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Determinants of Immigrant Selectivity and Skills

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Abstract: Whether immigrants are positively or negatively self-selected is much disputed. Whereas most previous studies have addressed this question by comparing the wages of immigrants to those of U.S. natives, this analysis uses occupation to examine the skill level of immigrants. Data on the occupational distribution of individuals granted legal permanent residence in 1995 indicate that the proportion of immigrants in skilled occupations is related to the corresponding proportion in source countries but not necessarily to the return to skill and other economic factors in the country of origin.

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Determinants of Immigrant Selectivity and Skills

I. Introduction

The debate about the costs and benefits of immigration to the United States centers on the issue of the quality of immigrants. However, it is not clear whether persons who choose to immigrate to the U.S. are more or less skilled, on average, than either the U.S. native-born population or than the pool of all potential immigrants. The factors that determine the skill level of immigrants are also uncertain. This analysis adds to the literature an examination of the determinants of the average skill level of immigrants across countries based on data on occupational distribution of immigrants.

Understanding the quality of immigrants and its determinants is important because of the large number of immigrants in the U.S. and because their own economic outcomes and their effect on natives depends on relative skill levels. The foreign born composed slightly more than 10 percent of the U.S. population in 2000, representing an increase of over 11 million people since 1990 (U.S. Bureau of the Census, 2001). Higher immigration of unskilled individuals appears to depress the wages of low-skilled immigrants already present in the U.S. as well as the wages of low-skilled U.S. natives (Borjas, Freeman, and Katz, 1997; Jaeger, 1996; Johnson, 1998). Because low-skilled immigrants appear to be a complement to the labor of skilled workers, larger flows of unskilled immigrants boost the earnings of skilled U.S. natives and skilled immigrants (Jaeger, 1996; Johnson, 1998). Previous research suggests that higher levels of skilled migration have little effect on the wages of U.S. natives (Borjas et al., 1997).

The primary method that has been used to examine whether immigrants are drawn from the top or bottom of the skill or income distribution is comparing immigrants to U.S. natives. Borjas (1987, 1991) and Cobb-Clark (1993) estimated wage equations for immigrants and

natives using data from decennial Censuses or the Current Population Survey (CPS) and examined the role of home-country political and economic conditions in country-level average relative wages. Barrett (1998) and Jasso, Rosenzweig, and Smith (2000) used a similar method with administrative data from the Immigration and Naturalization Service (INS) on new legal permanent residents; because the INS data do not contain wages, they imputed wage data to immigrants on the basis of the wages of natives in the same occupation. This imputation requires assuming that immigrants will work in these occupations in the U.S. and earn the same as natives, or at least that occupation at the time of receipt of legal permanent resident status is well-correlated with future earnings in the U.S., and that the transferability of occupation from the source country to the U.S. does not differ across countries.¹

Selection among immigrants has also been examined by comparing the skills of immigrants across source countries. Greenwood, McDowell, and Waldman (1996) used administrative data to estimate the determinants of the fraction of new legal permanent residents from a country who are in skilled occupations. This method does not involve a comparison to the skills of U.S. natives or to the skills of the home country population but rather a comparison of immigrants' skill levels across countries of origin and within countries over time.

The findings on immigrant selectivity are mixed. Barrett (1998), Borjas (1987, 1991) and Cobb-Clark (1993) conclude that immigrants are positively selected from countries with low

¹ Data from the 1995-98 March Current Population Survey suggest that this assumption may not hold. Among foreign-born individuals aged 16-64 who were not in the U.S. a year prior to the survey and who reported an occupation for the previous year and the survey year, 90 percent were in the same occupation (using the INS occupation categories) in both years. About 91 percent of immigrants from Mexico were in the same occupation, compared with 94 percent of immigrants from Asia and 88 percent of immigrants from Europe. In addition, the INS data give the occupation in the home country for newly arriving immigrants except for immigrants admitted under employment admission classes, who report the occupation they will hold in the U.S. Immigrants who are adjusting status and are already present in the U.S. apparently report their occupation in the U.S. The proportion of immigrants in these categories varies across countries, which creates problems for the imputation if immigrants occupy different occupations in their home country than in the U.S.

rates of return to skill relative to the U.S. and negatively selected from countries with higher returns to skill, as measured by income inequality. Jasso et al. (2000), in contrast, find that lower skill prices in the country of origin, as measured by higher average schooling levels, are associated with lower immigrant quality. Greenwood et al. (1996) find a negative association between immigrants' skills and gross domestic product (GDP) per capita in the source country relative to the U.S., whereas Borjas and Barrett report a positive relationship between source-country per capita GDP and the average wages of immigrants relative to U.S. natives.

This study uses INS data on the occupation of new legal permanent residents to examine the determinants of immigrant selection. The analysis makes several contributions to the literature. First, this study synthesizes the two previous methods used to examine immigrant selection by examining the effect of differences across countries in the return to skill—the approach taken by Borjas and others—on the fraction of immigrants who are in skilled occupations, the measure of skill used by Greenwood et al. Focusing on the occupational distribution of immigrants avoids potential concerns about imputing wages to immigrants who may work in different occupations in the U.S. than in their home country. In addition, this analysis investigates the relationship between the fraction of immigrants in skilled occupations and the comparable fraction in source countries, which has not been previously examined.

This analysis also establishes whether the fraction of immigrants who are in skilled occupations differs across admission categories and examines the applicability of the Roy selection model to immigrants admitted under different categories. The findings suggest how a change in immigration policy, such as a change in admission preferences, would affect the average quality of immigrants. Studies that use data on immigrants' relative earnings from the

Census or the CPS are unable to examine the effect of admission category, which is available only in INS data.

The model presented in the next section predicts the relationship between the average skill level of immigrants from a given country and returns to skill, economic conditions, and the skill level of the home country population. These predictions are then tested using INS data on men who received legal permanent resident status in 1995. The results provide mixed support for the model, and the results vary somewhat across admission categories. The findings suggest that the changing the distribution of immigrants across categories of admission would affect the average skill level of immigrants.

II. Analytical Framework

Beginning with work by Sjaastad (1962), migration models posit that individuals live in the area where their utility is maximized. Individuals are hypothesized to compare their utility in their current location to their expected utility in all other possible locations, including the disutility of moving to those locations, and choose the location with the highest utility. The literature on international migration has focused on the earnings component of utility, positing that individuals become immigrants when their expected earnings in the destination country, less migration costs, are higher than their earnings in the country of origin (Borjas, 1987, 1991; Chiswick, 1999; Taylor, 1987).

Borjas (2000) develops a model that predicts how relative returns to skill and other factors affect the average skill level of immigrants. The model, which is based on the Roy (1951) selection model, is briefly summarized here, and then its predictions are tested with data on the skill level of immigrants. In the model, immigrants' earnings in both the home country

and the destination country depend on skill, which is denoted by S and is observed, and on unobservable factors denoted by ε . The distribution of wages, w , in the home country and in the destination country, respectively, are given by

$$\ln w_0 = \mu_0 + \delta_0 S + \varepsilon_0 \quad (1)$$

and

$$\ln w_1 = \mu_1 + \delta_1 S + \varepsilon_1. \quad (2)$$

The coefficients δ_0 and δ_1 measure the return to skill in the home and destination countries, and μ_0 and μ_1 are mean (log) earnings. If δ_1 is larger than δ_0 , the return to skill is higher in the destination country than in the country of origin. The random, unobserved components of earnings ε_0 and ε_1 are jointly normally distributed with mean zero, variances σ_0^2 and σ_1^2 , and correlation coefficient ρ_{01} .

The distribution of skill in the home country is given by

$$S = \mu_S + \varepsilon_S, \quad (3)$$

where ε_S is assumed to be distributed normally with mean zero and variance σ_S^2 and is assumed to be uncorrelated with the difference in the random components of earnings between the destination country and the home country. Migration costs are assumed to be constant across individuals from a given country and equal to C .

Individuals live in the country in which their expected earnings are higher, given their skill level and migration costs. For an individual with skill level s , the decision to migrate can be represented by the index function I , where

$$I \approx \mu_1 - \mu_0 + (\delta_1 - \delta_0)s + \varepsilon_1 - \varepsilon_0 - \pi, \quad (4)$$

and $\pi = C/w_0$. Given skill level s , an individual migrates if $I > 0$.

As Borjas (2000) shows, the migration rate from the home country to the destination country is

$$P(z) = \Pr[\tau > -((\mu_1 - \mu_o) + (\delta_1 - \delta_o)\mu_s - \pi)] = 1 - \Phi(z), \quad (5)$$

where $\tau = (\varepsilon_1 - \varepsilon_o) + (\delta_1 - \delta_o)\varepsilon_s$ and $z = -((\mu_1 - \mu_o) + (\delta_1 - \delta_o)\mu_s - \pi)/\sigma_\tau$. The mean skill level of individuals who choose to migrate is

$$E(S | \mu_s, I > 0) = \mu_s + \frac{\sigma_s^2}{\sigma_\tau} (\delta_1 - \delta_o)\lambda \quad (6)$$

where $\lambda = \phi(z)/(1-\Phi(z))$.

Equation (6) predicts the effect of changes in average earnings and returns to skill in the source and destination countries on the average skill level of migrants. An increase in average earnings in the home country will raise (lower) the average skill level of migrants if the return to skill is higher (lower) in the destination than in the home country. Intuitively, an increase in average income in the home country reduces the incentive to migrate. Because positive selection on skill occurs when the return to skill is higher in the destination than in the source country, the increase in average home country income reduces migration from the lower end of the skill distribution while not affecting migration from the upper end of the skill distribution, raising the average skill level of migrants.

An increase in average earnings in the destination country will raise the average skill level of immigrants if the return to skill is lower in the destination country than in the home country. When the return to skill is lower in the destination than in the home country, negative selection occurs. In this case, an increase in average earnings in the destination raises skill threshold for migration, which boosts the average skill level of migration. The opposite holds for the positive selection case. An increase in the return to skill in the country of origin will

lower the average quality of migrants by reducing the incentive to migrate for individuals at the upper end of the skill distribution, whereas an increase in the return to skill in the destination country will raise the average quality of immigrants by increasing the incentive to migrate for more-skilled individuals.

Equation (6) also predicts the effect of changes in the average skill level in the source country and in migration costs on the average skill level of migrants. As Borjas (2000) shows, an increase in the average skill level in the source country raises the average skill level of migrants, but the effect is less than one-for-one. An increase in migration costs for all individuals will raise (lower) the average quality of migrants if the return to skill is higher (lower) in the destination country than in the home country. Intuitively, an increase in migration costs exacerbates the degree of positive or negative selection, which is determined by the relative return to skill across the two countries.

This model makes a few simplifying assumptions. It does not include multiple destination countries, although individuals presumably choose between home and several potential destinations. Borjas, Bronars, and Trejo (1992) show that, in a similar model with multiple destinations, individuals sort across areas based on relative returns to skill. Another assumption of the model here is that individuals make locational choices based solely on expected earnings. The majority of legal immigrants to the U.S. receive permanent resident status because they have relatives in the country, so desire to live near family members may also influence migration decisions for many potential immigrants. The applicability of the model to immigrants admitted on the basis of family ties—instead of because of job skills or for other reasons—is examined below.

III. Data and Methods

In the model developed above, the variables that determine the average skill level of immigrants are relative returns to skill, average earnings in the two countries, the average skill level in the home country, and migration costs. The effects of average earnings and migration costs depend on whether the return to skill is higher in the destination country or in the source country. The empirical test of the model involves regressing a measure of immigrants' skills on proxies for these factors. Some of the models estimated below also include controls for the distribution of immigrants across admission categories and for region of origin.

A. Immigrants' skills

The measure of immigrants' skills used here is the fraction of immigrants who report being in skilled occupations. The data on the skills and other characteristics of immigrants are from administrative data on men admitted as legal permanent residents to the U.S. The data, which are compiled by the INS, include the sex, age, class of admission, and country of origin of nearly all new "green card" recipients.² The data do not include any information about educational attainment or earnings. Data for fiscal year 1995, which is from October 1994 to September 1995, are used here. During this period, 720,461 individuals were admitted as legal permanent residents. Only men aged 16 to 64 (about 32 percent of all new legal permanent residents in 1995) are included in the sample used here.

The INS data include occupation for individuals aged 16 and older. For individuals admitted in employment-based admission classes, the occupation is the field they will perform in

² The INS data do not include illegal aliens adjusting to legal permanent resident status under the Immigration Reform and Control Act (IRCA) of 1986. In 1995, only 4267 individuals were admitted under the IRCA provisions.

the U.S.³ Immigrants admitted in other categories report their occupation in either the last country of residence or in the U.S.; immigrants who are already present in the U.S. and are adjusting their status presumably report their current occupation in the U.S., and immigrants newly arriving in the U.S. report their occupation in their country of last residence. Although some of these immigrants may not work in the same occupation in the U.S., occupation serves as proxy for human capital and skill level.

The INS data set has 25 occupational fields plus categories for students and children under age 16, homemakers, retired or unemployed individuals, and occupation not reported. Individuals who do not report an occupation or are students, homemakers, unemployed, or retired (about 40 percent of all new male immigrants aged 16-64) are not included in the main analysis here. Individuals are considered skilled if they report being in the “executive, administrative, and managerial” occupational field or in a professional or technical occupation.⁴

The INS data include over 200,000 men aged 15-64 from a total of 204 countries. As Table 1 reports, about 21 percent of these immigrants report being in a skilled occupation. When the 40 percent of prime-aged men who do not report an occupation or are students, homemakers, unemployed or retired are not included, the number of countries falls to 198. About 35 percent of these male immigrants are in skilled occupations (column 2).

This analysis focuses on a sample of immigrants from 51 countries because occupational data for the source country labor force are also available for these countries. These 51 countries, which are listed in Appendix Table 1, account for 46 percent of male immigrants aged 15-64 and

³ An exception is newly-arriving male immigrants accompanying a spouse who is the principal immigrant on an employment visa. These husbands presumably report the occupation they held in the country of last residence, and the principal spouse reports the occupation she will hold in the U.S. Less than 15 percent of male immigrants in employment-based admission classes are the accompanying spouse.

⁴ The skilled occupational categories correspond to codes 3-235 in the 1980 Census occupation codes. Greenwood et al. (1996) use the same categorization to classify immigrants as skilled.

for 45 percent of all individuals admitted as legal permanent residents in 1995. As column 3 of Table 1 indicates, almost 37 percent of these immigrants are in skilled occupations. If individuals who do not report an occupation or are students, homemakers, unemployed, or retired were included, 23 percent would be in skilled occupations.

B. Admission categories

The INS data include immigrants' class of admission. Immigrants receive permanent resident status for one of three main reasons: they are related to a citizen or permanent resident (family reunification); they are admitted on the basis of job skills (employment-based); or they are a refugee or asylee adjusting to permanent resident status. Immigration law also allows some individuals to receive permanent resident status for other reasons, such as the diversity lottery program. Some of the regressions discussed below include variables measuring the fraction of immigrants in each of the three main admission classes in order to examine the relationship between the fraction of immigrants who are skilled and the distribution of immigrants across admission classes. In addition, the data are stratified by admission class in some specifications in order to examine the applicability of the selection model across admission classes.

The distribution across admission categories of the immigrants from the 51 countries that are the focus of this analysis differs slightly from the distribution of all male immigrants aged 15-64. As Table 1 indicates, immigrants from the 51 countries are more likely to have been admitted under employment-based and family reunification preferences and less likely to have been admitted under refugee/asylee admission categories than immigrants as a whole. This is because the 51 countries do not include Cuba, Russia, and Vietnam, the primary countries of

origin for refugees and asylees; occupational data for the home country population are not available for these countries.

More than one-half of new recipients of legal permanent residence are already present in the U.S. and are adjusting from another status. Individuals converting from H1-B visas (temporary visas for skilled workers) and refugees and asylees are examples of individuals converting status.⁵ The fraction of immigrants from the 51 countries focused on here that are adjusting status is slightly lower than the corresponding fraction among all male immigrants, as Table 1 indicates.

The fraction of immigrants who are adjusting status is controlled for in some of the regressions discussed below for two reasons. First, occupational differences between new legal permanent residents already present in the U.S. and those coming from abroad may reflect differences in occupation structures across countries but not in skill levels. Second, the estimated coefficient may suggest the effect on immigrants' skill levels of changing the number of individuals allowed to adjust their status.

C. Economic variables

The fraction of the population in the source country that is skilled is based on the occupational distribution in the source countries. The International Labour Office (ILO) reports employment levels by occupation and sex for a large number of countries. The occupational classifications include executive/administrative/managerial and professional/technical, so a measure of skilled workers in the home country analogous to the measure for immigrants is

⁵ The main nonimmigrant categories from which individuals in the sample converted to permanent resident status are temporary visitors for pleasure (25 percent), entry without inspection (23 percent), and H1 visas (13 percent).

constructed.⁶ The occupation distribution in source countries in 1995 is used to calculate the fraction of the home country population that is skilled.⁷ As Table 2 reports, on average, about 22 percent of the home country labor force work in skilled occupations.

As in previous research, income inequality is used here as the measure of the return to skill. The Gini index, which increases as income inequality increases, proxies for the return to skill under the assumption that countries with more compressed income distributions have lower rates of return to skill. The index ranges from 19.5 (Slovakia) to over 59 (Paraguay) across the 51 countries, with a mean of about 37. The Gini index in the U.S. is 40.1.⁸

In the model, the direction of the effects of average income and migration costs depend on relative returns to skill. In the sample, 32 countries have greater income inequality than the U.S. and 19 have lower income inequality, as measured by the Gini coefficient. Countries with higher returns to skill (higher Gini indexes) than the U.S. tend to be Latin American and Asian nations, whereas countries with lower returns to skill tend to be European.

Dummy variables indicating whether the return to skill is higher or lower than in the U.S. are interacted with variables measuring average income in source countries and migration costs in the regressions estimated below. The model predicts that immigrants' skills should be positively associated with the interaction terms for countries with relatively low returns to skill and negatively associated with the interaction terms for countries with relatively high returns to

⁶ Several limitations of the ILO data should be noted. The lower age limit for inclusion in the data and the categorization of members of the armed forces vary across countries. A few developing countries only include individuals in urban areas. Despite these limitations, the ILO is the only organization that reports occupational data for a large number of countries.

⁷ Data from 1994 or 1996 are used for a few countries in order to increase the number of nations in the sample. The ILO occupational data for Ecuador and Paraguay are from 1994, and from 1996 for Honduras, Peru, Bangladesh, Croatia and Australia.

⁸ The income inequality data are from the World Bank (1997) and Tabatabai (1996) and for the closest year to 1995 available; the data are from the 1990s except for four countries with data from the 1980s (Austria, Hong Kong, Ireland and Singapore).

skill. The income measure is the log of GDP per capita in 1995 in dollars.⁹ Distance from the population center in the country of origin to New York, Miami, or Los Angeles (in thousands of miles) is used as the proxy for migration costs.¹⁰ These variables are the standard measures of income and migration costs used in previous research.

The models estimated here do not include variables measuring average income or the return to skill in the U.S. The analysis here is cross-sectional, so all immigrants face the same return to skill and economic conditions in the U.S. in a given year, and the constant in the regression captures these variables. If panel data were used, these variables would need to be included in the model. Using panel data would also offer the advantage of being able to include fixed country of origin effects. However, the covariates, particularly the measure of the return to skill, change only slowly over time and are not available on an annual basis for all countries. Distance, which proxies for migration costs, obviously does not change over time. Panel data methodologies would therefore not offer a substantial advantage over the cross-sectional approach used here.

The regressions discussed in the next section are estimated using weighted least squares, where the weights are the number of immigrants from each country used to construct the sample. The weights are used to make the results reflective of the composition of legal immigrants. Variables controlling for the fraction of the home country labor force that is skilled, the return to skill in the home country, and interactions of average income in the home country and distance with dummy variables indicating whether the return to skill in the home country is lower or higher than in the U.S. are first included in the model. Controls for distribution across classes of

⁹ The GDP data are from the United Nations (1997) and the World Bank (1997).

¹⁰ The distance is air miles. The data are from the Distcalc program of the U.S. Department of Transportation, Bureau of Airline Statistics, which was graciously supplied by Jeff Gorham. The closest of the three U.S. cities to the home country is used, except Los Angeles is used instead of Miami as the gateway for Mexico.

admission and for the fraction of immigrants adjusting status are then added, followed by an investigation of the robustness of the results to including dummy variables controlling for three of four continents. Results based on data stratified by class of admission are then presented, followed by results for newly-arriving versus adjusting immigrants and principal versus “tied” immigrants.

IV. Results

A. Overall results

The results provide mixed support for the model. Column 1 of Table 3 reports the results when variables measuring the average skill level of the home country, returns to skill in the home country, and the interactions with average income in the home country and migration costs are included in the regression. A 10 percentage point increase in the fraction of the home country labor force in skilled occupations is associated with an 8.5 percentage point rise in the fraction of immigrants from a country in skilled occupations, the less than one-for-one effect predicted by the model. Assuming that countries with higher income inequality have higher returns to skill, skilled immigration appears to be lower from countries with higher returns to skill, but the effect is not significant. GDP per capita is also not significantly associated with the fraction of immigrants who are skilled. Previous studies, in contrast, tended to find that average income is associated positively associated with immigrants’ skill levels but did not interact average income with a measure of the relative return to skill.

Higher migration costs, as proxied by distance, appear to raise the average skill level of immigrants from countries with higher returns to skill than the U.S., whereas there is no effect on the skills of immigrants from countries with relatively low returns to skill. The result for

countries with relatively high returns to skill is not consistent with the model, which predicts that an increase in average income should increase the extent of negative selection from countries that have relatively high returns to skill. Jasso and Rosenzweig (1990) similarly find that greater distance is associated with positive selection of immigrants, although they do not distinguish between countries with high and low relative returns to skill.

Column 2 of Table 3 shows the results when controls for the distribution of immigrants across admission categories are included in the model. The fraction of immigrants admitted under employment-based preferences, relative to immigrants admitted in “other” categories, is significantly positively associated with the fraction of immigrants in skilled occupations. The fractions of immigrants admitted under family reunification admission categories and because they are refugees or asylees and the fraction adjusting status do not appear to influence the fraction of immigrants in skilled occupations.

Including controls for three of four regions slightly weakens the results, as column 3 indicates. The fraction of immigrants in skilled occupations is not significantly different across Europe, Asia, Latin America, and Oceania after controlling for other factors. The fraction of immigrants admitted in employment-based categories remains positively associated with the fraction of immigrants in skilled occupations but only at the 10 percent level. Similarly, the relationships between immigrants’ skill levels and the skill level of the home country population and distance from countries with relatively high returns to skill weaken when the regional controls are added to the regression.

B. Results by Admission Category

The above results suggest that the fraction of immigrants in skilled occupations may differ between immigrants admitted under employment-based preference categories and immigrants admitted under other categories.¹¹ The determinants of the fraction of immigrants in skilled occupations may also differ across preference categories. For example, employment-based immigrants might be more sensitive to relative returns to skill and other economic factors than family reunification immigrants, who may be moving primarily to be near relatives. Economic factors may play no role in the migration decisions of refugees and asylees who are fleeing political persecution. Table 4 therefore shows the results when the data are stratified by major class of admission.

The results suggest that the determinants of the fraction of immigrants in skilled occupations differ somewhat across admission categories, but the results are not always as hypothesized. For example, the fraction of employment-based immigrants in skilled occupations appears to fall as distance increases among countries with lower returns to skill than the U.S., the opposite result of that predicted by the model. Immigrants' skill levels are significantly associated with skill levels in the home country only among family reunification immigrants. Among immigrants admitted under miscellaneous admission categories, home country GDP is positively associated with skill levels for immigrants from countries with both relatively low and relatively high returns to skill; the former result is consistent with the model, whereas the latter is not. The skill levels of these "other" immigrants decline as the return to skill in the home country increases, as predicted by the model. Although the Roy selection model seems best suited for explaining migration among employment-based immigrants, it does not appear to

¹¹ The mean fraction of immigrants in skilled occupations is .70 for employment-based immigrants, .26 for family reunification immigrants, .08 for refugees/asylees, and .42 for immigrants admitted in other categories.

better fit average skill levels among employment-based immigrants than among family reunification immigrants.

Economic factors appear to play almost no role in the skills of refugees and asylees, as expected. The goodness of fit, as measured by the adjusted R-squared, is also substantially lower for refugees/asylees than for the other admission categories.¹² The results for refugees and asylees should be treated with caution, however, because the large refugee/asylee-sending countries are not included in the sample.

The results for the variable controlling for the fraction of immigrants already present in the U.S. and adjusting status vary across preference categories. Recall that this variable should control for differences in the occupational structure of the U.S. and other countries. The fraction of immigrants adjusting status is positively associated with the skills of employment-based immigrants even though most members of this group report the occupation they will hold in the U.S. regardless of their location at the time of admission. This may indicate that foreign-born persons already present in the U.S. are better able to find high-skilled jobs than individuals living overseas searching for an employer willing to sponsor them for employment-based admission. The fraction of immigrants adjusting status is negatively associated with the skills of immigrants admitted in “other” categories, in contrast. This suggests that immigrants admitted for miscellaneous reasons work in higher-skilled occupations in their home country than they do in the U.S.

The previous results suggest that fraction of immigrants in skilled occupations may depend on the fraction of immigrants adjusting status, although the direction of the relationship is unclear. Columns 1 and 2 of Table 5 therefore investigate whether the determinants of the

¹² All refugees and asylees are adjusting immigrant status, so the fraction adjusting variable is not included in the model.

fraction of newly-arriving immigrants in skilled occupations differ between newly-arriving immigrants and immigrants who are adjusting status. About 34 percent of newly-arriving immigrants are in skilled occupations, compared with 40 percent of all immigrants adjusting status; part of this difference may be because adjusting immigrants are already present in the U.S. and presumably report their U.S. occupation, whereas newly-arriving immigrants report their occupation in the home country, except for most immigrants admitted under employment-based categories.

The results indicate several differences between the determinants of the skill levels of newly-arriving immigrants and adjusting immigrants. The fraction of newly-arriving immigrants in skilled occupations is significantly associated with the fraction of the home country labor force in skilled occupations, whereas the relationship is smaller and insignificant for immigrants adjusting status. The skill levels of adjusting immigrants increase as the fraction admitted under employment-based and family reunification preferences rise, whereas the skill levels of newly-arriving immigrants fall as the fraction admitted under family reunification preferences rises. The skill levels of neither group of immigrants are significantly influenced by relative returns to skill or other economic factors.

Columns 3 and 4 of Table 5 show the results if the sample is restricted to principal immigrants or “tied” immigrants, respectively. Tied immigrants receive legal permanent resident status because they are the spouse or minor child of a principal immigrant. Slightly less than 10 percent of immigrants in the main sample are tied immigrants. About 37 percent of principal immigrants are in skilled occupations, the same proportion as in the sample as a whole, compared with 34 percent of tied immigrants.

The results for principal immigrants are similar to those for all immigrants, which is not surprising since the vast majority of immigrants are principals. The fraction of tied immigrants in skilled occupations increases about one-for-one with the fraction of the home country labor force in skilled occupations, an effect slightly larger in magnitude than that among other groups of immigrants. The skills of tied immigrants appear to decline as GDP per capita increases among countries with relatively low returns to skill, the opposite result of that predicted by the model. Another difference is that the proportion of tied immigrants in skilled occupations declines as the fraction of refugees and asylees increases.

V. Conclusion

This study examined the determinants of the average skill level of immigrants using INS data on the occupation of new recipients of legal permanent resident status as a proxy for skill. Not surprisingly, immigrants admitted on the basis of job skills appear to have higher skill levels than individuals admitted because of family ties, refugees, asylees, and immigrants admitted for other reasons. The Immigration Act of 1990 allocates slightly over 20 percent of the annual cap of 675,000 immigrants (excluding refugee and asylee adjustments and certain other categories) to employment-based immigrants. These findings suggest that increasing the employment-based allocation of the cap across admission categories would raise the average skill of immigrants, as measured by their occupations.

The results generally do not indicate that the return to skill in the home country significantly influences immigrants' skills, whereas the selection model predicts that immigrants' skills should increase as the return to skill in the source country decreases relative to the U.S. Immigrants' skills appear to be related to average income in countries of origin and distances

from the U.S. in some specifications, but the results are not always consistent with the predictions of the theoretical model. Although the selection model posits that the migration decision depends solely on economic factors, it does not appear to better explain average skill levels among employment-based immigrants, who presumably are the group most likely to move to the U.S. for economic motives, than among family reunification immigrants. Previous research, in contrast, generally reported results consistent with selection models similar to the one included in this analysis. These studies, however, used data that do not include class of admission or did not investigate the role of admission categories in the INS data.

Why the results of this study are inconsistent with some of the predictions of the model and with previous findings is a subject for future research. One potential explanation is that the data used in this study include only new recipients of legal permanent resident status and not nonimmigrants or undocumented aliens. Comparing the skills of all foreign-born persons in the U.S. with skills in source countries might yield different conclusions. In addition, the occupations which individuals held in their home country might differ from their occupations in the U.S. Individuals might be employed in a skilled occupation in their home country but only be able to find employment in unskilled occupations as immigrants. Data on occupation held in both the country of origin and the destination is needed in order to determine whether immigrants are successful in their new country.

References

- Barrett, Alan. "The Effect of Immigrant Admission Criteria on Immigrant Labour-Market Characteristics." *Population Research and Policy Review*, October 1998, 17(5), pp. 436-56.
- Borjas, George J. "Self-Selection and the Earnings of Immigrants." *American Economic Review*, September 1987, 77(4), pp. 531-53.
- Borjas, George J. "Immigration and Self-Selection," in John M. Abowd and Richard B. Freeman, eds., *Immigration, Trade, and the Labor Market*. Chicago: University of Chicago Press, 1991, pp. 29-76.
- Borjas, George J. "The Economic Analysis of Immigration." In *Handbook of Labor Economics*, Vol 3, Ed. O. Ashenfelter and D. Card. Elsevier, 2000, pp. 1697-1760.
- Borjas, George J., Stephen G. Bronars, and Stephen J. Trejo. "Self-Selection and Internal Migration in the United States." *Journal of Urban Economics*, 1992, 32, pp. 159-185.
- Borjas, George J.; Freeman, Richard B.; and Katz, Lawrence F. "How Much Do Immigration and Trade Affect Labor Market Outcomes." *Brookings Papers on Economics Activity* (1997): 1-90.
- Chiswick, Barry R. "Are Immigrants Favorably Self-Selected?" *American Economic Review*, May 1999 (*Papers & Proceedings*), 89(2), pp. 181-85.
- Cobb-Clark, Deborah A. "Immigrant Selectivity and Wages: The Evidence for Women." *American Economic Review*, September 1993, 83(4), pp. 986-93.
- Greenwood, Michael J.; McDowell, John M. and Waldman, Donald M. "A Model of the Skill Composition of US Immigration." *Applied Economics*, March 1996, 28, pp. 299-308.
- Jaeger, David A. "Skill Differences and the Effect of Immigrants on the Wages of Natives." U.S. Bureau of Labor Statistics Working Paper No. 273, March 1996.
- Jasso, Guillermina and Rosenzweig, Mark R. "Self-Selection and the Earnings of Immigrants: Comment." *American Economic Review*, March 1990, 80(1), pp. 298-304.
- Jasso, Guillermina; Rosenzweig, Mark R. and Smith, James P. "The Changing Skill of New Immigrants to the United States: Recent Trends and their Determinants," in George J. Borjas, ed., *Issues in the Economics of Immigration*. Chicago: University of Chicago Press, 2000, pp. 185-225.
- Johnson, George A. "The Impact of Immigration on Income Distribution Among Minorities." In *Help or Hindrance? The Economic Implications of Immigration for African Americans*, Ed. D.S. Hamermesh and F.D. Bean. Russell Sage Foundation, 1998, pp. 17-50.

International Labour Office. *Yearbook of Labour Statistics*. Geneva: International Labour Office, 1996.

Roy, Andrew D. "Some Thoughts on the Distribution of Earnings." *Oxford Economic Papers*, 1951, 3, pp. 135-146.

Sjaastad, Larry. "The Costs and Returns of Human Migration." *Journal of Political Economy*, October 1962, 70(5, Part 2), pp. 80-93.

Tabatabai, Hamid. *Statistics on Poverty and Income Distribution: An ILO Compendium of Data*. Geneva: International Labour Office, 1996.

Taylor, J. Edward. "Undocumented Mexico-U.S. Migration and the Returns to Households in Mexico." *American Journal of Agricultural Economics* 69 (August 1987): 626-638.

United Nations. *Statistical Yearbook*. New York: United Nations, 1997.

U.S. Bureau of the Census. "The Foreign-Born Population in the United States." *Current Population Reports* P20-534. January 2001.

World Bank. *World Development Report*. Washington, D.C.: Oxford University Press, 1997.

Table 1.—Comparison of Sample to All Immigrants in INS data

	All Immigrants	Occupation Reported	Sample
Percent in skilled occupations	21.1	35.1	36.6
Percent employment-based	14.5	19.0	20.0
Percent family reunification	56.6	55.0	62.7
Percent refugee or asylee	18.2	13.9	3.8
Percent adjusting status	53.7	49.8	44.8
Number of countries	204	198	51
Number of immigrants	229,657	138,153	65,918

Note: The data include men aged 16-64 admitted as legal permanent residents in fiscal year 1995, except for individuals legalized under the Immigration Reform and Control Act (IRCA).

Table 2.— Summary Statistics

Variable	Mean	Minimum	Maximum
Percent skilled, source country	22.3 (11.4)	4.0	49.1
Gini index	36.9 (10.3)	19.5	59.1
GDP per capita	11501 (11874)	280	42416
Distance	4343 (2164)	366	8783

Note: Standard deviations are in parentheses. The number of observations is 51.

Table 3.—Determinants of Fraction of Immigrants in Skilled Occupations

Variable	(1)	(2)	(3)
Fraction skilled, source country	.851 (.326)	.569 (.274)	.604 (.323)
Gini index	-.011 (.011)	-.007 (.009)	-.004 (.009)
ln (GDP per capita) * low relative return to skill	.004 (.027)	.011 (.022)	-.002 (.023)
ln (GDP per capita) * high relative return to skill	-.029 (.030)	-.007 (.026)	-.001 (.030)
Distance * low relative return to skill	.002 (.013)	.011 (.011)	-.003 (.017)
Distance * high relative return to skill	.048 (.014)	.039 (.013)	.003 (.025)
Fraction employment-based immigrants		.532 (.198)	.446 (.236)
Fraction family reunification immigrants		-.151 (.124)	-.159 (.139)
Fraction refugees/asylees		-.355 (.272)	-.418 (.288)
Fraction adjusting status		-.095 (.203)	.008 (.223)
Europe			-.060 (.140)
Asia			-.002 (.132)
Latin America			-.256 (.192)
Adjusted R ²	.711	.808	.809

Notes: A country has a low (high) relative return to skill if its Gini index is smaller (greater) than the Gini index for the U.S. Each column is from a separate weighted least squares regression. The weights are the number of male immigrants aged 15-64 who reported an occupation. The regressions also include a constant. Percent “other” is the omitted category for class of admission, and Oceania is the omitted geographic area. Standard errors are in parentheses.

Table 4.—Determinants of Fraction of Immigrants in Skilled Occupations, by Class of Admission

Variable	Employment	Family	Refugee/Asylee	Other
Fraction skilled, source country	.434 (.364)	.925 (.306)	.080 (.268)	-.079 (.297)
Gini index	.002 (.013)	-.006 (.008)	-.003 (.009)	-.033 (.013)
ln (GDP per capita) * low relative return to skill	.047 (.033)	-.025 (.024)	-.001 (.017)	.058 (.021)
ln (GDP per capita) * high relative return to skill	.063 (.042)	-.028 (.028)	-.031 (.032)	.092 (.040)
Distance * low relative return to skill	-.029 (.017)	-.003 (.016)	-.011 (.025)	.016 (.019)
Distance * high relative return to skill	-.033 (.033)	.009 (.025)	-.003 (.014)	-.012 (.043)
Fraction adjusting status	1.396 (.357)	.164 (.163)	--	-.178 (.084)
Europe	-.106 (.141)	-.025 (.136)	.073 (.326)	-.062 (.147)
Asia	.005 (.137)	.089 (.129)	.244 (.325)	-.064 (.144)
Latin America	-.518 (.222)	-.204 (.190)	.287 (.338)	-.100 (.218)
Number of countries	51	51	44	51
Adjusted R ²	.724	.768	.288	.488

Notes: A country has a low (high) relative return to skill if its Gini index is smaller (greater) than the Gini index for the U.S. Each column is from a separate weighted least squares regression. The weights are the number of male immigrants aged 15-64 who reported an occupation. Oceania is the omitted geographic area. Standard errors are in parentheses.

Table 5.—Determinants of Fraction of Newly-Arriving and Principal Immigrants in Skilled Occupations

Variable	Newly-Arriving	Adjusting	Principal	Tied
Fraction skilled, source country	.754 (.327)	.283 (.289)	.454 (.309)	1.202 (.416)
Gini index	-.008 (.009)	-.004 (.009)	-.003 (.009)	-.001 (.011)
ln (GDP per capita) * low relative return to skill	-.023 (.023)	.018 (.022)	.002 (.022)	-.055 (.031)
ln (GDP per capita) * high relative return to skill	-.023 (.029)	.028 (.030)	.006 (.029)	-.050 (.042)
Distance * low relative return to skill	-.014 (.017)	.016 (.015)	.001 (.016)	-.012 (.019)
Distance * high relative return to skill	.002 (.026)	.005 (.023)	.001 (.024)	-.013 (.031)
Fraction employment-based immigrants	.355 (.226)	.907 (.183)	.723 (.235)	-.274 (.313)
Fraction family reunification immigrants	-.257 (.092)	.420 (.190)	-.088 (.133)	-.167 (.193)
Fraction refugees/asylees	--	.096 (.168)	-.193 (.267)	-.931 (.455)
Fraction adjusting status	--	--	-.208 (.209)	.520 (.366)
Europe	-.151 (.147)	.070 (.125)	-.048 (.131)	-.219 (.188)
Asia	-.025 (.137)	-.046 (.113)	-.041 (.123)	.043 (.177)
Latin America	-.288 (.207)	-.249 (.166)	-.256 (.180)	-.391 (.249)
Number of countries	51	50	51	49
Adjusted R ²	.767	.879	.833	.727

Notes: A country has a low (high) relative return to skill if its Gini index is smaller (greater) than the Gini index for the U.S. Each column is from a separate weighted least squares regression. The weights are the number of male immigrants aged 15-64 who reported an occupation. Percent “other” is the omitted category for class of admission, and Oceania is the omitted geographic area. Standard errors are in parentheses.

Appendix Table 1.—Countries Included in the Sample

Country	Percent Skilled	Number in Sample	Country	Percent Skilled	Number in Sample
<u>Latin America</u>			<u>Europe</u>		
Bolivia	28.0	264	Austria	41.9	301
Chile	35.1	302	Belgium	69.3	179
Colombia	18.8	1915	Canada	68.4	4896
Costa Rica	26.5	253	Croatia	18.4	456
Ecuador	15.8	1321	Czech Republic	50.0	16
El Salvador	4.3	2144	Denmark	64.9	154
Honduras	14.0	864	Estonia	16.7	24
Mexico	4.9	12400	Finland	75.7	103
Panama	32.9	234	Germany	60.2	1552
Paraguay	28.6	63	Greece	25.9	642
Peru	24.5	1530	Hungary	61.3	168
Uruguay	32.3	96	Ireland	45.9	1901
Venezuela	59.2	588	Italy	43.2	754
			Latvia	47.9	71
<u>Asia</u>			Netherlands	69.1	414
Bangladesh	39.1	1218	Norway	62.1	140
Hong Kong	54.4	2703	Poland	31.3	3507
Israel	51.6	858	Portugal	12.4	715
Japan	33.8	983	Romania	48.9	1087
Korea	52.2	2143	Slovakia	36.6	123
Malaysia	51.0	359	Slovenia	45.8	24
Pakistan	44.7	2134	Spain	57.6	380
Philippines	42.5	7539	Switzerland	75.1	341
Singapore	72.2	115	United Kingdom	66.0	4400
Sri Lanka	60.6	231			
Thailand	13.4	1026	<u>Oceania</u>		
Turkey	46.5	1243	Australia	66.5	776
			New Zealand	58.6	268

Notes: Data are for the 1995 fiscal year and include only new recipients of legal permanent resident status (not including individuals legalized under the IRCA).