

## Destination and Ethnic-Origin Effects on Immigrants' Earnings: A Multi-level Analysis

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This research examines how locality and ethnic groups affect the wages of their immigrant members differently. A multilevel random coefficient model with MSA (Metropolitan Statistical Area) as a geographic unit enables us to estimate the effects of contextual factors on wages more accurately than other models. The explanatory variables are based on ethnic-enclave theory and group-individual interaction theory. Using the 1990 U.S. Census PUMS (Public Use Microdata Samples), the analysis finds that the local characteristics such as clustering, communal types, communal resources, and labor market characteristics explain heterogeneity not only between ethnic groups but also between different geographic areas. The findings suggest that clustered, enclave-type geo-ethnic groups have a stabilization mechanism which functions as a safety-net for its members while it discounts individual achievements. It implies that current immigration policy will undermine the stability by admitting more non-family based immigrants.

### INTRODUCTION

Immigrants spread unevenly across the United States, and the unevenness varies from one ethnic group to another. Their choice of settlement is not arbitrary but deliberate. The question is why they chose one place over another. If they were economically rational individuals, they would settle where local labor market offers the highest return to their skills. If they came to join their families, they would find it rational to live with, or stay close to, their families. Or, it could be just because he or she likes geographic characteristics of their destinations, such as weather, local culture, etc. What is it, then, that attracts many immigrants to the limited number of areas? Is it general area characteristics or something more specific to ethnic groups?

Using race-ethnicity and destination MSA as a grouping scheme, this research examines how

immigrants' wages are influenced by locality and ethnicity to which they belong. The effects of local labor market on individual outcomes are rather straightforward: i.e., generally, immigrants as well as other workers in one labor market would receive better wages when the local economy is in good condition. The effects of ethnic groups, however, are not so simple because individual and collective rationalities coexist there. We assume that community factors selectively affect individual outcomes in the way that would not necessarily agree with individual rational choice theory, because an ethnic community would rather maintain its cohesion by relieving its members of their hardships than risking it by maximizing individual wealth. This inference will be tested through statistical analyses of hierarchical linear model (HLM).

## **HISTORICAL BACKGROUND**

The 1965 Amendment to the Immigration and Naturalization Act abolished the nationality-based quota system which had been disproportionately favoring white European immigrants against others. With this and some other minor amendments that followed, the U.S. immigration policy shifted its emphasis from race and nationality to family unification. Today's immigration policy is based on two basic categories: numerically unlimited and limited immigrations. The former applies to immediate relatives (spouse, minor children and parents) of U.S. citizens; the latter includes more remote family, employment-based and diversity immigrants.<sup>1</sup> The current overall annual limit set in effect since 1995 is 675,000, which can be pierced if the number of immediate family applicants exceeds the flexible maximum of approximately 400,000. As a result, at least 71 percent of all visa allotment is given to either immediate or remote family-sponsored immigrants. In fact, about 70 percent of all immigrants throughout 1980s and 90s were admitted under either immediate or remote family categories.<sup>2</sup>

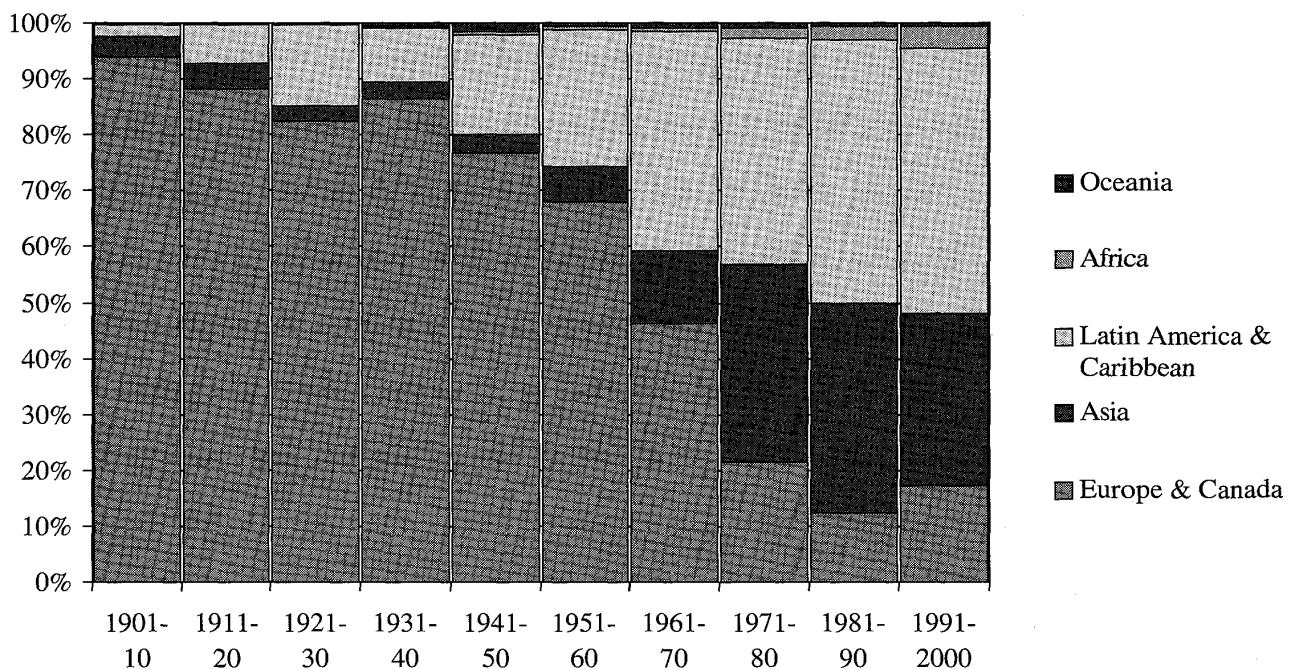
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1 The diversity category started in 1992 admits up to 55,000 immigrants per year by lottery.

2 INS Annual Report, various years. The percentage is calculated excluding immigrants who adjusted their undocumented status by the 1986 Immigration Reform and Control Act (IRCA). The IRCA very quickly legalized almost 2.7 million immigrants during the four years after its enactment in 1989. Approximately 2.4 million, or 92 percent of IRCA immigrants were Latin American and Caribbean, and most of them – 75 percent – were Mexican (INS Triennial Comprehensive Report on Immigration 1999).

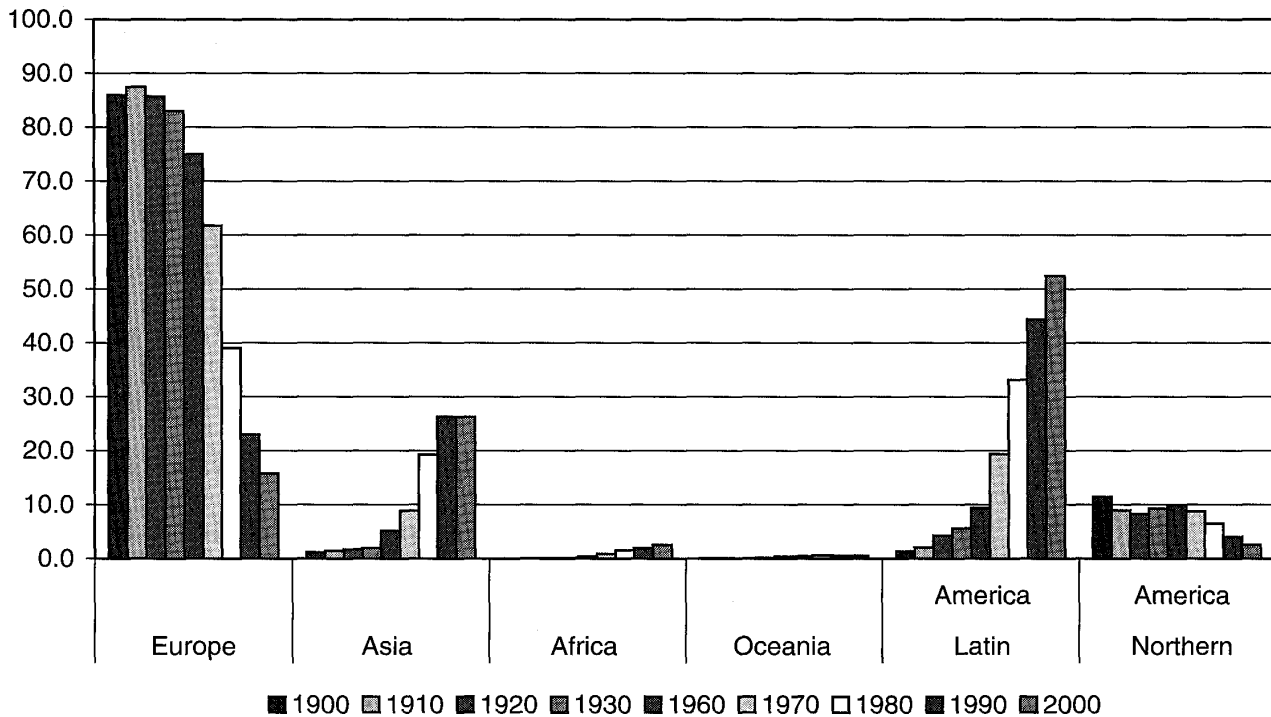
The major consequence of the post-1965 immigration policy, coincided with the shift in major source countries of immigrants, has been the new inflow from Asia and Latin America. **Figure 1** presents the change in the composition of immigrant flow by the region of origin in every decade over the past one hundred years. While the share of European immigrants dropped from 93.6 to 17.1 percent, Asian increased from 3.7 to 30.7 percent, Latin American and Caribbean from 2.1 to 47.2 percent. In terms of foreign stocks (foreign-born residents in the U.S.), this new wave of immigrants had fundamentally changed the ethnic composition of immigrants in the United States. As **Figure 2** shows, European-born residents declined steadily since 1920 from 12 million to 4.4 million, losing its share from 86 to 16 percent of the total foreign-born population. Meanwhile Asian and Latin American counterparts increased rapidly: Asian-born population in the year 2000 is estimated 7.2 million or 26 percent, and Latin American 14.5 million or 52 percent. Because the first generation immigrants have close kinship ties in their home countries, they will bring more coethnic immigrants under the family-oriented immigration policy, and accelerate the ethnic re-composition of immigrants as well as American population in general.

Figure. 1 Immigration to the United States by Regional Origin, 1901-2000 (% to total immigration)



Source : U.S. Census Bureau. *Historical National Population Estimates : July 1, 1900 to July 1, 1999.*

Figure. 2 Immigrant Stock in the U.S. 1900-2000 (% to total foreign born)



Source : See Figure 1.

## THEORETICAL BACKGROUND

As the immigrant stock in the United States diversified, immigration theories had turned its emphasis from monolithic assimilation to multicultural and pluralist perspectives. Researchers are increasingly aware that locality, ethnicity, and group-individual interaction crucially influence immigration processes. Their assumption is that adaptation of individual immigrants takes place within structural contexts of heterogeneous ethnic communities. In addition, this study assumes that diverse outcomes of immigrant adaptation resulted from various types of group-individual interactions. Some existing theoretical and empirical studies already have approached this heterogeneity of immigrant groups.

In her studies of Asian immigrants, Bonacich describes immigrants' socioeconomic position as "middleman minority" because they are located between mainstream producers and consumers. The "middleman minority", formed in response to societal hostility and ethnic solidarity, benefits from

the middle position so long as it retains its identity distinctive from the mainstream society (Bonacich 1973; Bonacich and Modell 1980). Light's analysis of ethnic and immigrant entrepreneurship extends the "middleman minority" from small-scale trade business to all self-employment businesses (Light 1984). In this model, ethnic entrepreneurs benefit from both ethnic and class resources in forms of physical, cultural, and human capital (Light and Bonacich 1988). Waldinger (1996) uses "ethnic niche" to explain his observation that immigrant concentrations are not limited to trade and self-employment but extend to a particular economic sector such as garment and construction industry. According to Waldinger, ethnic "concentration means that ethnics employed in niches may do better than their counterparts who work in industries of lower ethnic density" (Waldinger 1996: 95). Waters (1999) reports a case in which ethnic network hiring resulted in colonization of restaurant employees by Caribbean immigrants. This, however, does not necessarily mean immigrants are taking over all the niche industry. As Rosenfeld and Tienda (1999) point out, the creation of occupational niche may not completely wipe out native employment, but push natives upward in the occupational stratification which is often queued by nationality and ethnicity.

Portes and his associates derived an "ethnic enclave" model from the case of Cubans in Miami. An ethnic enclave consists of primary and secondary workers as well as entrepreneurs in multiple industries that cater to each other inside their ethnic group to develop a socioeconomic unit relatively autonomous from mainstream society (Wilson and Portes 1980; Portes and Jensen 1989, 1992; Zhou 1992). Their conclusion is that ethnic enclaves provide immigrants with upward socioeconomic mobility without their assimilation to the mainstream. It is controversial because for assimilationist perspective racial and ethnic de-segregation is one of the major paths to higher socioeconomic status (Massey and Denton 1988).<sup>3</sup> It was also pointed out that the ethnic enclave concept is not generally applicable because the Cuban enclave in Miami is unique and rather

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3 The assimilation controversy is now involving a topic over the "segmented assimilation" of second-generation immigrants (Gans 1992; Portes and Zhou 1993; Alba and Nee 1997), where Portes and others argue that assimilation does not necessarily promises positive outcome because adaptation to a lower-class status may leads to negative outcomes. I skip this important development in the literature because this study does not deal with the second generation.

exceptional (Logan, Alba and McNulty 1994).

Sanders and Nee (1987a, 1987b) tested Portes-Jensen hypotheses using the census data on Cuban in Miami and Chinese in California, and concluded that, contrary to Portes et al., ethnic enclaves trap the mobility of immigrant workers and enable employers to exploit cheap labor of coethnic workers (called ethnic mobility trap). A follow-up study of enclave economy by Zhou and Logan (1989) found positive effects among Chinese in New York City. Another study by Logan and Alba (1999) focusing on five ethnic groups in New York and Los Angeles, however, found negative effect of enclaves on annual income for a number of groups – Korean and Chinese in the two cities, Blacks and Puerto Rican in New York and Mexican in Los Angeles, except Blacks in Los Angeles who showed no effects. This finding may support assimilation perspective by equating enclave with lack of assimilation, but it cannot explain why many immigrants chose to live in enclaves even when the choice actually depresses one's income.

Other researchers use the concept of “embeddedness” to explain negative effects of immigrant ethnic groups. According to Portes and Sensenbrenner, “the same social mechanism that give rise to appropriable resources for individual use can also constrain action or even derail it from its original goal” (1993: 1338). For example, resourceful ethnic communities have a free-rider problem, suffer from the lack of connection to the ‘outside’, or impose ‘leveling pressure’ on ambitious activities. In this perspective, negative outcomes are not due to the lack of assimilation but to the characteristics of an enclave itself. Overall, the debate over positive or negative effects of ethnic enclave has not been settled. Some empirical research support one side of the debate and others support the other.

In order to specify circumstances in which positive or negative effect of ethnic group takes place, Portes and his associates conceptualized the modes of incorporation as combination of societal reception and group characteristics (Portes 1981; 1995; Portes and Bach 1985; Portes and Böröcz 1989; Portes and Rumbaut 1990). According to them the combination of friendly or antagonistic reception – political and economic – and class characteristics of an ethnic group determine what type of ethnic community it is and how it affects its individual members. This argument directs our attention to structural conditions, but its implication to individual action is equally important.

Group-individual interaction operates to balance individual and group level rationalities (McMahon 2001). Individuals settle in a co-ethnic community because they consider not only economic, but also social, ethical, as well as cultural conditions. A community as a whole, on the other hand, may not set priority on 'maximum output from minimum input' but on maintaining their status honor by gaining recognition from the mainstream society. Collectively, therefore, slow growth by many, rather than quick growth by a few, is an ideal goal to pursue. It then benefits individuals when they go out of their communities, because such general improvement helps eliminate disadvantages inherent to the perceptions of the minority group. For example, a successful small business owner who decided to stay in his/her community is balancing individual- and group-level rationalities by prioritizing group-level improvement over his/her personal economic goals.

The focus of this research, therefore, is the condition in which group rationality overrules individual rationality, or individual rational choice overrides collective rationality. Immigrant ethnic communities provide their members with protection from external shocks and in return hold some authority to regulate outliers and maintain their homogeneity and stability. Combination and balance of these rationalities in the group-individual interactions produce individual economic outcomes. Four basic theses are derived from this perspective. First, where an established communal group exists, positive effects of human capital are suppressed because group rationality is more prevalent. Let us call it a clustering effect. Secondly, a group that consists of newer immigrants or composed of very different classes does not have cohesion to impose the group rationality, thus individual rationality prevails. Let us call it a communal-type effect. Thirdly, if a group is poor in resources, it promotes the lives of its members, and vice versa. We call it a communal resource effect. Lastly, positive labor market reception of an ethnic group improves individual outcomes of the group members. We call it a labor market effect.

## **HYPOTHESES**

The discussion above leads us to the following hypotheses:

- 1) Clustering of a local-ethnic group decreases human capital effects of its member immigrants

living in the cluster, but it helps those who have difficulties.

- 2) The newer the ethnic group, the higher the effect of human capital. The economically disadvantaged will not be better off in such geo-ethnic groups.
- 3) Ethnic groups with more communal resources increase the effects of individual skills, whereas the less resourceful groups decrease the effects.
- 4) The more self-sustainable the ethnic labor market, the better the economic outcomes of individual immigrants.

It is not very new to focus on locality in immigration study. Encahutegui (1992) used county-level data to analyze the impact of immigrant on local employment. Tienda and Wilson (1992) used SMSA (Standard Metropolitan Statistical Area – in 1980 census geography) to study earnings of Hispanics. More recently Bean, Van-Hook and Fosset (1999) studied immigrant concentration at MSA-level on native employment. Gurak and Kritz (2000) constructed state-level contextual variables to explain interstate migration of immigrants. This research resembles Tienda and Wilson in terms of the geographical unit, and its approach is similar to Gurak and Kritz (2000) in which they focus on both individual and contextual level determinants, but it is unique in including as many as 15 ethnic groups and taking advantage of the Hierarchical Linear Model to analyze individual-group interaction.

## **SAMPLE AND DATA**

This study drew a sample from the 5 % Public Use Microdata Sample (PUMS) of the 1990 Census collected by the U.S. Census Bureau. Initially, all metropolitan Areas (MAs) including Metropolitan Statistical Area (MSA) and Primary MSA (PMSA) in the United States were selected. This selection excluded all non-metropolitan areas because non-MAs do not have geographic coherence – meaning it is not always in one piece – as far as MA coding is concerned. The sample was then grouped into fifteen race-ethnicities and 272 MSA or PMSA (from here on, I call just MSA for convenience) to construct geo-ethnic variables. The categorization scheme, as shown in **Table 1**, is based on four variables : place of birth, race, Hispanic and, for some cases, ancestry. It



Table 1. immigrant Category by Race &amp; Ethnicity

Code	Place of Birth	Race	Ethnicity
1	United Kingdom	white	non-Hispanic
1	Germany	white	non-Hispanic
1	Italy	white	non-Hispanic
1	Canada	white	non-Hispanic
1	Poland	white	non-Hispanic
1	Russia	white	non-Hispanic
2	China	Chinese / Taiwanese	non-Hispanic
3	Japan	Japanese	non-Hispanic
4	Korea	Korean	non-Hispanic
5	India	Asian Indian	non-Hispanic
6	Philippines	Filipino	non-Hispanic
7	Vietnam	Vietnamese	non-Hispanic
8	Cuba	Other	Cuban
9	Dominican Rep	Other	Dominican
10	Haiti	Black / Other	Haitian
11	Mexico	Other	Mexican
12	Jamaica	Black / Other	Jamaican
13	El Salvador	Other	Salvadoran
14	Guatemala	Other	Guatemalan
15	Colombia	Other	Colombian

is assumed that race-ethnicity overrides place of birth in terms of group affiliation.<sup>4</sup> Small geo-ethnic groups with less than 30 observations were dropped in order to maintain validity of group-level measurements.

Then individual sample with following characteristics was selected: immigrant males aged between 25 and 64 years old, worked and earned more than \$1,000 in the previous year, not living in group quarters, not enrolled in school, and not in armed forces.<sup>5</sup> It includes both wage/salary

4 This assumption is somewhat problematic because the number of ethnic minorities is increasing in many parts of the world (Vietnamese in Germany, Chinese in Thailand, etc) and it is uncertain how they identify themselves. In order to have ethnically homogeneous group, however, it was essential not to include mixed ethnicities in a group: e.g., putting a Chinese immigrant born in Germany into non-Hispanic White group.

5 A comparable sample of females was also analyzed. Its results were generally similar but the details need careful interpretation separate from the male sample, which is not done here. The inference made here is therefore limited to male immigrant population with the above-mentioned selection criteria.

earners and self-employed persons because self-employment is a very important job type for some immigrant ethnic groups. Individual sample was also subject to the group-size limitation to guarantee efficient statistical estimation: about 7.8 percent of initial individual cases were dropped because they had less than 30 cases in a group. The excluded immigrants are similar to those remained in terms of demographic characteristics, but different in terms of economic and immigration characteristics.<sup>6</sup> These immigrants are extremely dispersed and their exclusion is a potential cause of bias, but it will not be a serious problem because the remaining sample also contains widely dispersed immigrants. After the selection, the proportion of total MSA population that belongs to a particular immigrant group ranges widely from 1.3 to 45.2 percent – wide enough variation to ignore those dropped cases. Eventually, the sample consists of 140 thousand male immigrants in 141 MSAs, making 503 geo-ethnic groups.

To estimate population density, additional data of land area was obtained from the PL94-171 data published by U. S. Census Bureau.

## MEASUREMENTS OF MAJOR VARIABLES

The unit of analysis in this research is individual immigrants and the levels of observations are individual and geo-ethnic group (ethnicity and MSA). The dependent variable is individual hourly wages calculated from the sum of wage/salary/self-employment income divided by usual hours worked or weeks worked in the previous year. Explanatory variables at individual level include education, labor market experience (time spent in the U.S.), English proficiency, employment status, and disability (see **Table 2**). Marital status is included as a control. These human capital variables such as education, experience, and English have positive effects on wages and unemployment and disability have negative effects, as naturally expected. The question is how these human capital effects are related with group traits.

Geo-ethnic level variables are designed to capture the concepts derived from the theories : clustering, communal type, communal resource, and labor market (see **Table 3**). Clustering is

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<sup>6</sup> Two-sample t-tests indicated that the excluded immigrants entered rather recently, have better English skill and education, and receive higher income. 22.6 percent of them are Chinese and Indians.

Table 2. Summary Table of Individual Variables

	Dollar		Years				%			
	Hourly Earning	age	Residency	Education	Self Employed	Un-employed	Fluent English	Disability	Married	Citizen
White European	15.7	43.8	20.9	13.1	17.9	3.5	92.5	2.7	79.1	52.3
Chinese	11.5	40.7	13.0	13.4	15.3	3.1	73.6	1.7	80.2	54.4
Japanese	20.1	39.7	10.2	14.7	14.4	0.4	79.2	1.8	80.4	12.3
Korean	12.1	41.5	10.7	14.0	36.2	1.8	67.4	3.7	85.7	43.3
Indian	14.7	39.8	11.6	15.1	12.9	3.1	96.0	1.6	83.6	41.8
Filipino	12.0	41.5	13.4	14.0	5.5	2.6	96.2	2.1	79.1	61.3
Vietnamese	10.6	37.2	9.7	12.7	9.8	4.0	77.4	2.2	63.5	60.1
Cuban	10.4	44.4	19.7	11.5	18.6	4.2	68.6	2.6	73.8	55.3
Dominican	8.9	38.7	13.2	10.0	9.4	8.7	57.2	2.4	67.2	30.4
Haitian	8.6	39.2	11.7	10.9	7.8	7.3	76.8	2.1	60.9	27.3
Mexican	7.7	36.6	14.3	7.7	6.9	7.2	53.2	2.5	74.6	23.8
Jamaican	11.2	40.6	13.4	11.9	7.8	5.8	99.6	2.5	68.4	38.0
Salvadoran	7.6	34.9	9.4	8.7	5.9	6.3	52.0	1.7	63.7	17.2
Guatemalan	7.6	35.5	10.0	9.0	6.1	6.4	54.8	2.7	63.5	16.8
Colombian	9.9	39.0	13.4	11.9	13.0	5.2	68.2	2.1	66.4	29.3
Total	10.2	39.5	14.8	10.9	11.8	5.1	70.3	2.4	75.4	38.2

Source : U.S. Census Bureau 1990 PUMS (see text for details).

Table 3. Geo-Ethnic Level Variables

	1st Gen	Ethnic	*MSA	Welfare		Labor		Blue	High	Self-	**Resi-	MSA	Group G	n
	Immig.	Cluster	Density	Poverty	English	Force	sional	Collar	Educ	Emp	dence	Gini	ini	
White														
European	.023	.737	.032	.021	.097	.654	.262	.203	.534	.074	25.7	.508	.498	108
Chinese	.697	.013	.050	.022	.175	.715	.313	.100	.662	.067	11.6	.514	.550	47
Japanese	.503	.022	.076	.009	.094	.730	.359	.081	.723	.064	11.3	.516	.542	16
Korean	.738	.007	.071	.023	.171	.694	.203	.159	.582	.134	10.3	.514	.597	27
Indian	.752	.006	.047	.020	.135	.706	.343	.124	.735	.069	10.1	.515	.571	51
Filipino	.675	.019	.057	.029	.079	.692	.251	.152	.697	.040	12.6	.517	.467	35
Vietnamese	.812	.007	.045	.074	.326	.698	.115	.299	.445	.046	8.4	.514	.505	28
Cuban	.651	.022	.076	.052	.157	.712	.223	.229	.462	.068	20.7	.524	.518	23
Dominican	.710	.022	.103	.059	.339	.676	.071	.379	.243	.034	11.1	.517	.502	12
Haitian	.742	.011	.070	.017	.285	.683	.109	.235	.373	.039	10.3	.524	.461	9
Mexican	.332	.148	.023	.032	.353	.618	.086	.318	.250	.035	12.4	.523	.517	85
Jamaican	.783	.008	.070	.025	.169	.734	.172	.204	.429	.045	12.4	.524	.438	15
Salvadoran	.819	.008	.097	.022	.297	.733	.062	.355	.204	.040	8.3	.526	.507	16
Guatemalan	.810	.004	.076	.020	.303	.734	.064	.358	.241	.043	9.1	.528	.538	13
Colombian	.765	.009	.091	.022	.199	.738	.139	.300	.406	.052	12.4	.521	.509	18
Total	.508	.191	.050	.028	.196	.682	.209	.219	.495	.060	14.7	.517	.519	503

\* 10,000 persons per square km ; \*\* years. Source : See Table 2.

measured by the proportion of total MSA population that belongs to each geo-ethnic group. General urbanization – the number of persons (in 10,000) per square kilometer – is also used to account for wide variation of land sizes of MSAs. If the first hypothesis stands, these indicators of clustering decrease the positive human capital effects and mitigate negative individual effects such as unemployment and disability.

Communal type is measured in two folds. A “newness” of a group is derived from the average U.S. residency of member immigrants and the relative size of the first generation (foreign-born) in the ethnic group. Class concentration is measured by the proportions of the total labor force that are professional or blue collar. If the second hypothesis stands, the “newness” accelerates the effect of human capital, unlike clustering effects. The professional type groups also accelerate the human capital effect, but blue-collar groups have an orientation rather similar to clustering effects.

Communal resources are measured by the average education and/or the proportion of total population in a group that is highly educated. The lack of communal resources is measured by the proportion of group population whose earned income is less than 130% of the poverty threshold in the previous year,<sup>7</sup> and the proportion receiving welfare. If the third hypothesis stands, greater group resources positively affect the positive human capital effects, and negative resources negatively affect them. The lack of resources on negative individual effects is also negative, because there is no resource to help those unemployed or disabled.

Labor market conditions include job opportunities. The proportion of total population that is self-employed indicates positive opportunities and that is unemployed indicates negative opportunities for immigrant workers. The level of inequality and unemployment rate in MSA indicates competitive condition between groups. Inequality within a group, on the other hand, indicates more opportunity for skilled workers, suggesting that there is an enclave type of labor market. If the fourth hypothesis stands, higher unemployment rate of a geo-ethnic group negatively affect the positive human capital effects, but the skilled immigrants find positive effect on income where

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<sup>7</sup> It is well known that the official poverty thresholds are too low. To adjust the poverty indicator to somewhat real poverty level, I use here 130% – this is a standard procedure in income studies though the level of adjustment may vary within a reasonable range.

Table 4. Summary of Variables

Variable	Mean	Std. Dev.	Min	Max	Obs
Logged Wage	2.33	0.74	0	8.72	139957
Unemployed	0.05	0.22	0	1.00	139957
Education (yrs)	10.87	4.87	0	18.00	139957
Density (group)	0.05	0.14	0	1.99	503
Density (MSA)	0.50	0.76	0.01	4.57	503
Foreign Born	0.51	0.31	0	0.90	503
Professionals	0.21	0.12	0.01	0.56	503
Under Poverty	0.20	0.13	0.01	0.61	503
Self-Employed	0.06	0.03	0.00	0.22	503
Unemployment	0.05	0.03	0.00	0.20	503
Inequality (group)	0.52	0.02	0.44	0.60	503
Inequality (MSA)	0.52	0.05	0.39	0.68	503

Source : See Table 2.

within-inequality is greater.

Note that the geo-ethnic level variables are constructed based on the entire sample including both sexes and all ages, and weighted to obtain population estimates. Because these variables are not identical with the aggregate characteristics of the individual sample, a multivariate model is less severely subject to the problem of multicollinearity. Lastly, the modes of incorporation are hard to operationalize, especially when the number of national origin is limited. Ethnicity dummy variables are added to the model to account for any unobserved effects attributed to ethnicity. However, it is still speculative to interpret that these unaccounted differences are caused by the modes of incorporation and nothing else. The summary of major variables is shown in **Table 4**.

## ANALYTIC STRATEGIES

To address variations between geo-ethnic groups, statistical models need to take into account a nested multiple-level data structure. This study uses a random-effect model and Hierarchical Linear Model (Bryk and Rudenbush 1992) to approach the multi-level structure. The basic model is:

$$(1) \log W_{ij} = \alpha + \beta X_{ij} + \gamma X_j + \delta (X_{ij} \cdot X_j) + \lambda_k D_k + \nu_j + \varepsilon_{ij}$$

where  $\log W_{ij}$  is logged hourly wage,  $X_{ij}$  through  $X_j$  are vectors of individual and group-level explanatory variables, the group-individual interactions are in the parentheses,  $D_k$  is a set of dummy variables for immigrants' ethnicity,  $v_j$  is a group-level error and  $\varepsilon_{ij}$  is an individual-level error. Individual 'i' is nested in geo-ethnic group 'j' and 'j' is nested in ethnicity 'k'. It is assumed that the means of  $v_j$  and  $\varepsilon_{ij}$  are both 0 and their variances homoscedastic, and uncorrelated with Xs. The random-effect model is preferable to a fixed-effect model here because the estimates of random-effect model can be inferred to the population. It also can directly estimate  $\gamma$  and  $\lambda$ , whereas fixed-effect models drop them. However, random-effect models have biased estimates if Xs are correlated with errors and it is often the case. To avoid this problem, the random-effect models are tested using Hausman test against the fixed-effect estimates which are still unbiased when the Xs are correlated with errors.

In a hierarchical model, the equation (1) is a random-intercept model with non-randomly varying slopes. Keeping symbols comparable, equation (1) can be decomposed to 2-level hierarchical model. Using subscript  $n=1\dots N$  to indicate different first-level slopes:

$$\begin{aligned} (2) \log W_{ij} &= \alpha_j + \beta_{1j} X_{1ij} + \dots + \beta_{nj} X_{nij} + \varepsilon_{ij} \\ \alpha_j &= \alpha + \gamma_1 X_{1j} + \dots + \gamma_n X_{nj} + \lambda_k \mathbf{D}_k + v_j \\ \beta_{nj} &= \beta_n + \delta_n X_{nj} \end{aligned}$$

where the first line is an individual-level equation and the next line is a group-level equation for the individual-level intercept  $\alpha_j$  and third line for second-level slopes  $\beta_{nj}$ . Slope  $\beta_{nj}$  does not necessarily have the second-level factor  $X_{nj}$  unless the slope interact with  $X_{nj}$ . Interaction effects  $\delta$  are zero when  $\beta_j = \beta$ , in other words they have only main effects when  $\delta$ s are zero. Equations (1) and (2) are theoretically identical.<sup>8</sup>

Whereas the random-effect model (1) can include only one second-level error term, HLM can include additional random effects separately in the estimation of slopes.

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8 There are slight differences in the GLS (Generalized Least Square) estimations in STATA and HLM because whereas STATA uses within-OLS to estimate variance-covariance component of error terms, HLM uses REML (Restricted Maximum Likelihood) to estimate it. In most cases, these two software systems produce identical estimates by three digits when exactly same models are estimated.

$$\begin{aligned}
(3) \log W_{ij} &= \alpha_j + \beta_{1j} X_{1ij} + \dots + \beta_{nj} X_{nij} + \varepsilon_{ij} \\
\alpha_j &= \alpha + \gamma_1 X_{1j} + \dots + \gamma_n X_{nj} + \lambda_k \mathbf{D}_k + \nu_{\alpha j} \\
\beta_{nj} &= \beta_n + \delta_n X_{nj} + \nu_{nj}
\end{aligned}$$

In practice, not all  $\beta_{nj}$  have  $\nu_{nj}$  because usually a few slopes have random effects. Further extension to a three-level model is possible using higher category such as ethnicity or MSA, but this study is limited to 2-level models in order to avoid complication. The estimated  $\delta$ s are used to test the hypotheses. The robust standard-error estimation in HLM adjusts for potential heteroscedasticity and enables somewhat better assessment of statistical significances.

## RESULTS

After many trials, several redundant indicators were excluded from the model. Estimations of individual-group interactions were limited to the impacts of group variables on the effects of education and unemployment, because these two variables most efficiently represent positive and negative individual effects on hourly wages. **Table 5a** and **5b** shows main results regarding the determinants of these two effects ( $\delta_n$  and  $\gamma$ ) from the Hierarchical Linear Model equation (3). Full results are available upon request to the author. The large negative value of BIC (Bayesian Information Criterion) measure of model-fit shown at the bottom of the table indicates the model is a good fit.

The first two group effects indicate that higher population density decreases the effect of individual education on wages. For example, the effect of 10 additional years of education will be discounted by 2% if the coethnic density increases 100 persons per square kilometer. On the other hand, the positive impact on unemployment effect suggests that clustering also provides some job opportunities within ethnic groups.

The next set of group effects shows that newer ethnic group and greater proportion of professional occupation increase the education effect but decrease the unemployment effect. For example, if a group consists of completely professional workers, the effect of every year of education increases by 18%.

Thirdly, the proportion of people under poverty, which indicates the lack of communal resource,





decreases education effect. If everyone in the ethnic group earns below-poverty income, the effect of one additional year of education decreases by 3%.

Lastly, inequality within an ethnic group increases the education effect on wages. The greater proportion of self-employed persons decreases the effect of education. If self-employed population increases by 10 percent, the effect of 10 years of education decreases by 8%.

Coefficients for the ethnicity dummies are presented in **Table 5c**. The estimates are significant for all groups but Japanese. It indicates the differences between white European immigrants and each ethnic group that were not explained away by the model. Note that Chinese, Japanese, Indian and Filipino are the only ethnic groups whose educational attainments exceed the white European's. Three of these most educated groups receive the largest negative difference in wages after controlling for education and other factors, meaning that these groups receive significantly less (40% for Filipino) for their individual and group characteristics which are equivalent to that of white Europeans. It could be because the most rewarded parts of the groups were disproportionately dropped from the sample due to small group size. Or, as described in the "modes of incorporation" perspective, it could be labor market discrimination and/or government policy. Further investigation using national origin factors will be necessary to explain these between-ethnicity differences.

## **CONCLUSION**

The multilevel hierarchical model advanced our understanding of group-individual dynamics in immigrants' economic outcome. It was found that clustering of immigrants in an area limits the human capital effects and alleviates externality effects, but inequality within a group increases the education effect. On the other hand, the lack of communal characteristics exposes individuals directly to labor market. These findings suggest that there is a mechanism of stabilization in clustered and enclave-type geo-ethnic groups. With regard to immigration policy, increasing non-family, work-based, immigrants will undermine the enclave effects and increase social and economic costs of immigration.

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