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【論　文】

# Impacts of Low-skilled Immigration on the Internal Migration of the US-born Low-skilled Americans in the United States: An Assessment in A Multivariate Context

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〔Abstract〕

This paper assesses the impacts of low-skilled immigration on the interstate migration of the US-born low-skilled Americans, based on the disaggregated data of the 1990 Census. Our results reveal that the push effects of the immigration on the departure process was much stronger than its discouraging and complementary effects on the destination choice process; and that the push effects of low-skilled immigration are (1) stronger on whites than on non-whites, (2) much stronger on the poor than on the non-poor, (3) weaker on the 15-24 age group than on older age groups, and (4) the strongest on poor whites.

## INTRODUCTION

The US immigration process since the 1965 Immigration Act has undergone major changes, including (1) an increase in immigration level, (2) a shift in major sources from Europe to Latin America and Asia, (3) an increased concentration into a few port-of-entry states and metros, and (4) a decline in the immigrants' skill level (Massey, 1995; Borjas, 1994). Combined with the slowdown of economic growth since the oil crisis of 1973 and the massive loss of secure manufacturing jobs accompanying the globalization of the capitalist economic system (Sassen, 1988), these changes have helped raise anti-immigration sentiments in the United States, especially in California which not only is the most preferred destination of the new immigrants but also has a disproportionately large share of low-skilled immigrants (Liaw and Frey, 1998). Rightly or wrongly, immigration has been blamed for causing serious socioeconomic problems in the United States. For policy formulation and informed public debates, it is important to use empirical data to assess the potential impacts of immigration.

An important potential effect of immigration is the displacement of specific sub-populations in the major port-of-entry areas, resulting in the selective net out-migration of long-term residents. Such selective net out-migration could contribute to the demographic Balkanization of the country (Frey, 1995a, 1995b, 1996; Frey and Liaw, 1998). It may also help transfer other potential impacts of immigration (e. g. the reduction in wage levels and the rise in unemploy-

ment) to the rest of the country (Borjas, Freeman and Katz, 1992).

The main purpose of this paper is to assess the potential impacts of low-skilled immigration on the interstate migration of the US-born low-skilled persons in the United States, based on the 1985-90 migration data from the population census of 1990. Both the immigrants and US-born persons are restricted in this study to those in the labor-force age groups (aged 15-64 in 1990). Since interstate migration can also be affected by other factors such as distance, climate, and conventional labor market forces (Frey, et al, 1996 ; Liaw and Frey 1996), our assessment will be carried out in a multi-variate context.

The organization of the paper is as follows. We discuss the theoretical reasons for various impacts of low-skilled immigration and review briefly the previous empirical findings in section 2. The description of the data and the formulation of the multi-variate statistical model are presented in section 3. The estimated results are interpreted in section 4. Based on the best estimated results, the impacts of changes in low-skilled immigration are then assessed in section 5. The main findings are summarized in section 6. To reduce the burden on the readers, the detailed definitions of the explanatory variables are relegated to Appendix A.

## 1. POTENTIAL AND OBSERVED EFFECTS OF LOW-SKILLED IMMIGRATION

A large and sustained influx of low-skilled immigrants into a few port-of-entry states can push out the states' long-term residents and discourage in-migrants from other states for several reasons (Frey and Liaw, 1998). First, these immigrants may help create a 'dual' economy in which they complement the well-paid and high-skilled professionals but compete for the low-paying and insecure jobs against the low-skilled native workers. The benefits tend to accrue to the upper class, whereas the lower class bear the adverse economic consequences. Thus, the push effect on out-migration and the discouraging effect on in-migration are expected to be strong for the low-skilled US-born residents, especially those whose income is below the poverty line. Second, the immigrants may change radically the cultural milieu of the port-of-entry areas, undermining the native residents' sense of community and perhaps amplifying their ethnic prejudices as well. To the extent that the less-educated are less receptive or tolerant to different ethnic cultures, the low-skilled US-born residents are again expected to be more prone to react negatively "with their feet". Third, the low-skilled immigrants may burden heavily on the local social service systems, especially those for education, maternity, and welfare, resulting in an increase in local tax burden and a decrease in the quality and availability of these services to long-term residents. The push effects of these impacts may be similarly strong on both low-skilled and high-skilled natives.

In addition to benefitting the high-skilled natives via the dual labor market system, the low-skilled immigration may have other real and perceived beneficial impacts. First, to the extent that the low-skilled immigrants take jobs that the natives are unwilling to do, they can benefit not only the high-skilled but also the low-skilled natives. In other words, the immigration tide can raise all boats. Second, through strong motivation and hard work, these immigrants may succeed in their economic pursuit and help expand the markets of the goods and services produced by domestic industries. Through multiplier effects, they may help stimulate economic growth and raise the incomes of the natives of all strata. Third, the multicultural communities created by the immigrants may be perceived and enjoyed as stimulating and rich cultural environments by some natives, especially those who are young adults and above the poverty line. Thus, the low-skilled immigration may help reduce the out-migration and increase the in-migration of the native-born, even those with low skills.

From a long historical perspective, it is hard to deny that without immigrants the economy of the United States could not have been developed into the strongest one in the world. However, the US history also contained clear evidence that immigrants could be substitutes for native-born workers and hence affect the migration pattern of the native-born popu-

lation. During the rapid industrialization of the northern United States from the 1860s to the early years of the 20th century, the capitalists in the North preferred to import white immigrants from Europe over the abundant black labor in the South, partly based on the myth that blacks were not intelligent enough to work with machine (Myrdal, 1962). Despite the large and persistent wage gap between the North and the South, the surplus black labor was trapped in the South for many decades due to the large influx of European immigrants into the industrializing North. When this influx was stopped by World War One, the northern capitalists sent out agents to start a massive recruitment of the black labor in the South, resulting in the Great Migration of the blacks into the northern industrial cities, which remained at a fairly high (though reduced) level even during the depression years of the 1930s (Myrdal, 1962 ; Drake and Clayton, 1962). With this historical evidence and our own earlier research results (e. g. Frey 1995b ; Frey et al 1996) in mind, we can not easily accept the sweeping claim that "natives [in the United States during 1975-80 and 1985-90] do not migrate in response to the presence of immigrants in a metropolitan labor market" (Wright, Ellis and Reibel, 1997, p. 248).

Although the empirical investigations on the effects of immigration on internal migration during the 1970s and 1980s have so far yielded mixed results, most of the studies that stratify the population by skill levels and race or focus on low-skilled sub-populations have demonstrated the displacement effects of immigration on internal migration.[1] The study by Manson and his associates on the potential impacts of Mexican immigrants (who are mostly poorly educated) to Southern California concluded that "[Mexican immigrants] may have served as labor market complements to skilled internal in-migrants and, at the same time, as substitutes for the less-skilled workers", and that "the demand in California for low-wage low-skilled workers that was once met by internal migration is now being satisfied by immigrants from Mexico" (Manson, Espenshade and Muller 1985, p. 32)[2]. The study by Filer on the impact of immigration on the internal migration of up to 272 metropolitan areas in 1975-80 concluded that "the higher the concentration of recent immigrants in an area, the less attractive that area appears to have been for native workers", and that "mobility responses by native workers to immigrant arrivals are especially prominent among whites" (Filer, 1992, p. 267)[3]. Another study on the effect of immigration on the annual interstate migration of native-born population in 1981-90 highlighted that "States with high levels of recent immigration are less likely to retain Anglo workers or receive new Anglo interstate migrants" and that "Low skilled Anglos are more susceptible to this substitution effect than those of higher skill level" (White and Liang, 1998, p. 1)[4].

Our examination of the recent studies suggests that the finding of insignificant displacement effects of immigration on internal migration is most likely due to (1) the lack of proper disaggregation of the at-risk population, (2) an inadequate specification of the explanatory variables, and (3) the crudeness of the dependent variable and of the model design. White and Imai (1994) suspected that their finding of insignificant displacement effect of immigration on the native-born internal migration of the major metropolitan areas in 1965-70 and 1975-80 was probably due to a high level of aggregation : the migration data was not disaggregated by race, educational attainment or occupation. The dismissal of the displacement effect of immigration on the internal migration of native workers by Wright, Ellis and Reibel (1997) was, in our opinion, due to several methodological problems. First, in their specification of the explanatory variables, they made the dubious decision of lagging the employment growth rate by five years. The rapid responses of internal migration to the economic booms and busts of Texas and California in the recent decades suggest how seriously this lagged explanatory variable may have messed up the estimation results. Second, despite the existence of evidence that the reaction of internal migration to immigration is highly selective by race/ethnicity, their migration data were not disaggregated by race. Third, their use of net migration volume as the dependent variable does not allow the incorporation of highly important relational variables (e. g. distance and racial similarity) in their model. The inability to control for the

effects of these variables reduces the chance of making valid statistical inference.[5]

By using well-disaggregated migration data and avoiding previous methodological shortcomings, we have shown in our previous multi-variate analysis (Frey, et al 1996; Liaw and Frey, 1996) that the 1985-90 immigration indeed had displacement effects on the internal migration of young adult age groups, and that the effects were highly selective with respect to race, educational attainment and poverty status. We now want to extend this investigation to all labor force age groups and to assess the magnitude of the displacement and spillover effects.

## 2. DATA AND STATISTICAL MODEL

Our data on the 1985-90 interstate migration of the US-born low-skilled persons come from a multidimensional tabulation of all "long-form" records of the 1990 census, which was inflated to represent the total population.[6] In this paper, **low-skilled persons** are defined as those with **only high school education or less**. Washington, D. C. is considered as one of the states. Alaska and Hawaii are excluded from our analysis, because the data on one of the explanatory variables (AFDC and Food Stamp benefits) are not available for these states. In addition to the states of residence in 1985 and 1990, the dimensions of the tabulation include: (1) five-year age groups (15-19, 20-24, ···, 60-64), (2) educational attainment (less than high school, high school graduation), (3) poverty status (poor, non-poor), (4) race (Non-Hispanic White, Black, Asian, Hispanic, and American Indian), and (5) gender (female, male). Poverty status is defined according to the official poverty line. Observations with unknown poverty status, representing about 2% of the population, are put in the non-poor category for simplicity. Also for simplicity, we use race to represent "race and ethnicity". Pacific Islanders are included in the Asian group. Eskimos and Aleutians are included as American Indians.

Our multivariate statistical model is a two-level **nested logit model** formulated in the following way. For a potential migrant with personal attributes s and residing in state i, we specify that the migration behavior depends on (1) a departure probability p[i, s] at the upper level, and (2) a set of destination choice probabilities, p[j|i, s] for all j not equal to i, at the lower level. Based on a set of reasonable assumptions these probabilities then become functions of observable explanatory variables in the following two submodels (Kanaroglou, et al 1986).

**Destination Choice Submodel :**

$$p[j|i,s]=\exp(b'x[j,i,s])/\sum_{k\neq i}\{\exp(b'x[k,i,s])\} \quad \text{for } j\neq i \tag{1}$$

where x[j, i, s] is a column-vector of observable explanatory variables; b' is a row-vector of unknown coefficients.

**Departure Submodel :**

$$p[i,s]=\exp(d+c'y[i,s]+u^{*}I[i,s])/\{1+\exp(d+c'y[i,s]+u^{*}I[i,s])\} \tag{2}$$

where y[i, s] is another column-vector of observable explanatory variables; d, c' and u are unknown coefficients, with u being bounded between 0 and 1; and I[s, i] is the so-called inclusive variable:

$$I[i,s]=\ln\{\sum_{k\neq i}\{\exp(b'x[k,i,s])\}\} \tag{3}$$

where ln is the natural log function.

Assuming that the migration behaviors of all persons in the same cell of the multidimensional migration table depend on the same set of p[i, s] and p[j|i, s], we estimate the unknown coefficients in equations (1) and (2) sequentially by the maximum quasi-likelihood method (McCullagh 1983; Liaw and Ledent 1987).

The explanatory variable at the focus of this paper is the **low-skilled immigration rate**, which is defined by dividing (1) the state-specific number of 1985-90 **foreign-born** immigrants with high school education or less, aged 15-64, by (2) the 1985 state population, aged 15-64.[7] The unit is "percent per 5 years". In computing the values of this variable from the data of the 1990 census, we exclude the US-born returning "immigrants", because they are legally and sociologically not really immigrants. The three highest values of this variable are 4.07% (California), 2.24% (New York), and 2.15% (Florida).[8] Its weighted mean is 1.23%. Its values for other major immigrant-

receiving states are 1.63% for New Jersey, 1.45% for Massachusetts, 1.24% for Texas, and 1.10% for Illinois. It is expected that this variable would have significant interactions with the dummy variables representing race and poverty status in both departure and destination choice sub-models.

The remaining explanatory variables (i. e. the covariates) are chosen to provide a rather comprehensive multivariate context. They are used to represent the effects of conventional labor market variables, welfare generosity, racial similarity, qualities of physical and social environments, distance, contiguity, size of ecumene, non-natives' share of state population, and the armed forces' share of total employment (details in Appendix A).

Since the effects of the low-skilled immigration

Table 1. Estimation Result of Destination Choice Model for US-born Low-skilled Interstate Migrants of the 30-44 Age Grouop : 1985-90.

| Explanatory Variable | Best Model | | Marginal Contribution |
|---|---|---|---|
| | Coefficient | T-Ratio | to the Rho-square |
| **1. EFFECTS OF FOREIGN-BORN IMMIGRANTS** | | | **0.0006** |
| Low-skilled Immigration Rate | 0.05 | 10.1 | |
| Low-skilled Immigration Rate * Poor White | -0.16 | -16.8 | |
| Low-skilled Immigration Rate * Poor Black | -0.16 | -9.3 | |
| Low-skilled Immigration Rate * Poor Hispanic | -0.25 | -9.4 | |
| Low-skilled Immigration Rate * Poor Indian | -0.51 | -10.6 | |
| **2. EFFECTS OF AFDC & FOODSTAMP BENEFITS** | | | **0.0001** |
| AFDC & FS Benefit * Poor Female | 0.31 | 2.8 | |
| AFDC & FS Benefit * Poor Black Female | 1.53 | 6.1 | |
| AFDC & FS Benefit * Poor Indian Female | 3.35 | 5.9 | |
| **3. EFFECTS OF LABOR MARKET VARIABLES** | | | **0.0075** |
| Income | 0.47 | 14.8 | |
| Civilian Employment Growth | 2.18 | 19.2 | |
| Service Employment Growth | 3.00 | 29.6 | |
| **4. EFFECTS OF RACIAL ATTRACTIONS** | | | **0.0071** |
| Racial Similarity | 0.30 | 46.6 | |
| Racial Similarity * Black | 0.06 | 4.3 | |
| Racial Similarity * Asian | 0.27 | 3.9 | |
| Racial Similarity * Hispanic | 0.12 | 6.8 | |
| Racial Similarity * American Indian | 0.24 | 11.2 | |
| Racial Similarity * Less Than High School Educ. | 0.05 | 2.2 | |
| **5. EFFECTS OF DISTANCE AND CONTIGUITY** | | | |
| Ln(Distance) | -0.72 | -109.6 | |
| Ln(Distance) * Less Than High School Educ. | -0.07 | -8.5 | |
| Contiguity | 0.73 | 73.2 | |
| **6. EFFECTS OF SOCIAL & PHYSICAL ENVIRONMENT** | | | |
| Violent Crime Rate | -1.22 | -6.2 | |
| Coldness of Winter | -0.20 | -61.9 | |
| Coldness of Winter * Aged 35-39 | -0.02 | -6.9 | |
| Coldness of Winter * Aged 40-44 | -0.07 | -16.9 | |
| **7. EFFECT OF ECUMENE SIZE** | | | |
| Ln(Population Size) | 0.71 | 157.5 | |
| **Rho-Square: 0.1655** | | | |

Table 2. Estimation Result of the Departure Model for US-born Low-skilled Americans of the 30-44 Age Group : 1985-90.

| Explanatory Variable | Best Model | | Marginal Contribution |
|---|---|---|---|
| | Coefficient | T-Ratio | to the Rho-square |
| Constant Term | -3.04 | -21.3 | |
| 1. PUSH EFFECTS OF FOREIGN-BORN IMMIGRANTS | | | 0.0058 |
| Low-skilled Immigration Rate * White | 0.31 | 30.2 | |
| Low-skilled Immigration Rate * Black | 0.24 | 14.2 | |
| Low-skilled Immigration Rate * Asian | 0.16 | 2.9 | |
| Low-skilled Immigration Rate * Hispanic | 0.07 | 3.3 | |
| Low-skilled Immigration Rate * Indian | 0.15 | 3.7 | |
| Low-skilled Immigration Rate * Poor White | 0.23 | 24.1 | |
| Low-skilled Immigration Rate * Poor Black | 0.16 | 7.1 | |
| Low-skilled Immigration Rate * Poor Hispanic | 0.23 | 6.7 | |
| Low-skilled Immigration Rate * Poor Indian | 0.25 | 4.0 | |
| 2. PUSH EFFECT OF US-BORN IMMIGRANTS | | | |
| Returning Immigrantion Rate of US-Born Persons | 0.61 | 16.9 | |
| 3. RETAINING EFFECTS OF WELFARE | | | 0.0012 |
| AFDC&Foodstamp * Poor Black Females | -1.14 | -18.1 | |
| AFDC&Foodstamp * Poor Hispanic Females | -0.30 | -2.7 | |
| AFDC&Foodstamp * Poor Indian Females | -1.57 | -9.7 | |
| 4. EFFECTS OF LABOR MARKET VARIABLES | | | 0.0063 |
| Income | -0.79 | -7.9 | |
| Income * High School Graduate | -0.39 | -4.8 | |
| Civilian Employment Growth | -1.63 | -7.6 | |
| Service Employment Growth | -3.22 | -14.7 | |
| Service Employment Growth * High School Dropout | -0.77 | -4.2 | |
| Unemployment | 1.48 | 3.2 | |
| 5. RETENTION EFFECTS OF RACIAL SIMILARITY | | | 0.0020 |
| Racial Similarity * Black | -0.21 | -15.1 | |
| Racial Similarity * Asian | -0.41 | -11.9 | |
| Racial Similarity * Hispanic | -0.34 | -23.6 | |
| Racial Similarity * Am. Indian | -0.37 | -20.6 | |
| 6. EFFECTS OF PHYSICAL ENVIRONMENT | | | 0.0009 |
| Coldness of Winter | 0.11 | 12.9 | |
| Coldness of Winter * Aged 40-44 | 0.02 | 3.5 | |
| Hotness of Summer | 0.25 | 17.2 | |
| 7. RETENTION EFFECT OF SIZE OF ECUMENE | | | |
| Ln(Population Size) | -0.08 | -6.9 | |
| 8. EFFECTS OF AGE & EDUCATION SELECTIVITY | | | |
| Aged 35-39 | -0.14 | -11.6 | |
| Aged 40-44 | -0.34 | -12.6 | |
| High School Graduation | 0.36 | 3.0 | |
| 9. EFFECTS OF POPULATION COMPOSITIONS | | | |
| Non-Native's Share of State Popopulation | 2.61 | 31.3 | |
| Armed forces' Share of State Emp. * Aged 30-34 | 0.61 | 3.3 | |
| 10. DRAWING POWER OF THE REST OF SYSTEM | | | 0.0015 |
| Inclusive Variable | 0.43 | 22.5 | |
| Rho-square: 0.0278 | | | |

rate and the co-variates are expected to vary by the ages of the US-born persons, the nested logit model is applied separately to the 15-24, 25-29, 30-44, and 45-64 age intervals. The unequal age intervals are chosen to insure that all input data files of the estimation programs are of manageable sizes. Within each of the broad age intervals, one or more dummy variables are used to detect various aspects of age selectivity (e. g. increasing aversion to states with cold winter at older ages).

In constructing a relatively concise model (to be called the **best model** for simplicity) for each a interval, we only include the explanatory variab that are statistically significant (i. e. those wh t-ratios have a magnitude of at least 2.0) and subst tively sensible. However, a t-ratio with a magnitu of slightly less than 2.0 is also considered to be sign cant for the dummy variables representing rat small sub-populations (e. g. US-born Asians) in t destination choice sub-model for the 45-64 age int val.[9]

The goodness of fit of a given specification of

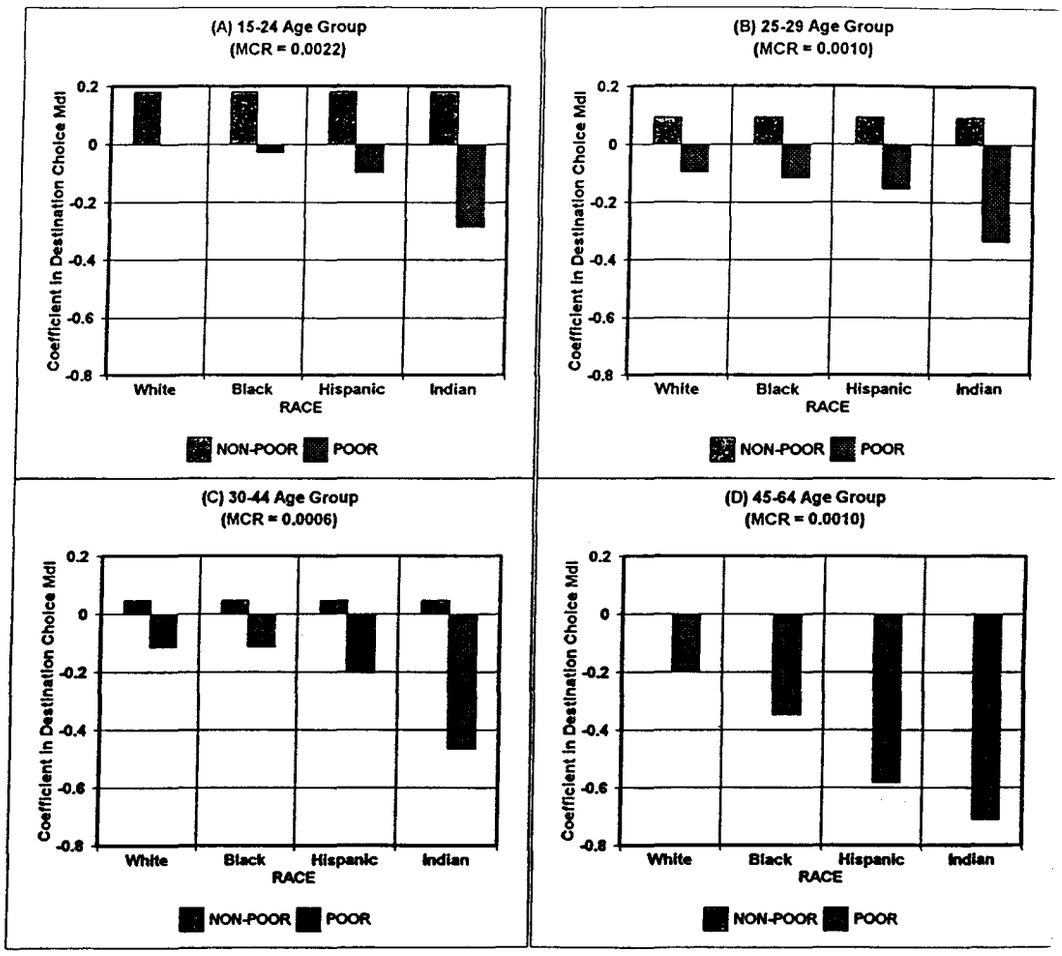



**Figure 1. The Coefficients of the Low-skilled Immigration Rate in the Destination Choice Submodel o the 1985-90 Interstate Migration of the US-born Low-skilled Americans in the Labor Forc Age Groups : by Poverty Status and Race (Ethnicity).**

sub-model is to be measured by :

$$\text{Rho-square} = 1 - Lg/Lo \quad (4)$$

where Lg is the maximum log of quasi-likelihood of the given specification and Lo is the maximum log of quasi-likelihood of the corresponding null sub-model (i. e. the destination choice submodel with b'=0 or the departure sub-model with c'=0).

To help evaluate the relative importance of one subset of explanatory variables (say conventional labor market variables) against another subset (say variables representing the effects of foreign immig tion), we will delete the two subsets of variables turn from the best model and then compare the resu ing decreases in Rho-square : the greater t decrease, the more important the deleted subset variables. The decrease in Rho-square resulting fr the deletion of a subset of explanatory variables called **marginal contribution to the Rho-square** Tables 1 and 2 and is denoted as MCR in Figure and 2.

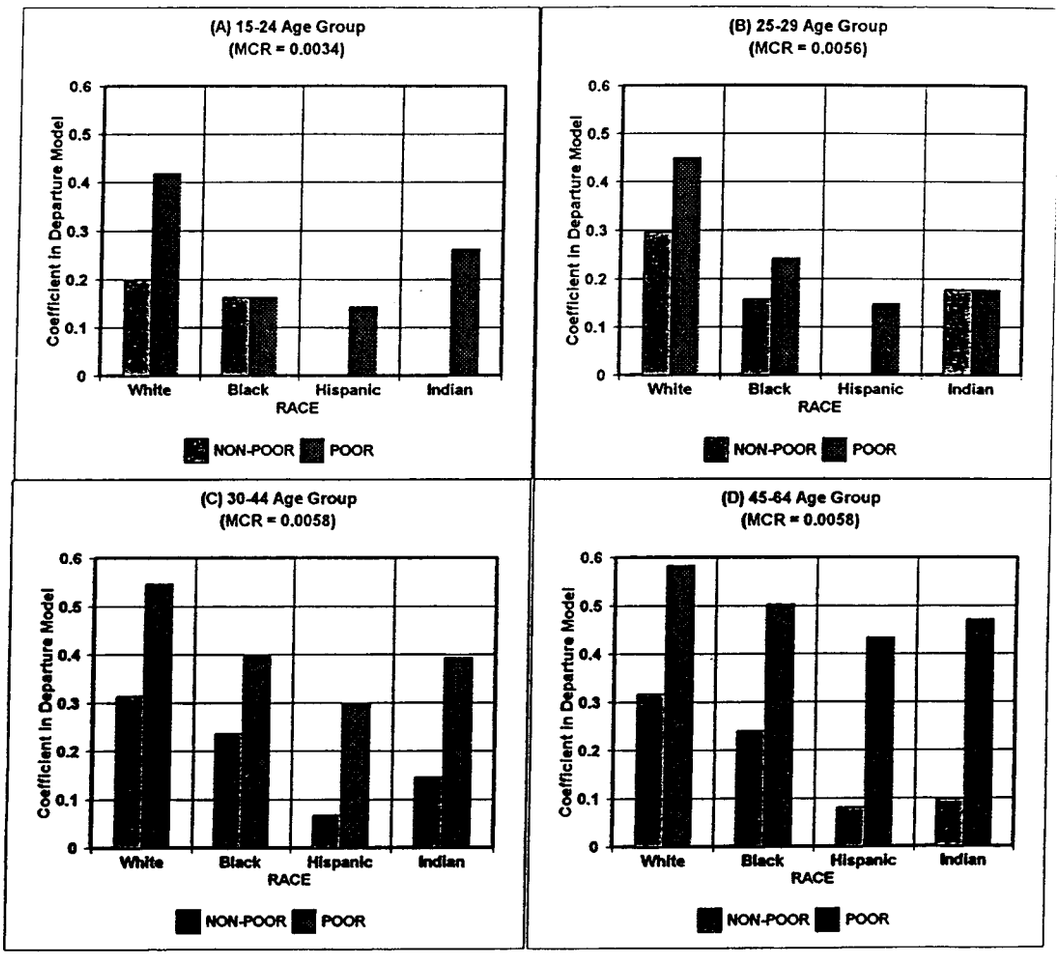



**Figure 2. The Coefficients of the Low-skilled Immigration Rate in the Departure Submodel of the 1985-90 Interstate Migration of the US-born Low-skilled Americans in the Labor Force Age Groups : by Poverty Status and Race (Ethnicity).**

## 3. ESTIMATION RESULTS

In order to make the estimation results understandable and to avoid overburdening the reader with too many numbers, we will present a detailed description in the text only for the 30-44 age interval.

### 3.1. Destination Choices of the US-born Low-skilled Migrants in the 30-44 Age Interval

The estimated coefficients in the destination choice submodel for the 30-44 age interval (Table 1) show that the effects of the low-skilled immigration rate on the destination choices of the US-born low-skilled migrants varied with poverty status: slightly positive on non-poor migrants and moderately negative on poor migrants.[10] In other words, non-poor migrants were mildly attracted to the states with many low-skilled immigrants, whereas poor migrants were moderately averse to choosing such states. Among poor migrants, American Indians and Hispanics were more subject to the discouraging effects of the low-skilled immigration than were whites and blacks (see footnote 10 for the numerical assessment).

Mainly because of the smallness of the US-born Asian population (only 0.4% of the US-born population) in the 15-64 age interval, the coefficients of the interaction terms between the low-skilled immigration rate and the dummy variables representing Asians and poor Asians mostly turned out to be not significantly different from zero in both destination choice and departure submodels. Therefore, we will say very little about US-born Asians in this paper.

The values of the marginal contribution to the Rho-square in Table 1 indicate that the explanatory power of the low-skilled immigration rate (0.0006) was somewhat greater than that of the welfare variable (0.0001) but much smaller than those of labor market variables (0.0075) and racial similarity (0.0071). Among the labor market variables, unemployment rate did not have a significant negative effect, whereas the positive effect of employment growth (especially in the service sector) was stronger than the positive effect of income.[11] The attraction of racial similarity was stronger for the minorities than for whites. It was also somewhat stronger for the migrants with less than high school education.

### 3.2. Departure Choices of the US-born Low-skilled Americans in the 30-44 Age Interval

The estimated coefficients in the departure submodel for the 30-44 age interval (Table 2) show that the low-skilled immigration rate had significant push effects on the departure choices of the US-born low-skilled persons of all five races, with the effect being stronger on whites than on other races. They also show that the poor of all races (perhaps with the exception of Asians) were more subject to the push effect of immigration than were their non-poor counterparts, and that the group most affected by the push effect was poor whites. The coefficient of the low-skilled immigration rate for the poor whites is 0.54 (the sum of 0.31 and 0.23), which is larger than the coefficient for any other group.

The values of the marginal contribution to the Rho-square in Table 2 indicate that the push effect of the low-skilled immigration rate (0.0058) was much stronger than the retaining effects of welfare benefits (0.0012) and racial similarity (0.0020) and was nearly as strong as the joint effects of the labor market variables (0.0063). Among the labor market variables, the retaining effect of employment growth (again, especially in the service sector) was stronger than the retaining effect of income and the push effect of unemployment. The retaining effect of racial similarity was (1) very strong on Asians, Hispanics and American Indians, (2) moderately strong on blacks, and (3) statistically insignificant on whites.

### 3.3. Selectivity in the Effects of Low-skilled Immigration Rate in All Age Intervals

Now we want to focus on the selective effects of the low-skilled immigration rate with respect to race, poverty status, and age. For this purpose, we have constructed Figures 1 and 2 from the estimated coefficients of the nested logit models for all four age intervals (15-24, 25-29, 30-44, and 45-64).[12]

With respect to the destination choice process, we

see in Figure 1 that the pull effect of low-skilled immigration rate on non-poor migrants decreased with their age : the coefficient of this variable decreased monotonically from nearly 0.2 for the 15-24 age group to zero for the 45-64 age group. In contrast, its discouraging effect on poor migrants tended to increase with age. For example, its coefficient for poor whites was magnified from zero in the 15-24 age group to about -0.2 in the 45-64 age group. Thus, non-poor labor force entrants were most likely to be attracted to the states with many low-skilled immigrants, whereas poor pre-retirees were most averse to choosing such states as their destinations. Among poor migrants, Hispanics and American Indians were more averse to choosing such states than were whites and blacks.

With respect to the departure process, both the poor and the non-poor were subject to the push effects of low-skilled immigration, with the effects being much stronger on the former than on the latter (Figure 2). This was true for all age groups. For both the poor and the non-poor, whites were more likely to be pushed out of the states with many low-skilled immigrants than were those of minority races. In all age groups, poor whites were most subject to the push effect of low-skilled immigrants.

## 4. IMPACT ANALYSIS

To see how changes in the level of the low-skilled immigration can impact on the net migrations of different states, we carry out two types of simulations. The first type involves an "across-the-board" change, which applies the same proportional change to the immigration rates of all states. The second type restricts the change to only California's immigration rate. The first type serves the purpose of assessing the differential impacts of a nation-wide change in the level of immigration, whereas the second allows us to get a concrete impression of the "spill-over" phenomenon from the state with the highest level of immigration.

We start the first type of simulations by decreasing and increasing the 1985-90 national number of immigrants in the labor force age group by 1,600,000 persons, among whom about 957,000 are low-skilled immigrants. For simplicity, we called these 50% changes, although the actual percentage is 48.9. To visualize the functional forms of the impacts of the changes, we reduce the magnitude of the changes successively by a factor of 0.5 and then display the functional forms in a set of graphs.

The second type of simulations is started by decreasing and increasing only California's low-skilled immigrants (aged 15-64) by 400,000 persons per five years. For simplicity, we also call these 50% changes, although the actual percentage is 52.8. Additional simulations are also performed by successively scaling the changes by a factor of 0.5 so that the functional forms of the impacts of these changes can be visualized.

### 4.1. Impacts of the Across-the-board Changes in Immigration

We see in the upper panel of Table 3 that the 50% across-the-board decrease in the low-skilled immigration causes California to switch from a net loser to a net gainer of US-born low-skilled migrants : its expected net migration is increased by 101,000 persons (from -14,000 to 87,000). In terms of changes in net migration volume and net migration rate, California experiences the greatest impact among the major immigrant-receiving states. Since its decrease in low-skilled immigrants is 370,000 persons, California has a displacement ratio of 27 low-skilled migrants to 100 low-skilled immigrants. The decrease in immigration also causes an increase in the net migration of other major immigrant-receiving states, ranging from 4,000 for Massachusetts to 53,000 for New York. The displacement ratios of Illinois, New York, and Texas (over 35 to 100) are greater than those of Massachusetts, Florida and New Jersey (about 10 to 100).

The lower panel of Table 3 shows that the 50% across-the-board increase in the low-skilled immigration causes a decrease in the net migration of all major immigrant-receiving states, ranging from 4,000 for Massachusetts to 188,000 for California. In terms of net migration volume and net migration rate, the impact is again strongest on California. The displacement ratios of California, New York and Illinois are

Table 3. The Impacts of Reducing and Increasing Low-skilled Immigrants (Aged 15-64) by About 50% on the Interstate Net Migrations of US-Born Low-skilled Americans (Aged 15-64) in Major Immigrant-receiving State in 1985-90 : Based on the Nested Logit Models for the 15-24, 25-29, 30-44, and 45-64 Age Groups.

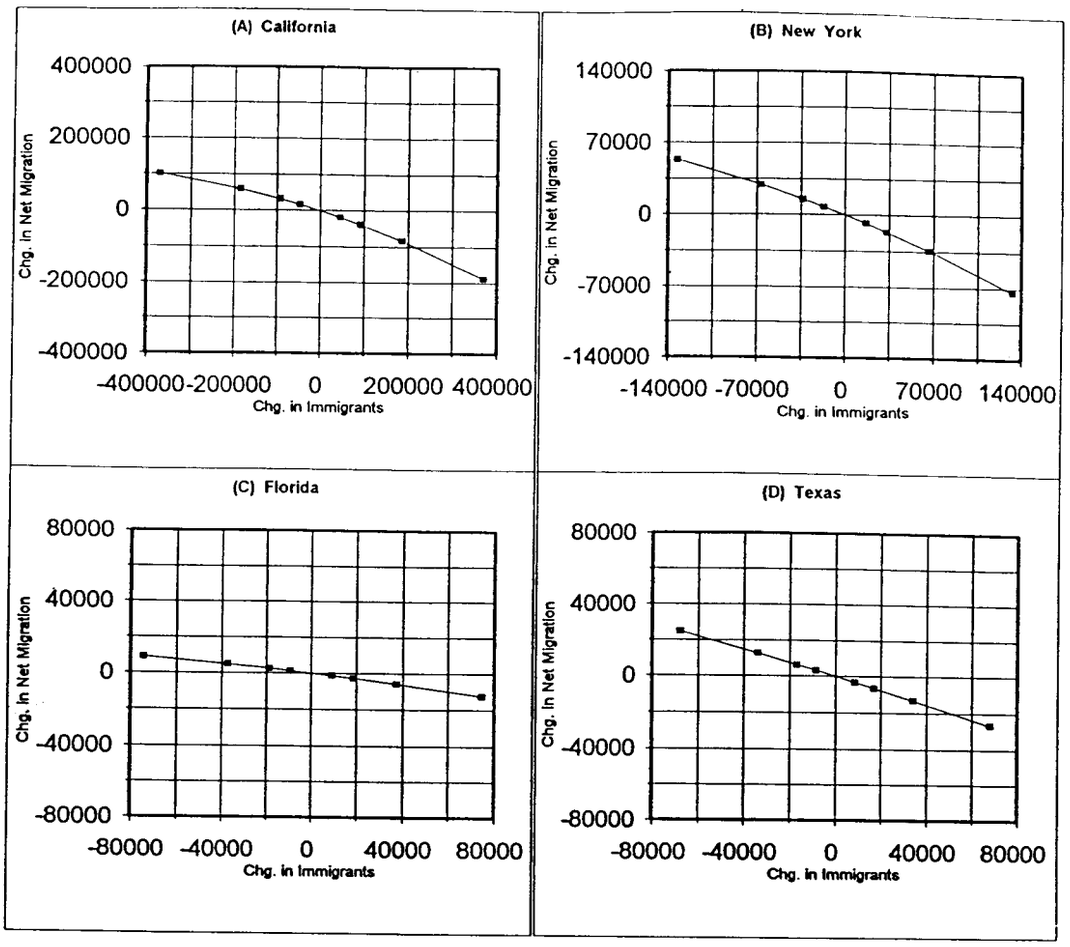
| State | Change in Immigrants Aged 15-64 | Base(1985) Population Aged 15-64 | Expected Net Migration Before Change | Expected Net Migration After Change | Expected Net Migration Impact | Expected Net Migration Rate Before Change | Expected Net Migration Rate After Change | Expected Net Migration Rate Impact | Change in Net Migrantion / Change in Imm. |
|---|---|---|---|---|---|---|---|---|---|
| | | | (Persons) | | | | (%) | | (%) |
| **Impact of Decreasing Immigration** | | | | | | | | | |
| CALIFORNIA | -369,882 | 6,082,805 | -14,454 | 86,516 | **100,970** | -0.24 | 1.42 | **1.66** | **-27.3** |
| NEW YORK | -133,012 | 4,827,116 | -129,755 | -76,605 | **53,150** | -2.69 | -1.59 | **1.10** | **-40.0** |
| FLORIDA | -74,444 | 3,277,570 | 196,693 | 205,513 | **8,820** | 6.00 | 6.27 | **0.27** | **-11.8** |
| TEXAS | -67,956 | 5,191,783 | -126,270 | -101,496 | **24,774** | -2.43 | -1.95 | **0.48** | **-36.5** |
| NEW JERSEY | -41,096 | 2,234,673 | 2,240 | 6,717 | **4,477** | 0.10 | 0.30 | **0.20** | **-10.9** |
| ILLINOIS | -41,007 | 3,453,353 | -115,475 | -94,740 | **20,735** | -3.34 | -2.74 | **0.60** | **-50.6** |
| MASS. | -28,312 | 1,628,761 | -9,335 | -5,268 | **4,067** | -0.57 | -0.32 | **0.25** | **-14.4** |
| **Impact of Increasing Immigration** | | | | | | | | | |
| CALIFORNIA | 369,882 | 6,082,805 | -14,454 | -202,577 | **-188,123** | -0.24 | -3.33 | **-3.09** | **-50.9** |
| NEW YORK | 133,012 | 4,827,116 | -129,755 | -204,263 | **-74,508** | -2.69 | -4.23 | **-1.54** | **-56.0** |
| FLORIDA | 74,444 | 3,277,570 | 196,693 | 184,414 | **-12,279** | 6.00 | 5.63 | **-0.37** | **-16.5** |
| TEXAS | 67,956 | 5,191,783 | -126,270 | -152,689 | **-26,419** | -2.43 | -2.94 | **-0.51** | **-38.9** |
| NEW JERSEY | 41,096 | 2,234,673 | 2,240 | -2,265 | **-4,505** | 0.10 | -0.10 | **-0.20** | **-11.0** |
| ILLINOIS | 41,007 | 3,453,353 | -115,475 | -138,920 | **-23,445** | -3.34 | -4.02 | **-0.68** | **-57.2** |
| MASS. | 28,312 | 1,628,761 | -9,335 | -13,601 | **-4,266** | -0.57 | -0.84 | **-0.26** | **-15.1** |

Note: The changes in immigration level are implemented by decreasing and increasing the 1985-90 foreign-born immigrants of the labor force age group by 1,600,000 persons (or 48.85%). Alaska and Hawaii are not included in the model. Age is defined as of 1990.

very high (over 50 to 100), whereas those of New Jersey, Florida and Massachusetts are relative low (about 10 or 15 to 100). Texas has a moderately high displacement ratio (about 40 to 100).

Comparison between the upper and lower panels of Table 3 shows that the 50% increase has greater impacts than does the 50% decrease in low-skilled immigration. The difference is particularly large for California. The non-linear functional relationships between immigration and net migration are shown in Figure 3 for California, New York, Florida and Texas. California has the strongest non-linear pattern, whereas the relationship for Texas is very close to being linear. New York and Florida have the greatest and smallest slope, respectively.

To show how the impacts of changes in the low-skilled immigration on the net migrations of low-skilled Americans are selective with respect to poverty status and race as well as age, we also compute the impacts for white, poor, and poor white sub-populations. Figure 4 shows the impacts of reducing the level of low-skilled immigration by about 50% on the four most important destinations of low-skilled immigrants. We find (1) that the impact on whites is somewhat greater than the impact on all races, (2) that the impact on the poor is substantially greater. and (3) that the impact on poor whites is the greatest. The complementary effect of immigration on non-poor young adults is reflected clearly in Florida by the decreases in the net migrations of the total and white populations in the 15-24 age group as a consequence of the reduction in immigration. To a much lesser extent, the same phenomenon is also observed in California. It is interesting to note that in Florida the net migration of non-poor pre-retirees (aged 45-64) is practically unaffected by the sharp reduction in immigration.




Note: The simulations are done by making the across-the-board changes in immigration by approximately -50%, -25%, -12.5%, -6%, +6%, +12.5%, +25%, and +50%, repectively.

**Figure 3. The Impacts of Changes in the Number of Low-skilled Immigrants (Aged 15-64) on the Number of US-born Low-skilled Net Interstate Migrants (Aged 15-64) : Simulation Result from the Nested Logit Models for the 15-24, 25-29, 30-44, and 45-64 Age Groups**

### 4.2. Impacts of Changes in Only California's Immigration

Reducing and increasing only California's low-skilled immigration by 50% result in greater displacement ratios of the low-skilled Americans in California than do the corresponding across-the-board changes : an increase of 34 net migrants per 100 immigrants and a decrease of 61 net migrants per 100 immigrants, respectively. The reduction of California's low-skilled immigrants by 400,000 results in an increase of its low-skilled net migrants by 137,000, whereas an increase of its low-skilled immigrants by 400,000 leads to a decrease of its net migrants by 244,000. The non-linear nature of this relationship is shown in panel A of Figure 5.

The spillover effects of changes in the low-skilled immigration of California on the net migrations of the neighboring states are substantial. An increase of California's low-skilled immigrants by 400,000 is

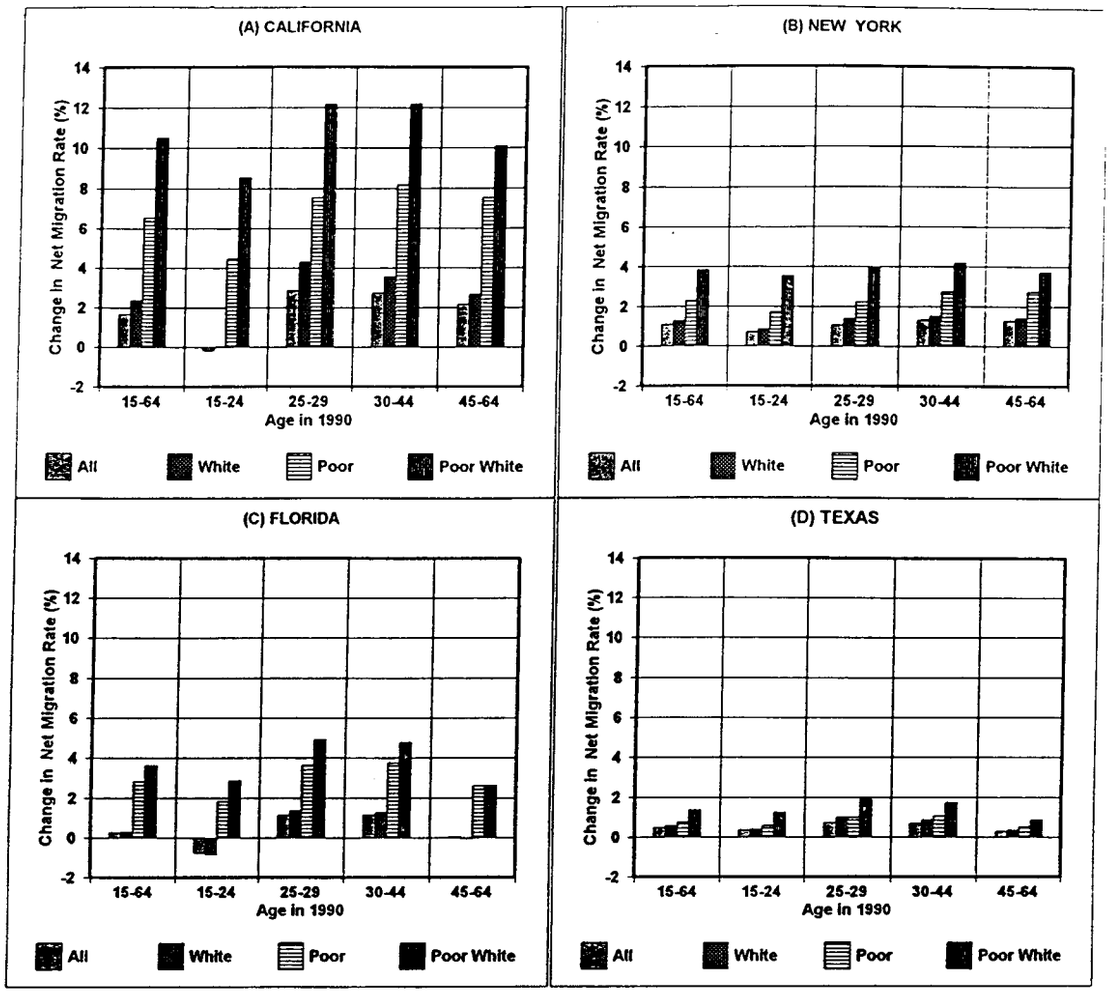
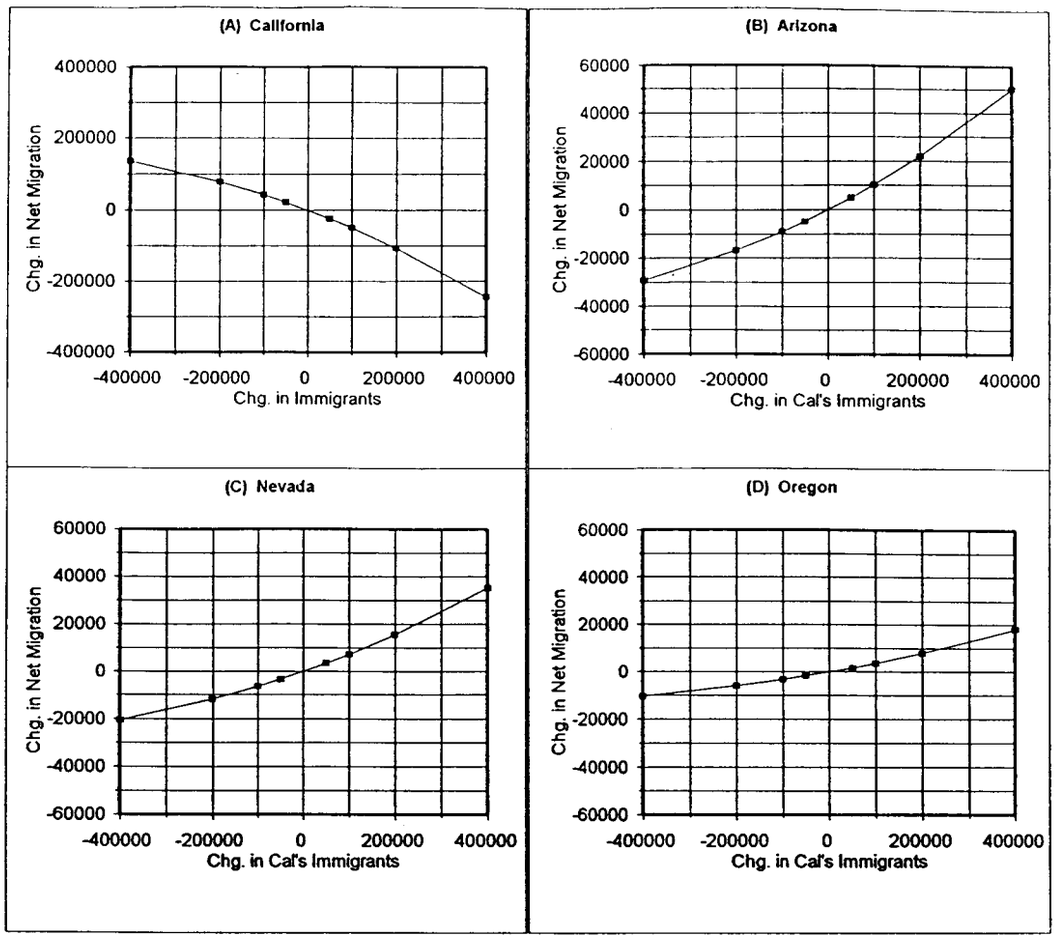



**Figure 4. Impacts of Making Across-the-board Reduction in Low-skilled Immigration by About 50% on the Net Migration Rates of US-born Low-skilled Persons (%/5 yreas) of Four Major Immigrant-receiving States: Selectivity by Age, Race and Poverty Status.**

expected to cause the low-skilled net migrations to increase by 50,000 in Arizona, by 35,000 in Nevada, and by 18,000 in Oregon. In terms net migration rates, these increases are 5.4% (from 11.2% to 15.6%) in Arizona, 11.3% (from 17.9% to 29.2%) in Nevada, and 2.3% (from 3.2% to 5.5%) in Oregon. A decrease of the same number of immigrants is expected to have milder effects on the net migrations in the opposite direction: -29,000 in Arizona, -21,000 in Nevada, and -10,000 in Oregon. The corresponding changes in net migration rates are: -3.2% in Arizona, -6.6% in Nevada, and -1.3% in Oregon. The shapes of the relationships between changes in California's immigration and the changes in the net migrations of the neighboring states are shown in panels B, C, and D of Figure 5. All of these relationships are clearly curvilinear. The curves of Arizona and Nevada are much steeper than that of Oregon.

In terms of net migration rates, the selective effects of a 50% reduction in California's low-skilled immi-




Note: The simulations are done by changing only California's low-killed immigration by approximately -50%, -25%, -12.5%, -6%, +6%, +12.5%, +25%, and +50%, repectively.

**Figure 5. The Impacts of Changes in Califomia's Low-skilled Immigrants (Aged 15-64) on the Net Migrations of US-born Low-skilled Persons (Aged 15-64) in California and its Neighboring States : Simulation Result from the Nested Logit Models for the 15-24, 25-29, 30-44, and 45-64 Age Groups.**

gration on California itself and on the neighboring states with respect to poverty status and race as well as age are shown in Figure 6. The effects on whites are in general somewhat greater than the effects on non-whites. The impacts are substantially greater on the poor than on the non-poor. Except for the spill-over effect on Oregon, the effects are the greatest on poor whites. As an extreme example, Nevada's net migration rate of the low-skilled poor whites in the 30-44 age group is expected to decrease by as much as 24% (from 33% to 9%). The selectivity by age is particularly great for the non-poor, with the main contrast being between the rather weak effects on the 15-24 age group and the strong effects on the older age groups.

## CONCLUSION

We have evaluated the effects of low-skilled immigration on the interstate migration of the US-born

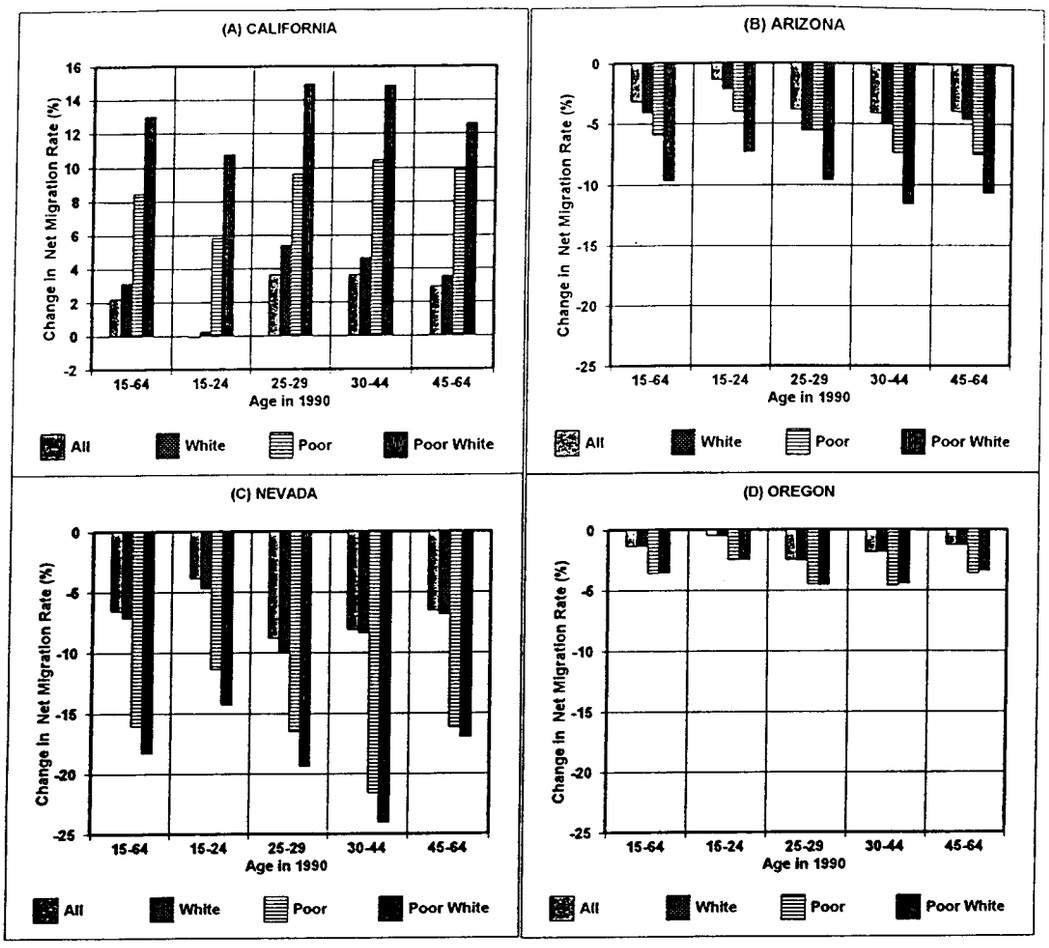



**Figure 6. Impacts of Reducing Only California's Low-skilled Immigration by About 50% on the Net Migration Rates of US-born Low-skilled Persons (%/5 yreas) of Califormia and Its Neighboring States.**

low-skilled Americans in 1985-90, using a set of nested logit models which allow the distinction between the departure and destination choice processes and the incorporation of other important explanatory factors. Our main findings are as follows.

First, the low-skilled immigration had much stronger effect on the departure process than on the destination choice process. With respect to the departure process, both the poor and the non-poor were subject to the push effect of immigration, with the former being more affected than the latter. With respect to the destination choice process, the poor were subject to the discouraging effect of immigration, whereas the non-poor were subject to its complementary effect. The discouraging effect was the strongest on pre-retirees (aged 45-64), whereas the complementary effect was the strongest on labor force entrants (aged 15-24).

Second, among all races, whites were most subject to the push effect of immigration. The group that was most affected by the push effect was poor whites.

Third, our simulation results show that the displacement ratios can be quite large in major immigrant-receiving states, and that a large increase

in immigration has a greater impact than does a large *decrease* in immigration. An across-the-board increase of immigration by 50% leads to a displacement ratio of 51 net migrants per 100 immigrants for California and 56 net migrants per 100 immigrants for New York, whereas a corresponding decrease in immigration results in a displacement ratio of 27 net migrants per 100 immigrants for California and 40 net migrants per 100 immigrants for New York.

Fourth, our simulation results also show that the spill-over effects of California's low-skilled immigration on its neighboring states are substantial. An increase of California's low-skilled immigrants by 400,000 (about 50%) is expected to cause the low-skilled net migrations to increase by 50,000 in Arizona, by 35,000 in Nevada, and by 18,000 in Oregon. In terms net migration rates, these increases are 5.4% in Arizona, 11.3% in Nevada, and 2.3% in Oregon. Arizona and Nevada receive by far the greatest spill-over impacts.

Fifth, the simulation results have also confirmed the main finding from the estimation results that the push effects of low-skilled immigration are (1) stronger on whites than on non-whites, (2) much stronger on the poor than on the non-poor, (3) weaker on the 15-24 age group than on older age groups, and (4) the strongest on poor whites.

An important lesson from our empirical work is that the impacts of immigration on internal migration is highly selective with respect to race and poverty status. It not only raises serious doubts about the conclusions drawn from studies based on highly aggregated data but also indicates that fruitful research on this subject in the future must start with a proper disaggregation of the at-risk population.

## NOTE

1. Walker, Ellis and Barff (1992) and White and Hunter (1993) also found evidence of this displacement effect. Due to space limitation, we skip them in our review.
2. The data used in Manson, Espenshade and Muller (1985) are mainly from the PUMS (public use micro sample) of the 1980 population census and the Current Population Surveys of the early 1980s.
3. Filer (1992) uses the 1980 census PUMS, which are aggregated separately by race, educational attainment and occupation. His inference is based on simple correlation, multiple regression and simultaneous equations.
4. White and Liang (1998) use the data from the 1981, 1984, 1987 and 1990 Current Population Surveys. Their inference is based logit models.
5. The use of net migration rate as the dependent variable can be similarly problematic. In a simultaneous-equations model, this usage resulted in an exaggerated impact of immigration : an addition of one immigrant is expected to reduce three internal migrants! (Filer, 1992, p.266).
6. The long-form records represent 16.7% of the total population. Only the long-form questionnaires contain the "residence 5-years ago" question.
7. It has been reported in the multi-variate studies of the effects of immigration on internal migration by Manson, Espenshade and Muller (1985) and Filer (1992) that their conclusions are not affected by whether the immigration rate is lagged by five-years or not.
8. The 1985-90 foreign-born low-skilled immigrants (aged 15-64 in 1990) amounted to nearly 2,000,000 persons. The shares of these immigrants by the major port-of-entry states were : 38.7% by California, 13.9% by New York, 7.8% by Florida, 7.1% by Texas, 4.3% by New Jersey, 4.3% by Illinois, and 3.0% by Massachusetts. The combined share of the low-skilled immigrants by these seven states was 79.1%.
9. The 76,522,000 US-born low-skilled persons (aged 15-64 in 1990) were very unevenly distributed among the races : 77.6% whites, 15.3% blacks, 5.8% Hispanics, 1.0% Indians, and only 0.4% Asians. The composition by poverty status was 14.2% poor and 85.8% non-poor. In the 45-64 age interval, the shares by the Asians and the poor were 0.2% and 11.1%, respectively.
10. The positive cofficient of Low-skilled Immigration Rate (0.05) in Table 1 applies to all migrants. Because the dummy variables that interact with this immigration variable do not represent the non-poor migrants, the effect of this immigration

variable on the destination choice probabilities of the non-poor migrants is simply represented by the coefficient of 0.05, which implies that the non-poor migrants of all races were slightly attracted by the states with a high immigration rate. This coefficient contribute to the determination of the effects for the poor migrants in the following way: $0.05-0.16=-0.11$ for poor whites, also $0.05-1.16=-0.11$ for poor blacks, $0.05-0.25=-0.20$ for poor Hispanics, and $0.05-0.51=-0.46$ for poor Indians. Thus, the aversion to destinations with high immigrant rate was stronger for poor Indians ($-0.46$) and poor Hispanics ($-0.20$) than for poor whites ($-0.11$) and poor blacks ($-0.11$).

11. This inference is based on the relative magnitudes of the associated t-ratios in Table 1. The changes in Rho-square due to the deletions of income and employment growth variables in turn yield the same inference.

12. Due to space limitation, the tables containing all the estimated coefficients for the 15-24, 25-29, and 45-64 can not be included in this paper but will be provided at the reader's request.

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## APPENDIX A. The Covariates in the Nested Logit Models for the 15-24, 25-29, and 45-64 Age Intervals and the Estimated Coefficients

### 1. Covariates in the Destination Choice Model

**Income**: This is the income per capita of a potential destination computed in the following way. First, we adjust the state-specific 1985 and 1989 nominal per capita incomes by the corresponding state-specific cost of living indices of the same years. Second, the 1985 and 1989 adjusted values are then averaged. The unit is $10,000 per person.

**Total Employment Growth**: For each potential destination, this variable is the state-specific 1985-1989 growth of total civilian employment divided by the 1985 total civilian employment. The unit is "proportion per 4 years".

**Service Employment Growth**: For each potential destination, this variable is the state-specific 1985-1989 growth of service employment divided by the 1985 service employment. The unit is "proportion per 4 years".

**Unemployment Rate**: This is the 1985 unemployment rate of a potential destination state. The unit is proportion. Instead of the average value of the 1985-89 period, we use the 1985 value for unemployment rate, because we believe that among the three labor market variables, it is more subject to the feedback effect of migration.

**AFDC and Food Stamp Benefit**: For each potential destination, this variable is computed in the following way. First, the state-specific 1985 and 1989 nominal values of the combined AFDC and Food Stamp benefits per recipient family are adjusted by the corresponding 1985 and 1989 cost of living indices, respectively. Second, the adjusted 1985 and 1989 values are then averaged. The unit is $10,000 per family per year.

**Coldness**: For each potential destination, this variable is defined as a weighted average of the heating degree-days of cities with records from 1951 to 1980, using city populations as the weights. The unit is 1000 degree(F)-days.

**Hotness**: For each potential destination, this variable is defined as a weighted average of the cooling degree-days of cities with records from 1951 to 1980, using city populations as the weights. The unit is 1000 degree(F)-days.

**Violent Crime Rate**: For each potential destination, this variable is the average of state-specific 1985 and 1989 violent crime rates. The unit is cases per 1,000

residents.

**Ln(Distance)**: This variable is the natural log of the population gravity centers of origin and destination states. The unit is ln(miles).

**Contiguity**: For each potential destination, this is a dummy variable assuming the value of 1, if it shares a common border with the state of origin.

**Racial Similarity**: For the migrants of a specific race, this is the logit of the specific race's proportional share of the potential destination's population in 1985, computed indirectly from the data of the 1990 census.

**Ln(Population Size)**: For each potential destination, this variable is the natural log of the state-specific 1985 population, computed indirectly from the data of the 1990 census. The unit is Ln(1,000,000 persons).

**2. Covariates in the Departure Model**

(Note: All the covariates in the departure model that have the same names as those in the destination choice model are defined in the same way, expect for that the state in question is the origin rather than a potential destination.)

**Returning Immigration Rate of US-born Persons**: For each origin, this variable is obtained by dividing the state-specific number of 1985-90 US-born immigrants by the 1985 state population. Since the data come from the 1990 census, individuals less than 5 years old in 1990 are excluded from both numerator and denominator. The unit is "percent per 5 years".

**Non-native's Share of State Population**: For each origin, this variable is computed from the data of the 1980 and 1990 censuses in the following way. First, the 1980 and 1990 state-specific numbers of non-natives (i. e. those who were born in other states in the United States) were divided by the corresponding total populations of the state. Second, the two resulting figures are then averaged and transformed into a logit. The reasons for using this variable are (1) that it is well-known that non-natives are more migratory than natives (Long 1988), and (2) that our multidimensional migration table does not have the non-native native distinction.

**Armed Forces' Share of State Employment**: For each origin, this variable is computed from the data of the 1980 and 1990 censuses in the following way. First, the 1980 and 1990 gender- and state-specific employments in the armed forces were divided by the corresponding total employment. Second, the two resulting figures are then averaged and transformed into a logit. The reasons for using this variable are (1) that members of the armed forces are expected to be more migratory than their civilian counterparts, and (2) that our multidimensional migration table does not have military/civilian distinction.

**Inclusive Variable**: For each origin, this variable represents the attractiveness of the rest of the United States. Its values are computed according to equation (3), using the estimated coefficients of the best destination choice model.

**Keywords**: Low-skilled Immigration, Internal Migration, Displacement

# 自国生まれ未熟練アメリカ人労働者の国内移動に対する未熟練労働移民の影響：多変量解析による評価

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本稿の主題は，1985-90年間における自国生まれ未熟練アメリカ人労働者の州間移動に対して，アメリカへの未熟練労働移民がどれほど影響を与えたかの評価である。この評価は，1990年センサスの個別データを用いて，nested logit モデルを適用しておこなった。このモデルの主な長所は，州間移動を，移出選択過程(departure process)と目的地選択過程(destination choice process)とに区別できることにある。未熟練労働者とは，高校卒業者とそれ以下の教育水準の人々である。労働市場での交代と補充を見込んで「未熟練労働移民」も「自国生まれ未熟練労働者」も，生産年齢（15歳～64歳）人口に限定している。

主要な結果：「未熟練労働移民」の押し出し（push）効果は，目的地選択過程よりも移出選択過程に対してはるかに強い影響を及ぼし，「自国生まれ未熟練労働者」の移動の目的地選択過程に対する落胆的かつ補充的効果よりも強いことが明らかになった。その押し出し効果は，(1)少数民族よりも白人のほうに，(2)非貧困層よりも貧困層のほうに，(3)15-24歳の年齢層よりも他の年齢層に，強く働いており，(4)貧困白人に最も強く働いている。

シミュレーションの結果によると，移民が最も集中しているカリフォルニア州では，もし，移民が5年間に50%増加すると，2人の「未熟練労働移民」が1人の「自国生まれ未熟練アメリカ人労働者」との交代を招くほどの強い影響がみられる。

外国から流入した移民の国内人口移動に与える影響は，非常に選択的であることが認められた。本研究の成果は，人口を人種別，教育水準別，職業別などに区分し，それらの国内人口移動への影響を評価することの必要性を示している。