0%	5.3%
	Other	15.6%	15.6%	15.7%	5.4%	6.6%	4.0%	6.0%	8.0%	3.6%
	N	**737**	**424**	**313**	**3674**	**1986**	**1688**	**2728**	**1461**	**1267**

Source: Author's calculation of Census PUMS 2000 unweighted sample.

Notes: "Other" includes bicycle, walk, and other means of transportation to work.

Table 3. Multinomial Logit Model Results on Commuting Mode for Low-skilled Latino Immigrants for Six-City Combined Sample

Commuting Mode	Carpool		Public Transit		Other Modes	
(Auto alone is the base mode)	Coef.	Z value	Coef.	Z value	Coef.	Z value
Intercept	0.240*	2.44	-3.124*	-20.5	-1.906*	-11.14
Personal-level Variables						
Age 16-25	0.313*	8.23	0.359*	6.93	0.335*	5.63
Age 36-45	-0.068*	-2.18	-0.039	-0.88	-0.079	-1.49
Age 46-55	0.012	0.26	0.014	0.22	-0.012	-0.16
Age 56-65	-0.088	-1.34	-0.049	-0.57	0.032	0.31
Experience	-0.017*	-3.59	-0.012	-1.95	-0.023*	-3.14
Experience squared	0.000*	3.85	0.000*	4.52	0.001*	4.5
Female	0.402*	21.46	0.765*	30.15	0.373*	12.03
Having children	-0.213*	-9.7	-0.478*	-13.8	-0.419*	-10.44
Married	0.048*	2.44	-0.433*	-16.4	-0.164*	-5.15
Arrived in 1990s	0.327*	15.08	0.688*	23.18	0.674*	18.99
Arrived in 1970s	-0.076*	-3.14	-0.232*	-6.11	-0.204*	-4.25
Arrived before 1970	-0.049	-1.42	-0.075	-1.43	0.105	1.72
English well	-0.271*	-6.43	-0.512*	-8.99	-0.596*	-8.81
English poor	0.412*	9.81	0.347*	6.23	0.337*	5.11
Homeowner	-0.236*	-13.1	-0.957*	-33.7	-0.928*	-27.47
Total nonwage income (log)	0.003	1.62	-0.009*	-3.17	-0.007*	-2.12
Employment Variables						
Manufacturing	-0.451*	-18	0.232*	5.42	-0.116*	-2.43
Trade	-0.719*	-26.4	0.499*	11.56	0.434*	9.31
Finance, Insurance and Real Estate	-0.886*	-14.7	0.236*	2.71	0.214*	2.17
Services	-0.649*	-23.5	0.537*	12.34	0.142*	2.87
Public Administration	-0.830*	-20.6	-0.096	-1.4	-0.473*	-5.61
Latino niche	0.276*	12.02	0.461*	13.53	0.440*	10.85
PUMA-level Variables						
Rail stations	0.051*	2.45	0.079*	2.46	-0.167*	-4.79
Minimum auto insurance	0.000	-1.44	0.000*	1.98	0.000*	-3.12
Central city enclave	0.087*	2.31	1.669*	28.51	0.421*	6.53
Central city non-enclave	-0.031	-0.74	1.207*	19.76	0.214*	3.06
Inner-ring suburb enclave	0.011	0.38	0.744*	15.68	0.154*	3.19
Inner-ring suburb non-enclave	-0.148*	-5.18	0.374*	7.32	-0.033	-0.67
Outer-ring suburb enclave	0.146*	4.85	0.456*	8.2	-0.225*	-3.98
MSA-level Variables						
License for illegal immigrants	0.037	0.54	0.168	1.92	-0.231	-1.92
Chicago	-0.308*	-4.92	0.144	1.31	0.408*	3.39
Denver	-0.374*	-4.93	-0.413*	-2.99	-0.273	-1.77
Los Angeles	-0.371*	-4.41	0.202	1.48	0.793*	5.18
Seattle	-0.548*	-4.52	-0.103	-0.54	-0.016	-0.07
Washington, D.C.	-0.533*	-7.74	0.598*	5.25	0.242	1.9
N = 86687						
Pseudo R^2 = 0.1056						

* *p<0.05*

Notes: "Other modes" include bicycle, walk, and other means of transportation to work.

Table 4. Multinomial Logit Model Results on Enclave and Niche Variables for Low-skilled Latino Immigrants by City

	Commuting Mode	Carpooling		Public Transit		Other Modes	
	(Auto alone is the base mode)	Coef.	Z value	Coef.	Z value	Coef.	Z value
Atlanta	Latino niche	0.608*	3.24	0.761*	2.37	0.061	0.16
	Central city non-enclave	0.141	0.4	3.619*	4.37	1.423*	2.01
	Inner ring suburb enclave	-0.241	-1.26	2.265*	3.39	0.744	1.58
	[illegible] enclave	-0.568	-1.43	3.288*	3.85	0.082	0.09
	Outer ring suburb enclave	-0.238	-1.36	1.527*	2.23	0.826	1.84
		N = 1882		**Pseudo R^2 = 0.1736**			
Chicago	Latino niche	0.262*	4.64	0.256*	2.56	0.250*	2.27
	Central city enclave	0.293*	2.88	3.045*	16.26	0.389*	2.34
	Central city non-enclave	0.005	0.03	2.839*	14.07	0.246	1.13
	Inner ring suburb enclave	0.126	1.09	1.921*	8.84	0.046	0.23
	[illegible] enclave	0.04	0.47	0.930*	4.92	-0.036	-0.25
	Outer ring suburb enclave	0.293*	3.64	-0.391	-1.64	-0.446*	-2.84
		N = 12534		**Pseudo R^2 = 0.1098**			
Denver	Latino niche	0.749*	4.29	0.441	1.56	-0.329	-0.83
	Central city enclave	0.610*	2.68	1.534*	3.06	-0.444	-0.88
	Central city non-enclave	0.351	1.18	1.143*	2.05	-1.158	-1.85
	Inner ring suburb enclave	0.500*	2.57	1.084*	2.39	-1.291*	-2.7
	[illegible] enclave	0.335	1.75	1.137*	2.74	-1.256*	-2.73
		N = 1918		**Pseudo R^2 = 0.1112**			
Los Angeles	Latino niche	0.223*	7.65	0.504*	12.01	0.526*	10.71
	Central city enclave	-0.085	-1.65	1.085*	14.87	0.318*	3.69
	Central city non-enclave	-0.147*	-2.9	0.678*	9.38	0.182*	2.16
	Inner ring suburb enclave	-0.063	-1.9	0.444*	8.17	0.128*	2.25
	[illegible] enclave	-0.216*	-6.37	0.247*	4.22	0.007	0.12
	Outer ring suburb enclave	0.159*	4.46	0.484*	7.79	-0.205*	-3.12
		N = 62929		**Pseudo R^2 = 0.1072**			
Seattle	Latino niche	-0.103	-0.5	0.227	0.68	0.534	1.46
	Central city enclave	0.397	0.9	1.297*	2.23	-0.141	-0.12
	Central city non-enclave	-0.717	-1.72	0.701	1.35	0.167	0.21
	Inner ring suburb enclave	-0.078	-0.34	1.352*	2.41	0.464	1.12
	[illegible] enclave	0.216	0.9	1.508*	2.49	0.021	0.05
		N = 883		**Pseudo R^2 = 0.1318**			
Washington, D.C.	Latino niche	0.391*	4.46	0.614*	5.93	0.554*	3.84
	Central city enclave	-0.589	-1.48	2.673*	5.34	-0.174	-0.26
	Central city non-enclave	-1.039*	-2.09	1.550*	2.73	-1.458	-1.8
	Inner ring suburb enclave	0.179	1.34	1.139*	6.06	0.131	0.57
	[illegible] enclave	0.057	0.43	0.759*	3.82	-0.364	-1.45
	Outer ring suburb enclave	0.032	0.23	0.663*	3.33	-0.09	-0.38
		N = 5866		**Pseudo R^2 = 0.1464**			

** p<0.05*

Notes: 1.This model regresses these three travel modes (besides auto alone) on personal-level variables, employment variables and PUMA-level variables (as specified in Table 3 except MSA-level variables). Only coeffients on niche and enclave variables are reported here.

2. "Other modes" include bicycle, walk, and other means of transportation to work.

Table 5. Multinomial Logit Model Results on Enclave and Niche Variables for Low-Skilled Latino Immigrants by Gender for Six-City Combined Sample

	Commuting Mode	Carpooling		Public Transit		Other Modes	
	(Auto alone is the base mode)	Coef.	Z value	Coef.	Z value	Coef.	Z value
Male	Latino niche	0.287*	10.53	0.458*	10.69	0.410*	8.49
	Central city enclave	0.061	1.3	1.588*	20.21	0.155	1.93
	Central city non-enclave	-0.019	-0.37	1.154*	14.03	0.023	0.26
	Inner ring suburb enclave	-0.012	-0.34	0.641*	9.9	-0.072	-1.18
	Inner ring suburb non-enclave	-0.159*	-4.43	0.356*	5.02	-0.113	-1.86
	Outer ring suburb enclave	0.113*	3.05	0.328*	4.24	-0.276*	-4.05
		N = 55857		**Pseudo R^2 = 0.1084**			
Female	Latino niche	0.164*	3.73	0.435*	7.64	0.441*	5.84
	Central city enclave	0.161*	2.47	1.814*	20.37	0.939*	8.6
	Central city non-enclave	-0.055	-0.76	1.297*	14.08	0.584*	4.98
	Inner ring suburb enclave	0.067	1.38	0.914*	12.95	0.592*	7.28
	Inner ring suburb non-enclave	-0.125*	-2.63	0.412*	5.53	0.15	1.8
	Outer ring suburb enclave	0.247*	4.75	0.615*	7.56	-0.106	-1.04
		N = 30155		**Pseudo R^2 = 0.0978**			

* *p<0.05*

Notes: 1. This model regresses these three travel modes (besides auto alone) on personal-level variables, employment variables, PUMA-level variables and MSA-level variables (as specified in Table 3 except "female"). Only coeffients on niche and enclave variables are reported here.

2. "Other modes" include bicycle, walk, and other means of transportation to work.

Appendix 1. Multinomial Logit Model Results on Commuting Mode for Low-skilled Latino Immigrants for Six-City Combined Sample with PUMA Mean Commuting Time Added

Commuting Mode	Carpool		Public Transit		Other modes	
(Auto alone is the base mode)	Coef.	Z value	Coef.	Z value	Coef.	Z value
Intercept	-1.177*	-3.52	-3.468*	-6.43	2.780*	4.83
Personal-level Variables						
Age 16-25	0.315*	8.26	0.360*	6.94	0.331*	5.56
Age 36-45	-0.069*	-2.2	-0.04	-0.9	-0.079	-1.48
Age 46-55	0.01	0.22	0.013	0.22	-0.011	-0.14
Age 56-65	-0.09	-1.37	-0.049	-0.57	0.036	0.34
Experience	-0.017*	-3.58	-0.012	-1.94	-0.023*	-3.11
Experience squared	0.000*	3.87	0.000*	4.52	0.001*	4.43
Female	0.404*	21.58	0.769*	30.22	0.370*	11.95
Having children	-0.214*	-9.73	-0.478*	-13.84	-0.418*	-10.41
Married	0.048*	2.44	-0.433*	-16.43	-0.166*	-5.2
Arrived in 1990s	0.327*	15.1	0.688*	23.17	0.674*	18.99
Arrived in 1970s	-0.077*	-3.19	-0.232*	-6.13	-0.201*	-4.19
Arrived before 1970	-0.048	-1.39	-0.075	-1.43	0.101	1.65
English well	-0.273*	-6.49	-0.512*	-8.99	-0.594*	-8.78
English poor	0.410*	9.77	0.347*	6.23	0.338*	5.12
Homeowner	-0.245*	-13.5	-0.959*	-33.6	-0.901*	-26.55
Total nonwage income (log)	0.003	1.65	-0.009*	-3.17	-0.007*	-2.15
Employment Variables						
Manufacturing	-0.457*	-18.25	0.230*	5.37	-0.098*	-2.06
Trade	-0.720*	-26.44	0.497*	11.52	0.436*	9.34
Finance, Insurance and Real Estate	-0.889*	-14.75	0.233*	2.68	0.219*	2.22
Services	-0.650*	-23.54	0.534*	12.28	0.141*	2.85
Public Administration	-0.832*	-20.62	-0.098	-1.42	-0.467*	-5.53
Latino niche	0.280*	12.17	0.461*	13.52	0.427*	10.52
PUMA-level Variables						
Mean commute time (log)	0.420*	4.44	0.103	0.66	-1.422*	-8.52
Rail stations	0.048*	2.28	0.079*	2.46	-0.151*	-4.3
Minimum auto insurance	-0.096	-1.36	0.186	1.9	-0.313*	-2.69
Central city enclave	0.051	1.33	1.664*	28.08	0.543*	8.29
Central city non-enclave	-0.04	-0.94	1.207*	19.75	0.237*	3.41
Inner-ring suburb enclave	0.012	0.42	0.745*	15.69	0.168*	3.48
Inner-ring suburb non-enclave	-0.143*	-5	0.375*	7.33	-0.045	-0.93
Outer-ring suburb enclave	0.195*	6.07	0.466*	8.05	-0.357*	-6.09
MSA-level Variables						
License for illegal immigrants	0.008	0.11	0.154	1.73	-0.122	-1.01
Chicago	-0.307*	-4.91	0.138	1.24	0.479*	3.98
Washington, D.C.	-0.544*	-7.9	0.602*	5.28	0.323*	2.53
Denver	-0.290*	-3.7	-0.394*	-2.8	-0.509*	-3.24
Los Angeles	-0.352*	-4.18	0.212	1.55	0.709*	4.6
Seattle	-0.470*	-3.84	-0.076	-0.4	-0.238	-1.07
N= 86678						
Pseudo R^2 = 0.1062						

* p<0.05

Notes: "Other modes" include bicycle, walk, and other means of transportation to work.

Appendix 2. Multinomial Logit Model Results on Commuting Mode for Low-skilled Blacks for Six-City Combined Sample with PUMA Mean Commute Time Added

Commuting Mode	Carpool		Public Transit		Other modes	
(Auto alone is the base mode)	Coef.	Z value	Coef.	Z value	Coef.	Z value
Intercept	-2.362*	-6.53	-4.806*	-12.82	4.241*	6.6
Personal-level Variables						
Age 16-25	0.223*	3.67	0.395*	6.22	0.324*	2.94
Age 36-45	0.234*	4.96	0.183*	3.66	0.268*	2.93
Age 46-55	0.269*	4.22	0.171*	2.6	0.338*	2.79
Age 56-65	0.145	1.91	-0.032	-0.42	0.045	0.32
Experience	-0.035*	-4.93	-0.021*	-2.76	-0.053*	-4.18
Experience squared	0.000*	4.27	0.000*	2.95	0.001*	4.65
Female	0.277*	11.39	0.345*	13.35	-0.168*	-3.6
Having children	0.099*	2.89	-0.159*	-3.95	-0.350*	-4.4
Married	0.093*	3.53	-0.446*	-15.19	-0.494*	-8.62
Homeowner	-0.326*	-13.06	-0.723*	-27.1	-0.845*	-16.78
Total nonwage income (log)	0.013*	4.68	0.012*	4.24	0.034*	6.42
Employment Variables						
Manufacturing	-0.358*	-6.33	-0.240*	-3.29	-0.630*	-4.92
Trade	-0.350*	-6.98	0.236*	3.93	0.206*	2.17
Finance, Insurance and Real Estate	-0.454*	-7.43	0.340*	4.98	0.067	0.58
Services	-0.231*	-4.99	0.324*	5.72	0.128	1.39
Public Administration	-0.471*	-9.82	0.008	0.13	-0.712*	-6.84
PUMA-level Variables						
Mean commute time (log)	0.435*	4.33	0.620*	5.95	-1.760*	-9.8
Rail stations	0.084*	2.67	0.532*	12.92	0.214*	3.31
Minimum auto insurance	0.162	1.47	-0.318*	-2.54	-0.954*	-4.76
Central city enclave	0.011	0.17	1.983*	27.34	0.953*	8.69
Central city non-enclave	-0.055	-1.09	1.809*	27.41	0.593*	6.26
Inner-ring suburb enclave	-0.121*	-2.53	0.970*	15.07	0.038	0.4
Inner-ring suburb non-enclave	-0.079*	-2.09	0.816*	14.27	-0.006	-0.08
Outer-ring suburb enclave	-0.143	-1.87	0.049	0.39	-0.087	-0.62
MSA-level Variables						
Chicago	-0.172*	-3.71	0.075	1.46	0.145	1.6
Washington, D.C.	-0.038	-1.05	0.601*	14.01	0.489*	6.22
Denver	-0.192*	-1.97	-0.475*	-4.27	-0.587*	-3.12
Los Angeles	-0.412*	-3.77	-0.297*	-2.17	0.666*	3.19
Seattle	-0.057	-0.71	0.601*	6.43	0.089	0.61
N = 59391						
Pseudo R2 = 0.0842						

* p<0.05

Notes: "Other modes" include bicycle, walk, and other means of transportation to work.