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SELF-SELECTION AND THE EARNINGS OF IMMIGRANTS

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ABSTRACT

This paper analyzes the way in which the earnings of the immigrant population may be expected to differ from the earnings of the native population because of the endogeneity of the migration decision. The conditions that determine the nature of the self-selection are derived and depend on economic and political characteristics of the sending and receiving countries. The empirical analysis shows that differences in the U.S. earnings of immigrants with the same measured skills, but from different home countries, are attributable to variations in conditions in the country of origin at the time of migration.

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Self-Selection and the Earnings of Immigrants

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This paper analyzes the way in which the earnings of the immigrant population may be expected to differ from the earnings of the native population because of the endogeneity of the decision to migrate. The empirical study shows that differences in the U.S. earnings of immigrants with the same measured skills, but from different home countries, are attributable to variations in political and economic conditions in the countries of origin at the time of migration.

Immigrants in the United States do not make up a random sample of the population from the countries of origin. This is perhaps the most convincing finding in the literature that analyzes how immigrants perform in the U.S. labor market. In the "first-generation" studies of this literature (Barry R. Chiswick, 1978; Geoffrey Carliner, 1980; Gregory DeFreitas, 1980), cross-section earnings functions were estimated and two conclusions were reached: (1) the age/earnings profile of immigrants is steeper than the age/earnings profile of the native population; and (2) the age/earnings profile of immigrants crosses the age/earnings profile of natives about 10-15 years after immigration. Thus, after a relatively short adaptation period immigrant earnings "overtake" the earnings of the native-born. The first of these findings was often explained in terms of the human capital framework: Immigrants presumably have stronger investment incentives than native workers, and thus immigrant earnings grow

at a faster rate than native earnings. The existence of the overtaking age, however, was explained in terms of the unobserved characteristics of the migrants: Immigrants are a self-selected group and, as a result, immigrants may be "more able and more highly motivated" (Chiswick, 1978, p. 900) than the native-born.

Recently, the focus has shifted from analyses of single cross-section data sets to studies of cohort or longitudinal data (see my 1985 and 1987 papers; and Guillermina Jasso and Mark R. Rosenzweig, 1985, 1986). The departure point for these studies is the well-known fact that the analysis of a single cross-section of data cannot separately identify aging and cohort effects.[1] The cross-section finding that immigrant earnings and years-since-migration are positively correlated can be explained either in terms of an aging effect (i.e., assimilation) or it may be due to cohort differences in quality (caused by non-random return migration propensities and/or secular shifts in the skill mix of immigrants admitted to the United States). These recent studies, in effect, bring to the forefront the question of how cohort quality and immigrant self-selection are related. For example, are immigrants selected from the upper or lower tail of the ability (or income) distribution in the sending countries? Even if immigrants are drawn from the upper tail of the income distribution in the home country, does that ensure that they end up in the upper tail of the U.S. income distribution? Finally, if cohort quality has experienced a secular decline in the postwar period, as my 1985 analysis suggests, what factors are responsible for this change in the selection mechanism determining immigration?

This paper presents a theoretical and empirical study of these questions. It is assumed that individuals compare the potential incomes in the United States with the incomes in the home countries, and make the migration decision

based on these income differentials (net of mobility costs). The use of this standard model allows a systematic analysis of the types of selection biases that are created by this behavior.[2] It will be seen that the common assumption that immigrants are drawn from the upper tail of the "home" income distribution requires a set of conditions that will not be generally satisfied. More importantly, this type of model suggests a few key variables (namely, the characteristics of the relevant income distributions) that "predict" the types of selection biases created by income-maximizing behavior on the part of potential migrants.

The empirical work presented in this paper analyzes the U.S. earnings of immigrants from 41 countries using the 1970 and 1980 Censuses. Not surprisingly, it is found that the variance in (relative) immigrant earnings across these countries is substantial. Using the theoretical insights, however, the analysis shows that the variance in various measures of the "quality" of immigrants can be explained to a large extent by a few key variables describing economic and political conditions in the countries of origin.

I. Theoretical Framework

Suppose there are two countries: country 0 and country 1. For concreteness, country 0 denotes the "home" country or the country of origin while country 1 denotes the United States or the country of destination.[3] Residents of the home country have earnings which are distributed as:

$$\ell n\, w_0 = \mu_0 + \varepsilon_0 \,, \tag{1}$$

where $\varepsilon_0 \sim N(0,\sigma_0^2)$. The earnings facing this population if they were to migrate to the United States are given by:

$$\ell n\, w_1 = \mu_1 + \varepsilon_1 \,, \tag{2}$$

where $\varepsilon_1 \sim N(0,\sigma_1^2)$, and ε_0 and ε_1 have correlation coefficient ρ.

Equations (1) and (2) describe the earnings distributions facing a given individual that is contemplating emigration to the United States. This framework, due to A.D. Roy (1951), can be interpreted as decomposing individual earnings into a part due to observable socioeconomic variables (μ_0 and μ_1), and a part due to unobserved characteristics (ε_0 and ε_1). The Roy model focuses on the impact of selection biases on the disturbances ε_0 and ε_1. Initially, therefore, variations in socioeconomic variables (which shift μ_0 and μ_1) are ignored, but their role will be discussed below.[4]

The parameter μ_1 is the mean income that residents from the home country would earn in the U.S. if all home country citizens were to migrate to the United States. In general, this level of income need not be the same as that of the U.S. native population since the average skills of the two populations - even in the absence of selection biases - may differ. For simplicity, in the remainder of the discussion it is assumed that these intercountry differences in skill (such as education and age) have been standardized, and hence μ_1 also gives the earnings of the average native worker in the U.S.[5]

The migration decision for persons in country 0 is determined by the sign of the index function:

$$(3) \qquad I = \ell n\left(\frac{w_1}{w_0+C}\right) \simeq (\mu_1-\mu_0-\pi) + (\varepsilon_1-\varepsilon_0) \ ,$$

where C gives the level of mobility costs, and π gives a "time-equivalent" measure of the costs of emigrating to the United States (i.e., $\pi = C/w_0$). Assume that π is constant across all individuals in the country of origin. Since migration to the U.S. occurs when $I>0$, the emigration rate from the country of origin is given by:

$$(4) \qquad P = Pr[v > -(\mu_1-\mu_0-\pi)] = 1-\Phi(z) \ ,$$

where $v = \varepsilon_1-\varepsilon_0$; $z = -(\mu_1-\mu_0-\pi)/\sigma_v$; and Φ is the standard normal distribution function.

Equation (4) neatly summarizes the economic content of the theory of migration proposed by Larry A. Sjaastad (1962). If follows from (4) that the emigration rate is: (a) a negative function of mean income in the home country; (b) a positive function of mean income in the United States; and (c) a negative function of the costs of emigrating to the United States. There are, however, a number of other implications in the theory that yield important insights into the kinds of selection biases generated by the endogenous migration decision. In particular, consider the conditional means $E(\ell n\ w_0 | I>0)$ and $E(\ell n\ w_1 | I>0)$. The first of these means gives the average earnings of emigrants in the country of origin, while the latter term gives the average earnings of these migrants in the United States. Under the normality assumptions these conditional means are given by:

$$E(\ell n\ w_0 | I>0) = \mu_0 + \frac{\sigma_0\sigma_1}{\sigma_v}(\rho - \frac{\sigma_0}{\sigma_1})\lambda, \tag{5}$$

$$E(\ell n\ w_1 | I>0) = \mu_1 + \frac{\sigma_0\sigma_1}{\sigma_v}(\frac{\sigma_1}{\sigma_0} - \rho)\lambda, \tag{6}$$

where $\lambda = \phi(z)/P$; and ϕ is the density of the standard normal. The variable λ is inversely related to the emigration rate, and takes on a value of zero when P=1 (Heckman, 1979). Assume initially that P<1 so that at least part of the home country's population is better off by not emigrating. Then the second terms in (5) and (6) define the kinds of selection biases generated by income-maximizing behavior. Equation (5) shows that the average emigrant may be "better" or "worse" than the average person in the country of origin depending on $\rho \gtrless \sigma_0/\sigma_1$. Similarly, equation (6) shows that the average immigrant in the U.S. may have higher or lower earnings than the average native person depending on $\sigma_1/\sigma_0 \gtrless \rho$. Let Q_0 be the income differential between the average emigrant and

the average person in country 0, Q_1 be the income differential between the average immigrant and the average native person in the United States, and $k = \sigma_1/\sigma_0$. There are three cases that are of interest:[6]

Case 1. Positive Selection: $Q_0>0$ and $Q_1>0$.

In this situation the "best" persons leave the country of origin and when they get to the U.S. they outperform the native population. A reading of the literature on the earnings of immigrants suggests that this positive selection is most often assumed in the interpretation of those empirical results. Inspection of equations (5) and (6), however, shows that the necessary (and sufficient) conditions for positive selection to occur are:

$$\rho > \min(\tfrac{1}{k}, k) \text{ and } k > 1. \tag{7}$$

Thus if ρ is sufficiently high and if income is more dispersed in the U.S. than in the country of origin, the immigrants arriving in the U.S. are indeed selected from the upper tail of the home country's income distribution and will outperform the native-born.

Case 2. Negative Selection: $Q_0<0$ and $Q_1<0$.

In this type of selection the U.S. draws persons from the lower tail of the home country's income distribution and these immigrants do not perform well in the U.S. labor market. The necessary (and sufficient) conditions for negative selection to occur are:

$$\rho > \min(\tfrac{1}{k}, k) \text{ and } k < 1. \tag{8}$$

Negative selection again requires that ρ be "sufficiently" positive but that the income distribution be more unequal in the home country that in the U.S.[7]

Case 3. Refugee Sorting: $Q_0<0$ and $Q_1>0$.

The U.S. draws below-average immigrants (in terms of the country of origin), but they outperform the U.S. native-born upon arrival. The necessary (and sufficient) condition for this to occur is:

$$\rho < \min(\frac{1}{k}, k) \quad . \tag{9}$$

These three cases summarize the quality differentials between migrants and the native base in each of the two countries. It seems plausible to argue that for non-Communist countries ρ is likely to be positive and large. After all, profit-maximizing employers are likely to value the same factors in any market economy. The quality of immigrants in the United States then depends entirely on the ratio of variances in the income distributions of the United States and the country of origin. Suppose, for example, that $\sigma_0^2 > \sigma_1^2$. The United States, in a sense, "insures" low-income workers against poor labor market outcomes while "taxing" high-income workers (relative to the country of origin). This opportunity set implies that low-income workers have much greater incentives to migrate than high-income workers, and thus leads to immigrants being negatively selected from the population. Conversely, if $\sigma_1^2 > \sigma_0^2$, the home country now protects low-income workers from poor labor market outcomes and "taxes" the high income worker. This opportunity set generates a "brain drain" into the United States. Available data on the distribution of income (World Bank, 1986, pp. 226-227) suggests that income is more unequally distributed in the large number of "third-world" countries (e.g., Mexico, India, etc.) which form the bulk of current immigration to the U.S.[8] Income maximizing behavior is inconsistent with the traditional assumption that the U.S. draws the "best" workers from a given country and that those workers will (eventually) outperform the U.S. native-born.

On the other hand, ρ need not always be positive and strong. It is likely, in fact, that ρ is negative for countries that have recently experienced a Communist takeover. The change from a market economy to a Communist system is often accompanied by structural shifts in the income distribution and, in particular, the confiscation of the financial holdings of entrepreneurs. Imigrants from such systems will be in the lower tail of the "revolutionary" income distribution but will outperform the average U.S. native worker. This result signals the movement of persons who cannot match with the new political structure, but who "seek refuge" and match quite well in a market economy.

These insights are developed under the assumption that selection biases do exist (i.e., $P<1$ and $\lambda>0$). Since for most countries in Latin America and Asia the mean level of the U.S. income distribution greatly exceeds the mean level of the home country's income distribution, it is unclear why -- in the context of an income-maximizing model -- the entire population of country 0 does not emigrate to the United States.

There are two reasons why we do not observe wholesale migrations of entire populations to the United States. First, it is not the differences in mean income levels that determine the extent of migration, but the differences in mean income levels net of migration costs. These migration costs will be both monetary and psychic, and are likely to be large in countries which have different cultural and social backgrounds than the United States. Second, there are statutory restrictions on the number of legal immigrants the U.S. will accept from any given country. These quotas play the important role of increasing migration costs for emigrants (if the numerical constraints are binding) since these individuals will presumably have to compete (and invest time and effort) to obtain the relatively scarce visas. Hence mobility costs

ensure that only some persons in country 0 find it worthwhile to emigrate and thereby create the selection biases that are apparent in immigration data.

The model outlined above can be used to infer how the quality of immigrants in the United States will differ in the cross-section (across different countries of origin) or over time (as economic conditions in the country of origin and in the U.S. change). The income-maximization hypothesis implies the existence of a quality-of-immigrants equation given by:

$$Q_1 = Q_1(\mu_1-\mu_0-\pi,\sigma_0,\sigma_1,\rho) \quad . \tag{10}$$

To determine the restrictions implied by the behavioral assumption of income maximization it is instructive to recall that $Q_1 = \gamma\lambda$, where $\gamma = \frac{\sigma_0\sigma_1}{\sigma_v}(k-\rho)$. The parameter γ does <u>not</u> depend on the size of the flow, while λ does. The impact of any variable α on the quality of immigrants in the U.S. is given by:

$$\frac{\partial Q_1}{\partial \alpha} = \lambda \frac{\partial \gamma}{\partial \alpha} + \gamma \frac{\partial \lambda}{\partial \alpha} \quad . \tag{11}$$

The first term in (11) holds the size of the flow constant and will be called the "composition" effect. It measures how a change in the ability mix of a constant-sized immigrant pool affects their quality (relative to the U.S. native population). The second term in (11) will be called the "scale" effect and captures what happens to the quality of U.S. immigrants as the size of the flow is increased for any given "mix" (i.e., for constant γ).

Consider what happens to immigrant quality as the mean of the home country's income distribution increases. It can be shown that:

$$\frac{\partial Q_1}{\partial \mu_0} = \frac{\sigma_1\sigma_0}{\sigma_v^2}(k-\rho)\frac{\partial \lambda}{\partial z} \quad . \tag{12}$$

Shifts in μ_0 lead only to a scale effect on Q_1. In addition, it is easy to show that $\partial\lambda/\partial z>0$.[9] As discussed earlier, the sign of $k-\rho$ determines whether immigrants fall in the upper or lower tail of the U.S. income distribution.

Equation (12) shows that k-ρ also determines what happens to the (U.S.) earnings of immigrants as mean income in the home country increases. If k-ρ is negative (immigrants are coming from countries with significantly more unequal income distributions and ρ is "sufficiently" positive), $\partial Q_1/\partial \mu_0 < 0$. The intuition for this result follows from the fact that as μ_0 increases the emigration rate falls. The increase in μ_0 improves the position of the "marginal" immigrant so that he no longer migrates. But this marginal immigrant was more productive than the average immigrant. The increase in μ_0, therefore, leads to a reduction in the average quality of the immigrant population. Since the mean of the home country's income distribution and mobility costs play identical roles in the model, equation (12) also predicts that increases in mobility costs will <u>decrease</u> immigrant quality if $k-\rho<0$.

It is important to note that this result only captures the impact of changes in μ_0 (or migration costs) on the extent of selection bias (Q_1). The increase in μ_0, however, can be induced by either a shift in the skill distribution of the country of origin's population, or by an increase in the country's wealth that is unrelated to skills (e.g., the discovery of a large inventory of natural resources). If μ_0 shifts because of the latter factor, equation (12) correctly predicts the change in observed immigrant earnings (which are given by $\mu_1 + Q_1$). However, if μ_0 shifts due to an increase in the skill level of the population, the change in immigrant earnings will also depend on the term $d\mu_1/d\mu_0$. This derivative will be positive if skills are transferable across countries, and this skill shift may dominate the selection bias effect given by (12). Hence the (relative) earnings of immigrants in the U.S. may well be a positive function of μ_0 regardless of the sign of equation (12).[10]

The change in the quality of immigrants due to a mean-preserving increase in the income inequality of the home country is given by:

$$(13) \qquad \frac{\partial Q_1}{\partial \sigma_0} = \frac{\sigma_1^2 \sigma_0}{\sigma_v^3}(\rho^2-1)\lambda - \frac{\sigma_1 \sigma_0^2}{\sigma_v^3}(k-\rho)(1-\rho k)\frac{\partial \lambda}{\partial z} \cdot z \quad ,$$

where the first term gives the composition effect and the second term gives the scale effect. Since $|\rho| \leq 1$, the composition effect will always be non-positive. An increase in σ_0 reduces the income of the poorest while it improves the position of the richest. Hence the mix of immigrants will include more persons from the lower tail of the distribution.

In addition, a change in σ_0 changes the rate of emigration. Equation (13) shows that the sign of the scale effect depends on the sign of three terms: $(k-\rho)$, $(1-\rho k)$ and z. The first two of these terms are nothing but the restrictions in equations (7) and (8). Suppose, for concreteness, that there is negative selection: the least able persons leave the home country and they perform below the U.S. native average. This implies $k-\rho<0$ and $1-\rho k>0$. Inspection of (13) reveals that the direction of the scale effect depends on the sign of $z = -(\mu_1-\mu_0-\pi)/\sigma_v$. If $\mu_1 > \mu_0 + \pi$, so that mean U.S. incomes are higher than foreign incomes even after adjusting for mobility costs, z is negative, the scale effect is negative and thus immigrants from countries with more income inequality will perform worse in the United States.

The intuition for the workings of the scale effect can be grasped by considering Figure 1, which is drawn with $z<0$ and $\sigma_1<\sigma_0$. As σ_0 increases, the worse-off persons in country 0 will still want to migrate, while the better off persons become relatively better off and their migration incentives decline. The emigration rate drops due to the withdrawal of the "best" potential migrants from the market, and thus the quality of the pool that does reach the United States declines.

The last characteristic of the home country's income distribution which determines the quality of immigrants is ρ. It can be shown that:

$$(14) \qquad \frac{\partial Q_1}{\partial \rho} = - \frac{\sigma_1 \sigma_0^3}{\sigma_v^3} (1-\rho k)\lambda + \frac{\sigma_1^2 \sigma_0^2}{\sigma_v^3} (k-\rho) \frac{\partial \lambda}{\partial z} \cdot z$$

Changes in the correlation coefficient also induce two effects. Consider first the composition effect. Its sign depends on $-(1-\rho k)$, which is negative if there is negative selection. An increase in ρ implies that a better match exists between performance in the U.S. and in the home country. Since $\sigma_0 > \sigma_1$ this decreases the profitability of migration for the best persons in country 0 and increases it for the worst persons.

In addition, changes in ρ have an impact on the emigration rate, and the scale effect is given by the last term in (14). If the conditions for negative selection hold, $k-\rho<0$ and the sign of the scale effect will depend on the sign of $-z$. If, as before, we assume $z<0$, the scale effect of an increase in the correlation coefficient on the quality of immigrants is seen to be positive.

A summary of the comparative statics results under the various regimes is provided in Table 1. One implication is immediately clear: generalizations about the quality of immigrants in the United States are hard to come by. The model does, however, isolate the key factors that determine the types of selections in the immigrant population and these factors shed some light on my 1985 finding that the quality of immigrants declined in the postwar period. Prior to the 1965 Amendments to the Immigration and Nationality Act, immigration to the United States from Eastern Hemisphere countries was regulated by numerical quotas. These quotas were based on the ethnic population of the United States in 1919 and thus encouraged immigration from (some) Western European countries and discouraged immigration from all other countries. The favored countries have one important characteristic: their income distributions are probably much less dispersed than those of countries in Latin America or Asia. The 1965 Amendments revamped the quota system, established a

20,000 numerical limit for immigration from any single country (subject to both Hemispheric and worldwide numerical limits), and led to a substantial increase in the number of immigrants from Asia and Latin America. The new flow of migrants originate in countries that are much more likely to have greater income inequality than the United States. It would not be surprising, therefore, if the quality of immigrants declined as a result of the 1965 Amendments.[11]

II. Empirical Framework

The quality measure Q_1 derived in the previous section is the standardized wage differential between immigrants and natives in the U.S. In any given cross-section, this wage differential is affected by two factors: (1) differences in the skill composition of the various immigrant cohorts; and (2) the rate of convergence between foreign- and native-born earnings (i.e., the rate of assimilation of immigrants). An empirical framework for measuring these effects thus begins with the specification of the regression model:

$$(15) \qquad \ell n\, w_i(T) = X_i\theta_T + \delta I_i + \alpha_1 I_i y_i + \alpha_2 I_i y_i^2 + \beta_1 I_i C_i + \beta_2 I_i C_i^2 + v_i \ ,$$

where $w_i(T)$ is the wage rate of individual i in cross-section year T; X_i is a vector of socioeconomic characteristics; I_i is a dummy variable set to unity if the individual is foreign-born; y_i represents the number of years the immigrant has resided in the United States; and C_i is the calendar year of the immigrant's arrival. The parameters α_1 and α_2 capture the impact of assimilation on the (relative) earnings of immigrants, while β_1 and β_2 capture the cohort differentials.[12]

Of course, in a single cross-section of data equation (15) cannot be estimated since the variables C_i and y_i are related by the identity $T \equiv C_i + y_i$. Substituting this identity in (15) yields:

$$(16) \qquad \ell n\, w_i(T) = X_i\theta_T + (\delta+\beta_1 T+\beta_2 T^2)I_i + (\alpha_1-\beta_1-2\beta_2 T)I_i y_i + (\alpha_2+\beta_2)I_i y_i^2 + v_i$$

Equation (16) shows that the typical cross-section earnings function estimated in the immigration literature does not identify a single parameter of interest.[13] It is easy to show, however, that if another cross-section is available in calendar year T' all the parameters in (15) can be identified.[14] Moreover, the comparison of the two cross-section regressions provides interesting insights about the extent and direction of cohort quality differentials. Let $\gamma_1 = \delta+\beta_1 T+\beta_2 T^2$, $\gamma_2 = \alpha_1-\beta_1-2\beta_2 T$, and $\gamma_3 = \alpha_2+\beta_2$, be the coefficients of the immigration variables in the cross-section at calendar year T. This vector will shift over time since:

$$(17) \qquad \frac{\partial \gamma_1}{\partial T} = \beta_1 + 2\beta_2 T$$

$$(18) \qquad \frac{\partial \gamma_2}{\partial T} = -2\beta_2$$

$$(19) \qquad \frac{\partial \gamma_3}{\partial T} = 0$$

The immigration vector in cross-section earnings functions (except for the coefficient of $I \cdot y^2$) is inherently unstable, though the direction of the instability provides insights into the underlying structural changes. For instance, γ_1 (the coefficient of the immigrant dummy) will be shifting down over time if the quality of immigrants is decreasing at the "margin" (i.e., in the cross-section year T). In addition, the age/earnings profile of immigrants (relative to natives) becomes steeper over time (i.e., γ_2 increases) if the decline in the quality of immigrant cohorts has accelerated over the sample period.

The empirical analysis below uses the 1970 and 1980 Census cross-sections to identify the parameters of interest ($\delta, \alpha_1, \alpha_2, \beta_1$, and β_2). From these estimates it is possible to calculate measures of three alternative dimensions of cohort quality that underlie the discussion. The first of these dimensions is simply the wage of an immigrant cohort relative to the native base prior to any assimilation taking place; i.e., a measure of the "raw" skills a given immigrant cohort brings to the United States. A second dimension is given by the extent to which the quality of successive immigrant cohorts is changing over time, while a third dimension is given by the extent to which the earnings of a specific immigrant cohort grow--above and beyond pure aging effects--in the U.S. labor market. Clearly, there are many ways of defining variables that capture these three facets of the "quality" of immigrants. However, since all possible definitions of a particular dimension of quality are based on the same underlying parameters, there is a high degree of correlation among the alternative measures. Thus, to some extent, the choice of the empirical representation of a given facet of quality is arbitrary. In the empirical analysis below, the three dimensions of quality are defined by:

1. The predicted wage differential in 1979 between the most recently arrived immigrant cohort and the native base. This measure of the quality of a single cohort of immigrants--prior to assimilation taking place -- is given by the coefficient of the immigrant dummy variable in the 1980 cross-section.

2. The rate of wage growth (relative to natives) for an immigrant cohort that has resided in the United States for 10 years. This is the assimilation effect evaluated at y = 10, and is given by $\partial \ell nw/\partial y \big|_{y=10} = \alpha_1 + 20\alpha_2$.

3. The predicted wage differential immediately after immigration between the 1979 cohort and the 1955 cohort. This measure of the extent of cohort quality change is designed to compare the typical immigrant that

migrated prior to the 1965 Immigration and Nationality Act with the typical immigrant from the most recent wave. Using equation (15) it is easy to show that this change in cohort quality is given by $24(\beta_1 + 2\beta_2 T - 24\beta_2)$, where T indexes the 1980 cross-section.

III. Regression Results from the 1970-1980 Censuses

The data are drawn from the 1970 2/100 U.S. Census (obtained by pooling the 5% SMSA and County Group Sample and the 5% State Sample) and the 1980 5/100 A Sample.[15] The complete samples are used in the creation of the immigrant extracts, but random samples are drawn for the native "baseline" population.[16] The analysis is restricted to men aged 25-64 who satisfied four sample selection rules: (1) the individual was employed in the calendar year prior to the Census; (2) the individual was not self-employed or working without pay; (3) the individual was not in the Armed Forces (as of the survey week); and (4) the individual did not reside in group quarters.[17]

Since labor market conditions changed substantially between 1970 and 1980, the empirical framework derived in the previous section focused on the behavior of immigrant earnings relative to the earnings of natives. In this paper all immigrant groups will be compared to a single native base: the group of white, non-Hispanic, non-Asian men.

Forty-one countries were chosen for analysis. The countries were selected on the basis that both the 1970 and 1980 Censuses contained a substantial number of immigrants from that country. In particular, it is necessary to have at least 80 observations of persons born in a particular foreign country in the pooled 2/100 1970 Census to enter the sample of the 41 countries.[18] The 41 countries under analysis account for 90.4 percent of all immigration to the U.S. between 1951 and 1980.

Summary statistics on the immigrant flow in the 1951-1980 period are presented in Table 2. The first column of Table 2 gives the total number of immigrants from each country that arrived in the United States in that period. Although this number is interesting, it is more instructive if it is converted into a percentage of the country of origin's 1980 population. This statistic is presented in column 2 and gives the percentage by which the country of origin's population would increase (in 1980) if all the persons who emigrated to the United States in the past three decades returned to their birthplace. This percent ranges from the trivially small (.04 percent of Brazil and the USSR) to the amazingly large (over 10 percent for Jamaica). Of the 41 countries in Table 2, 17 of them experienced emigration to the United States which exceeded 1 percent of that country's population.

The national composition of the flows received by the United States over the 1951-1980 period did not remain constant over the three decades. Column 3 gives the flow of immigrants in the 1951-1960 decade as a percent of the country's 1950 population; while column 4 presents the flow of immigrants in 1971-1980 as a percent of the country's 1970 population. These statistics document the declining importance of Western European countries as a source of immigrants and the increasing importance of Asia and Latin America. The fact that the characteristics of the sending countries changed drastically during the postwar period implies that the types of selections that distinguish the immigrant population from the native-born also changed.

The 1970 and 1980 cross-section regressions were jointly estimated in each of the 41 samples (i.e., the group of immigrants from a specific country of origin pooled with the "white" native base), using the (ℓn) wage rate in the year preceding the census as the dependent variable. The socioeconomic vector of characteristics X included: years of completed schooling, age, age

squared, whether health limits work, whether married, spouse present, and whether resident of an SMSA. The regression framework derived in Section II implies that the coefficient of the quadratic years-since-migration variable should be constant across Censuses. This restriction was satisfied (at the 10 percent level of significance) by 32 of the 41 countries in the data, and hence was imposed on the analysis.

The restricted coefficients of the immigration vector in both the 1970 and 1980 Census cross-sections are presented in the first five columns of Table 3. The coefficients of the immigration variables in 1970 differ drastically from the coefficients of the immigration variables in 1980. This difference implies that cross-section regressions do not capture the "true" assimilation impact since cohort effects are confounding the analysis. Consider, for example, Colombia. In 1970, the most recent immigrants earned about 22 percent less than the native base, and their (relative) earnings increased by about 1.7 percent in the first year after immigration. By 1980, the most recent wave of Colombians earned 40 percent less than the same native base, and their earnings increased by about 2.2 percent in the first year after immigration. The tilting of the cross-section profile so that later cross-sections are steeper and have a more negative constant term implies that the quality of the more recent Colombian immigrant waves is lower than that of the earlier waves. Conversely, consider the immigrants from France. In 1970, the typical French immigrant earned about 8 percent less than a comparable native person, and had earnings growth of about .2 percent during that first-year after immigration. By 1980, the most recent immigrant earned about 10 percent more than the native base, and had earnings growth of minus .5 percent during that first year. The flattening of the cross-section profile implies that the quality of French immigrants increased over the sample period.

Three dimensions of cohort quality are implicit in these regression coefficients. The entry wage differential between the 1979 immigrant cohort and the native base is given by the coefficient of the immigrant dummy in the 1980 Census cross-section. Table 3 clearly shows that this coefficient has a large variance across countries. The last two columns of Table 3 present estimates of the other two dimensions of cohort quality: the assimilation rate defined by the slope of the earnings/assimilation path at y = 10; and the rate of change in cohort quality, defined by the earnings differential between the 1979 cohort and the 1955 cohort at the time of arrival in the U.S. Since these estimated parameters are functions of the cross-section coefficients of Table 3, it is not surprising to find that there is a lot of variance in both of these variables across countries. Immigrants from some countries have high assimilation rates, while immigrants from other countries experience no assimilation at all. Similarly, the rate of cohort quality change is sometimes positive (thus indicating quality increased between the 1955 and 1979 cohorts) and sometimes negative (thus indicating a quality decrease across cohorts). For example, the most recent immigrant wave from the United Kingdom has an earnings potential that is about 13 percent higher that the wave that arrived in 1955, while the most recent immigrants from India have 28 percent lower earnings than the earlier cohort.

The Roy model suggests that country-specific characteristics of the income distribution (and mobility costs) determine the quality of immigrants in the United States. The important task, therefore, becomes the identification of observable variables which can proxy for these theoretical parameters, and the determination of whether these country-specific variables "explain" the variance in the quality proxies presented in Table 3.

IV. Determinants of Immigrant Quality

Table 4 describes the construction and source of country-specific aggregate variables which portray the political and economic conditions (as well as some characteristics of the immigrant populations) of the 41 countries under analysis during the 1950-1979 period. Table 4 also presents the mean and range of these variables and comparable statistics for the U.S.

Three of these variables are designed to capture political conditions in the country of origin. These political measures are obtained from the Cross-National Time-Series Archive (CNTSA), a historical dataset containing both political and economic variables for all sovereign countries since 1815 (up to 1973).[19] The CNTSA set contains a variable describing the extent of "party legitimacy", i.e., whether or not there is competition among political parties in the electoral system. The measure of party legitimacy is interpreted as an index of political freedom, and is used to construct two variables: (1) a dummy variable set equal to unity if the immigrant's birthplace had a competitive political system during the entire 1950-1973 period; and (2) a dummy variable set equal to unity if the immigrant's birthplace had a competitive political system at the beginning of the period, but lost its political freedom by the end of the period. The omitted dummy variable indicates whether the birthplace of the immigrant had a noncompetitive political system both at the beginning and at the end of the 1950-1973 period.[20] The last index of political stability used is a variable measuring the number of political assassinations (defined as a politically motivated murder or attempted murder of a high government official or politician) that took place in the specific country during the 1950-1973 period.

The country-specific vector also includes variables that describe economic conditions in the various countries of origin:

1. The logarithm of per capita Gross National Product in 1980 (in U.S. dollars). In addition, the analysis also uses the average annual percentage change in that variable over the 1963-1980 period. These variables, of course, are designed to control for the mean level of the income distribution (as well as changes in that level) in the various countries of origin.

2. The ratio of household income accruing to the top 10 percent of the households to the income accruing to the bottom 20 percent of the households (circa 1970). Unfortunately, this measure of income inequality does not exist prior to the 1970s for most of the countries under analysis, and hence the change in the extent of income inequality during the last three decades cannot be documented. The empirical analysis below will proxy for the change in income inequality by using the change in the fraction of GNP that can be attributed to central government expenditures over that period. Presumably, the greater the role of the government the more taxation and income redistribution that occurs, and hence the less unequal the income distribution will be.

3. The level of mobility costs is proxied by the number of air miles between the country's capital and the nearest U.S. gateway.

Finally, the regressions also include variables that describe relevant characteristics of the immigrant population itself. The two variables in this category are the fraction of the most recently arrived immigrants who speak English well or very well, and the average age at migration. These variables are likely to affect the earnings of immigrants as well as their incentives to invest in human capital, and hence will be important determinants of immigrant quality.

A. Determinants of the Entry Wage Differential

In the last section a variable measuring the entry wage differential

between the foreign-born and the native-born for the immigrant cohort arriving in 1979 was calculated for each of the 41 countries under analysis. Table 5 presents the generalized least squares regressions of this measure of immigrant quality on the country-specific aggregate variables.[21]

The simplest specification in column 1 shows that the variable measuring whether or not the country was politically competitive in the postwar period has a strong positive impact on the immigrant's entry wage. Immigrants from these countries have 27 percent higher relative earnings (at the time of entry into the U.S.) than immigrants from politically repressive countries. This basic regression also shows that the extent of income inequality has a weak negative impact on the relative quality of immigrants. Immigrants from countries with more income inequality are of lower quality. This result is consistent with the theoretical implications of the Roy model. As income inequality increases, the migration incentives for persons in the upper tail of the distribution decline, thus lowering the average quality of the immigrant population.

In the second column of Table 5, the variables measuring mobility costs and the age and English proficiency of immigrants are added to the regression. The results suggest that persons migrating from countries that have 100% English proficiency rates have about 26 percent higher relative earnings at the time of entry than immigrants from countries with 0% English proficiency rates.[22] Table 5 also shows that age at migration has a significant negative impact on the initial relative earnings of immigrants in the United States. Hence persons who migrate as youths have an easier time in the U.S. labor market than older immigrants.

The third regression in Table 5 adds the mean level of GNP per capita to the list of exogenous variables. Its impact is strongly positive, and its

inclusion increases the explanatory power of the regression to over 80 percent! A 10 percent increase in a country's GNP increases the relative earnings of immigrants by about 1.2 percent. This effect is likely to be caused by the fact that the higher the GNP in the country of origin, the greater the resemblance between that country's economic structure and that of the U.S., as well as the greater the skills of the immigrant flow. Hence immigrants from those countries perform quite well in the U.S. labor market. The last regression in Table 6 adds continent dummies (the omitted continent is Europe) to control for continent-specific fixed effects. These additional controls do not have a major impact on the coefficient of the other variables.[23]

Table 5 shows that the introduction of the GNP variable has a major impact on the coefficient of the inequality variable: the latter turns positive (and insignificant). The reason for this shift lies in the very high negative correlation between the two variables ($r = -.6$). Since high-income countries (mostly in Western Europe) also tend to have the least amount of income inequality, the impact of per capita GNP on initial immigrant quality is likely capturing shifts in both the mean and the variance of the country of origin's income distribution.

The results in Table 5, therefore, are not entirely consistent with the theoretical predictions. Note, however, that these regressions do not truly constitute a "test" of the theory. The Roy model shows that selection biases will depend on a number of parameters which are not directly measurable. Table 5 attempts to explain inter-country differences in terms of variables which supposedly proxy for these primitive concepts. Clearly the errors introduced in the creation of these variables weaken the link between the theory and the empirical work. Nevertheless, it is important to note that these few country-specific variables "explain" a large fraction of the inter-country differences evident in Census data.

B. Determinants of the Rate of Assimilation

The assimilation rate is defined by the rate of earnings growth of an immigrant cohort (relative to natives) evaluated at 10 years after immigration. Table 6 presents the regressions of this variable on the various country-specific proxies.

Assimilation rates are determined by political factors. In particular, immigrants from free countries have lower assimilation rates than immigrants from countries with a long history of political repression, while immigrants from countries that recently lost their political freedom have the highest assimilation rates. These results are consistent with the hypothesis that the costs of return migration for immigrants from politically repressive countries are "high", and therefore they have the most incentives to adapt to the U.S. labor market. The same reasoning can also explain the strong positive impact of the number of assassinations on the rate of immigrant assimilation: immigrants from politically unstable countries have greater incentives to assimilate in the U.S. labor market since their return migration may be costly.

The regression in column 2 shows that although distance between the U.S. and the country of birth has a positive impact on the assimilation rate, the effect is not significant. However, immigrants from countries with higher levels of English proficiency have much higher assimilation rates. In fact, the rate of earnings growth of immigrants from English-speaking countries is 1.4 percentage points higher than that of immigrants from countries with 0% English proficiency rates. Similarly, the age at immigration has a strong positive impact on assimilation rates. This result is consistent with the hypothesis that immigrants who migrate as youths have little to gain from assimilation per se. On the other hand, the adaptation period is likely to be important for persons who migrate at older ages.

The last two regressions in Table 6 add the per capita GNP variable and the continent dummies to the list of regressors. These variables have a significant impact on the assimilation rate (in column 4). Immigrants from wealthier countries have higher assimilation rates, and Europeans (the omitted continent dummy) have higher assimilation rates than immigrants from the Americas, but lower assimilation rates than immigrants born in Asia or Africa. Despite the strongly significant impact of the continent dummies, the qualitative effect of most of the other variables in the regression is unaffected.

C. Determinants of the Change in Cohort Quality

Section III calculated a variable measuring the wage differential between the 1979 immigrant cohort and the 1955 immigrant cohort as of the date of immigration. The regressions analyzing the determinants of cohort quality change are presented in Table 7. It should be noted that the specification of these regressions differs slightly from those presented in Tables 5 and 6 since cohort quality change is likely to be determined by changes in the explanatory variables over the 1954-1979 period.

The simple specification in column 1 reveals that cohort quality change is strongly influenced by practically all the variables in the regressions. For example, the quality of cohorts from countries that experienced a shift from political competition to repression increased by about 13 percent (relative to the quality of cohorts from countries that were politically repressive throughout the period). This effect is consistent with the implications of the theory developed in Section I. The change in political structure can be viewed as a change in the correlation coefficient of the earnings of individuals between the home country and the U.S. The change towards a repressive government may make the correlation coefficient in earnings across the two

countries negative. Thus persons in the "revolutionary" lower tail of the home country's income distribution migrate to the U.S. and perform quite well in the U.S. labor market.

Table 7 also shows that cohort quality change is strongly affected by the average annual change in the percent of GNP that is attributable to expenditures by the central government. Presumably the greater the role of the government, the more income redistribution that takes place and the greater the decrease in income inequality over the postwar period. The coefficient of this variable in Table 8 is consistent with the theoretical implication.

The next two regressions in Table 8 introduce the (ℓn) level of GNP to control for country-specific differences in wealth, and the continent dummies to control for continent-specific fixed effects. The continent dummies are not very significant, but the GNP variable does have a strong positive impact on cohort quality change. Its positive coefficient confirms the finding suggested by the descriptive analysis in Section III: the quality of immigrants admitted to the United States has been increasing over time when the immigrants originate in Western Europe and has been declining over time when the immigrants originate in the less developed countries.

One factor causing systematic quality shifts across immigrant cohorts may have been the change in the quota system mandated by the 1965 Amendments to the Immigration and Nationality Act. Table 4 defined a variable that measures the change in the fraction of the home country's population "eligible" for emigration to the United States before and after the 1965 Amendments. Higher levels of this variable imply a reduction in the levels of "mobility costs" faced by potential emigrants. The Roy model suggests that its impact on the rate of cohort quality change is positive if the correlation coefficient between earnings capacities in the two countries is positive and if income is

more unequally distributed in the countries of origin than in the United States. The last column of Table 7 adds the quota variable to the regression and shows that it indeed has a positive and significant impact on the rate of change in cohort quality. It is important to note that this regression is estimated on only 28 observations since the quota system prior to the 1965 Amendments was applicable only to countries that were in the Eastern Hemisphere.

D. Determinants of the Emigration Rate

The empirical analysis in this paper focuses on the determinants of the (relative) earnings of immigrants. It is worth noting, however, that the Roy model also implies that the emigration rate will be a function of the same characteristics of the income distribution, political conditions, and migration costs that determine the relative earnings of immigrants. Therefore, it is important to explore if the emigration rate from the various countries of origin is responsive to shifts in the country-specific variables that have been used throughout this section.

Table 8 presents two probit regressions on the emigration rate.[24] The dependent variable is obtained from the second column of the summary statistics presented in Table 2, and is the percentage of the country of origin's population that emigrated to the United States in the 1951-1980 period. The first of the two regressions includes the political variables, the distance variable (to measure migration costs), and the inequality variable, while the second regression adds the continent dummies.[25]

As expected, the distance between the country of origin and the United States has a negative impact on the emigration rate. The emigration rate is also lower for countries that have high levels of GNP per capita. These results, of course, are consistent with the predictions of the wealth-

maximization framework. More interestingly, the second moment of the income distribution (as predicted by the Roy model) plays an important role in the determination of the emigration rate. In particular, countries with more income inequality have lower emigration rates. This negative coefficient is implied by the wealth-maximization framework if there is negative selection in the immigrant pool. Negative selection requires that the correlation between earnings in the U.S. and in the sending countries be sufficiently positive and that the U.S. has less income inequality than the sending countries. If, in addition, mean income in the U.S. exceeds mean income in sending countries (adjusted for mobility costs), as income inequality in the home country increases, the migration incentives of the most able decreases while the poorest will still migrate. Hence the emigration rate declines due to the withdrawal of high-income persons from the pool of emigrants. The analysis of the emigration rate, therefore, leads to results that are generally consistent with the types of selection biases that have been documented in this paper.

V. Summary

What determines the (labor market) quality of foreign-born persons in the United States? Most of the literature addresses this question simply by assuming that immigrants are a "select" group, and that the selection mechanism somehow sends the most able and the most ambitious persons in any country of origin to the United States. This paper is an attempt to analyze both the conceptual and empirical foundations for this type of assertion. Among the major findings of the study are:

1. If potential emigrants are income-maximizers, foreign-born persons in the United States need not be drawn from the most able and most ambitious in the country of origin. Two conditions must be satisfied in order for

positive selection to take place: (1) there is a strong positive correlation between the earnings a worker may expect in the home country and the earnings the same worker may expect in the U.S.; and (2) the U.S. has a more unequal income distribution than the home country. If the income distribution in the sending country is more unequal than that of the U.S. (and the correlation in earnings is positive and strong), emigrants will be chosen from the lower tail of the income distribution in the country of origin.

2. The empirical analysis of the earnings of immigrants from 41 different countries using the 1970 and 1980 Census shows that there are strong country-specific fixed effects in the (labor market) quality of foreign-born persons. In particular, persons from Western European countries do quite well in the United States, and their cohorts have exhibited a general increase in earnings (relative to their measured skills) over the postwar period. On the other hand, persons from less developed countries do not perform well in the U.S. labor market and their cohorts have exhibited a general decrease in earnings (relative to their measured skills) over the postwar period.

3. The empirical analysis of the variance in various dimensions of immigrant incomes shows that a few variables describing political and economic conditions in the various countries of origin explain over two-thirds of the intercountry variance in the mean U.S. incomes of immigrants with the same measured skills. Immigrants with high incomes in the U.S. relative to their measure skills come from countries that have high levels of GNP, low levels of income inequality, and politically competitive systems.

Footnotes

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[1] For a recent discussion of this identification problem see James J. Heckman and Richard Robb (1983).

[2] The model is formally identical to that presented in A.D. Roy's (1951) study of the impact of self-selection in occupational choice on the income distribution. The wealth-maximization hypothesis is also the cornerstone of the human capital model proposed by Larry A. Sjaastad (1962). However, both Sjaastad's work and the literature it engendered pay little attention to the selection biases that are at the core of the Roy model.

[3] Two important problems are ignored by the two-country setup. First, it is likely that potential movers from any country j will have more than one possible country of destination. Secondly, the probability that U.S. native-born persons emigrate to other countries may not be negligible. These possibilities are ignored in order to focus on the essential aspects of the selection problem.

[4] The Roy model has been recently used by Robert J. Willis and Sherwin Rosen (1979) to analyze the types of selection biases created by the college attendance decision. Heckman and Guilherme Sedlacek (1985) present a generalization of the Roy model and apply it to the problem of estimating market wage functions.

[5] It is possible, of course, that the average person in country 0 has ethnic or racial characteristics which are favored or penalized by the U.S. labor market. Hence the mean income of (equally skilled) natives may not equal μ_1. This possibility is ignored in the discussion that follows, but it can be easily incorporated into the model.

[6] A fourth case where $Q_0>0$ and $Q_1<0$ is theoretically impossible since it requires $\rho>1$.

[7] The generalization of the model to allow for variable mobility costs (π) shows that the necessary conditions for negative selection remain unchanged as long as mobility costs and earnings do not have an "excessive" negative correlation.

[8] It must be noted, however, that these data on income inequality do not correspond exactly to the variances that are the primitive parameters of the Roy model. In particular, σ_0^2 and σ_1^2 describe the dispersion in "opportunities" (for given socioeconomic characteristics).

[9] This follows trivially from the fact that λ is defined as $E(x|x>z)$, whre x is a standard normal random variable.

[10] This discussion illustrates how differences in skill characteristics can enter the Roy model. More generally, the earnings distributions in the two countries can be written as:

$$\ell n\ w_0 = X\delta_0 + \varepsilon_0,$$

$$\ell n\ w_1 = X\delta_1 + \varepsilon_1,$$

and the emigration rate (for given characteristics X) is given by:

$$P = Pr\{(\varepsilon_1-\varepsilon_0) > -[X(\delta_1-\delta_0) - \pi]\}\ .$$

Selection will occur not only on the basis of unobserved characteristics (ε), but also in terms of the socioeconomic variables X as long as the two

countries value these skills differently. Although the empirical analysis below (by holding X constant) focuses on the selections in ε, it would be very interesting to also investigate the types of selections generated in X.

[11] In addition, the 1965 Act changed the emphasis in the allocation of visas towards family reunification and away from occupational preferences. This shift may well lead to an even steeper decline in the quality of immigrants admitted to the U.S.

[12] The parameters β_1 and β_2 capture two kinds of cohort effects: (1) differences in the skill composition of cohorts due to a secular trend in the quality of immigrants; and (2) differences due to selective emigration of foreign-born persons in the U.S. Little is known, however, about the selection biases associated with return migration even though the Roy model can be generalized to account for the possibility that individuals make "mistakes". Unfortunately, U.S. data on the return migration of foreign-born persons is basically non-existent, and hence this problem is ignored in what follows.

[13] Except perhaps for the coefficient of the immigrant dummy. This coefficient gives the wage differential between the most recent cohort of immigrants and the native-born population.

[14] Provided that period effects on the immigrant/native wage differential are negligible. This assumption is far from innocuous. Unfortunately, since only two cross-sections are available, little can be done to test its validity.

[15] The two 1970 samples that are pooled are essentially independent of each other. The only substantive difference between them -- in the context of this study -- is that the set of persons for whom SMSA residence is defined differs in the two samples. However, the coefficients of the SMSA dummy in earnings functions estimated separately in the two samples are not statistically different from each other.

[16] The native-born extract is a .001 sample in the 1970 Census and a .00042 sample in the 1980 Census.

[17] The analysis is restricted to men aged 25-64 in either Census year. This differs from the more common methodology of tracking the "same" men over time. It can be shown (Heckman and Robb, 1983) that if the underlying parameters are constant over time it is unnecessary to track specific cohorts across Censuses in order to identify the structure. In addition, the samples exclude men who are self-employed. This restriction creates its own set of selection biases. However, an equally serious problem would arise if self-employed men were included in the study and their incomes were analyzed jointly with the wages of salaried men. Finally, the data exclude men who had annual earnings under $1,000 in either of the Census years.

[18] Only two of the countries in the analysis have between 80 to 100 observations in the 1970 Census, an additional 11 countries have between 101 and 200 observations, 8 have between 201 and 300 observations, and 20 have more than 300 observations. Of course, the sample sizes in the 1980 Census are significantly larger.

[19] The Cross-National Time-Series Archive was created by Professor Arthur Banks and is available through the Inter-University Consortium for Political and Social Research.

[20] There is also the possibility that a country gained its freedom during the 1950-1973 period. Only one country, however, falls in this category (The Dominican Republic). To reduce the number of exogenous variables, this country was pooled with the countries that were "free" throughout the entire period.

[21] The dependent variables in the "second stage" regressions presented in this section are themselves estimated regression coefficients (or linear

combinations thereof). Hence the disturbances in these regressions are heteroscedastic. Let y_i be the true value of the dependent variable (for country i) in the second-stage regressions. The "true" model is given by:

$$y_i = Z_i\beta + \varepsilon_i$$

where $E(\varepsilon_i) = 0$ and $E(\varepsilon_i^2) = \sigma_\varepsilon^2$. The variable y_i is unobserved, but $\hat{y}_i$ is estimated from the regressions in Section III, where $\hat{y}_i = y_i + v_i$, $E(v_i) = 0$, $E(v_i^2) = \sigma_i^2$, and ε_i and v_i are assumed to be independent. The heteroscedasticity arises because the estimated regressions are given by:

$$\hat{y}_i = Z_i\beta + (\varepsilon_i - v_i) = Z_i\beta + \mu_i,$$

where $E(\mu_i) = 0$ and $E(\mu_i^2) = \sigma_\varepsilon^2 + \sigma_i^2$. The OLS regression of the second stage provides an estimate of $\hat{\mu}_i$, and combined with the estimates of $\hat{\sigma}_i^2$ available from the first stage regressions, the parameter σ_ε^2 can be estimated by:

$$\hat{\sigma}_\varepsilon^2 = \frac{SSE - \Sigma\hat{\sigma}_i^2}{N - K} \quad .$$

where SSE is the error sum of squares from the second stage regression and N - K is the number of degrees of freedom. The calculated $\hat{\sigma}_\varepsilon^2$ is then used to reestimate the second stage regression using generalized least squares.

[22] These results are consistent with the estimated gains to English language proficiency reported in Walter McManus, William Gould and Finis Welch (1983).

[23] To further test the sensitivity of the results two additional variables were introduced into the regression: the percent of the country's labor force that is in agriculture, and the per capita school enrollment rate. Both of these variables were highly correlated with GNP per capita, and in fact became insignificant once GNP was controlled for. Their impact on the other variables in the regression was negligible.

[24] The probits were estimated using generalized least squares. The estimator, therefore, is minimum chi-squared and efficient.

[25] The regressions in Table 8 exclude the age at migration from the list of regressors since this variable was calculated in the subsample of immigrants and may have little relationship to the age distribution of the population in the country of origin.

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Table 1

Summary of Comparative Statics Results

		Positive Selection $Q_0>0, Q_1>0$	Negative Selection $Q_0<0, Q_1<0$	Refugee Sorting $Q_0<0, Q_1>0$
$\partial Q_1/\partial \mu_0$:	Composition Effect	none	none	none
	Scale Effect	+	-	+
$\partial Q_1/\partial \sigma_0$:	Composition Effect	-	-	-
	Scale Effect, $z<0$	-	-	+
	$z>0$	+	+	-
$\partial Q_1/\partial \rho$:	Composition Effect	+	-	-
	Scale Effect, $z<0$	-	+	-
	$z>0$	+	-	+

TABLE 2

IMMIGRATION FLOWS TO THE UNITED STATES IN THE 1951-1980 PERIOD

Country of Birth	1951-1980 Immigration: Total Number (in 1000s)	1951-1980 Immigration: As Percent of 1980 Population[a]	1951-1960 Immigrants as Percent of 1950 Population[a]	1971-1980 Immigrants as Percent of 1970 Population[a]
Europe:				
Austria	48.1	.6	.4	.1
Czechoslovakia	60.4	.4	.2	.1
Denmark	30.0	.6	.3	.1
France	90.1	.2	.1	.04
Germany	611.5	1.0	.7	.1
Greece	232.3	2.4	.6	1.1
Hungary	93.4	.9	.7	.1
Ireland	120.9	3.5	2.2	.5
Italy	524.8	.9	.4	.2
Netherlands	85.7	.6	.5	.1
Norway	45.1	1.1	.8	.1
Poland	244.9	.7	.5	.1
Portugal	204.2	2.1	.2	1.2
Romania	49.8	.2	.1	.1
Spain	71.2	.2	.04	.1
Sweden	41.9	.5	.3	.1
Switzerland	40.1	.6	.4	.1
United Kingdom	562.9	1.0	.4	.2
USSR	105.4	.04	.02	.02
Yugoslavia	147.0	.7	.4	.2
Asia and Africa:				
China (Taiwan)	331.9	1.9	.4	1.4
Egypt	46.4	.1	.02	.1
India	211.1	.03	.001	.03
Iran	59.1	.2	.01	.2
Israel	48.1	1.3	.7	.9
Japan	131.1	.1	.05	.05
Korea	314.8	.8	.02	.8
Philippines	478.9	.9	.1	1.0
Americas:				
Argentina	81.5	.3	.1	.3
Brazil	43.1	.04	.02	.01
Canada	676.4	2.8	2.0	.5
Colombia	165.5	.6	.4	.6
Cuba	611.9	6.3	1.5	3.2
Dominican Republic	251.9	4.3	.5	3.4
Ecuador	96.7	1.2	.3	.8
Guatemala	45.1	.7	.1	.5
Haiti	100.2	1.8	.1	1.3
Jamaica	221.7	10.3	.6	7.3
Mexico	1399.8	2.0	1.2	1.3
Panama	50.8	2.6	1.2	1.5
Trinidad & Tobago	88.0	8.0	.2	6.0

Source: U.S. Bureau of the Census (various issues).

[a]The population base refers to the country of origin.

TABLE 3
ESTIMATES OF MODEL PARAMETERS[a]

Country of Birth	1970 I	1970 I·y	1980 I	1980 I·y	1980 I·y²	Rate of Assimilation at y=10	1955-79 Change in Cohort Quality
Europe:							
Austria	.0189	.0036	.0321	.0034	-.00003	.0040	.0287
	(.26)	(.75)	(.52)	(.82)	(-.45)	(.66)	(.20)
Czechoslovakia	-.1525	.0147	-.1441	.0127	-.00019	.0088	-.0143
	(-2.48)	(3.34)	(-2.79)	(3.23)	(-2.74)	(1.64)	(-.10)
Denmark	.0838	-.0033	.2018	-.0056	.00009	.0068	.2441
	(.82)	(-.44)	(2.14)	(-.81)	(.72)	(.78)	(1.21)
France	-.0785	.0020	.0999	-.0046	.00005	.0111	.3183
	(-1.28)	(.47)	(2.48)	(-1.33)	(.79)	(2.05)	(2.74)
Germany	.0999	-.0025	.1409	-.0047	.00007	-.0002	.0618
	(3.82)	(-1.37)	(5.40)	(-2.62)	(2.38)	(-.10)	(1.17)
Greece	-.2400	.0115	-.3092	.0141	-.00018	.0049	-.1231
	(-6.70)	(3.73)	(-11.28)	(5.42)	(-3.33)	(1.56)	(-1.75)
Hungary	-.1555	.0173	-.2082	.0145	-.00021	.0036	-.1744
	(-2.98)	(4.12)	(-4.30)	(4.23)	(-3.31)	(.86)	(-1.85)
Ireland	-.0732	.0019	-.0514	.0027	-.00002	.0050	.0666
	(-1.54)	(.53)	(-1.09)	(.78)	(-.28)	(1.26)	(.72)
Italy	.0133	.0060	-.0673	.0065	-.00009	-.0031	-.1855
	(.60)	(3.72)	(-3.45)	(4.58)	(-3.49)	(-1.55)	(-4.07)
Netherlands	.0127	-.0061	.1252	-.0074	.00015	.0062	.2487
	(.23)	(-1.45)	(2.71)	(-2.15)	(2.35)	(1.35)	(2.41)
Norway	.2245	-.0093	.2785	-.0096	.00015	-.0013	.1241
	(2.54)	(-1.55)	(3.77)	(-1.76)	(1.58)	(-.17)	(.71)
Poland	-.1936	.0181	-.2734	.0184	-.00024	.0058	-.1865
	(-5.70)	(7.62)	(-11.08)	(9.61)	(-6.86)	(1.98)	(-3.08)
Portugal	.0797	.0032	-.0913	.0073	-.00012	-.0102	-.3418
	(1.95)	(.86)	(-3.25)	(2.47)	(-1.95)	(-2.77)	(-4.02)
Romania	-.3015	.0263	-.3161	.0229	-.00030	.0136	-.0929
	(-4.23)	(4.97)	(-7.02)	(5.47)	(-3.65)	(2.17)	(-.72)
Spain	-.3547	.0233	-.1920	.0134	-.00022	.0203	.2245
	(-6.15)	(4.32)	(-4.10)	(2.88)	(-2.39)	(3.98)	(1.92)
Sweden	.0128	.0119	.0465	.0099	-.00021	.0080	.0465
	(.13)	(1.90)	(.69)	(1.88)	(-2.14)	(.88)	(.24)
Switzerland	-.0201	.0132	.1467	.0067	-.00015	.0171	.2912
	(-.27)	(2.18)	(2.48)	(1.33)	(-1.56)	(2.56)	(1.97)
United Kingdom	.0607	-.0006	.1271	-.0023	.00002	.0038	.1303
	(2.70)	(-.34)	(7.38)	(-1.61)	(.67)	(1.84)	(2.81)

TABLE 3 (continued)

Country of Birth	1970		1980			Rate of Assimilation at y=10	1955-79 Change in Cohort Quality
	I	I·y	I	I·y	I·y²		
USSR	-.3509	.0277	-.4299	.0262	-.00035	.0105	-.2144
	(-6.70)	(8.34)	(-18.75)	(11.70)	(-7.67)	(2.22)	(-2.31)
Yugoslavia	-.0659	.0096	-.0920	.0097	-.00009	.0054	-.0608
	(-1.51)	(2.72)	(-2.82)	(3.52)	(-1.61)	(1.49)	(-.79)
Asia and Africa:							
China (Taiwan)	-.4525	.0227	-.5327	.0254	-.00037	.0114	-.1481
	(-14.34)	(9.43)	(-26.43)	(11.66)	(-8.22)	(4.01)	(-2.44)
Egypt	-.4466	.0421	-.4586	.0396	-.00056	.0260	-.0706
	(-7.00)	(5.67)	(-10.84)	(7.57)	(-4.34)	(4.76)	(-.57)
India	-.2847	.0453	-.4340	.0497	-.00096	.0179	-.2845
	(-7.09)	(9.71)	(-21.41)	(16.75)	(-11.03)	(5.33)	(-3.84)
Iran	-.4078	.0229	-.3101	.0249	-.00031	.0294	.2690
	(-4.71)	(3.03)	(-10.19)	(5.45)	(-2.47)	(4.13)	(1.88)
Israel	-.2998	.0282	-.3397	.0260	-.00041	.0128	-.1314
	(-4.19)	(4.54)	(-8.44)	(5.74)	(-3.84)	(2.11)	(-1.00)
Japan	-.1314	.0010	.1016	-.0049	.00002	.0159	.4616
	(-2.65)	(.19)	(4.31)	(-1.46)	(.18)	(3.60)	(4.78)
Korea	-.5450	.0439	-.4481	.0393	-.00071	.0323	.1544
	(-8.69)	(5.72)	(-19.44)	(9.68)	(-5.40)	(6.31)	(1.37)
Philippines	-.4360	.0265	-.3881	.0266	-.00041	.0233	.1158
	(-13.31)	(11.30)	(-23.14)	(13.33)	(-9.34)	(7.84)	(1.80)
Americas:							
Argentina	-.2099	.0210	-.2427	.0186	-.00032	.0077	-.1191
	(-3.81)	(3.58)	(-5.80)	(4.13)	(-3.11)	(1.65)	(-1.12)
Brazil	-.1430	.0114	-.0257	.0062	-.00015	.0123	.1941
	(-1.70)	(1.44)	(-.45)	(1.00)	(-1.11)	(1.66)	(1.19)
Canada	.0645	.0003	.1165	-.0013	-.00000	.0030	.0988
	(2.86)	(.17)	(6.06)	(-.91)	(-.21)	(1.50)	(2.17)
Colombia	-.2247	.0169	-.4030	.0219	-.00036	-.0007	-.3444
	(-4.33)	(2.74)	(-12.67)	(5.78)	(-3.71)	(-.17)	(-3.82)
Cuba	-.4612	.0214	-.4517	.0208	-.00025	.0164	.0129
	(-22.20)	(8.89)	(-18.26)	(9.24)	(-5.20)	(9.74)	(.28)
Dominican Republic	-.3293	.0141	-.4556	.0142	-.00018	-.0019	-.3020
	(-5.81)	(2.45)	(-13.91)	(3.62)	(-1.74)	(-.44)	(-3.01)
Ecuador	-.4041	.0242	-.4195	.0210	-.00026	.0127	-.0906
	(-6.06)	(3.28)	(-9.77)	(4.13)	(-1.98)	(2.58)	(-.82)
Guatemala	-.5127	.0408	-.4013	.0298	-.00066	.0222	.0828
	(-5.76)	(5.03)	(-8.97)	(5.09)	(-4.40)	(2.96)	(.51)
Haiti	-.3356	-.0027	-.5234	.0175	-.00011	.0064	-.1130
	(-4.99)	(-.34)	(-13.95)	(3.39)	(-.77)	(1.20)	(-.94)

TABLE 3 (continued)

Country of Birth	1970		1980			Rate of Assimilation at y=10	1955-79 Change in Cohort Quality
	I	I·y	I	I·y	I·y^2		
Jamaica	-.3322	.0165	-.2594	.0097	-.00020	.0095	.0600
	(-6.75)	(4.06)	(-9.33)	(2.92)	(-2.77)	(2.24)	(.64)
Mexico	-.3307	.0191	-.4037	.0206	-.00031	.0078	-.1497
	(-16.57)	(14.80)	(-34.72)	(22.25)	(-15.94)	(4.16)	(-3.61)
Panama	-.3438	.0159	-.2516	.0115	-.00010	.0165	.1476
	(-3.52)	(2.31)	(-4.35)	(2.07)	(-.88)	(2.04)	(.84)
Trinidad & Tobago	-.3091	.0187	-.3257	.0211	-.00024	.0158	.0013
	(-4.02)	(2.59)	(-6.94)	(3.70)	(-1.95)	(2.35)	(.03)

[a]The t-ratios are presented in parentheses. The cross-section regressions hold constant the individual's completed schooling, age, marital status, health and SMSA residence.

TABLE 4
DEFINITION OF COUNTRY-SPECIFIC VARIABLES

Variable	Definition and Source	Mean	Minimum	Maximum	U.S. Value
Politically Competitive System	= 1 if the country had a competitive party system during the entire 1950-1973 period; 0 otherwise. Source: Cross-National Time-Series Archive (CNTSA)	.41	-	-	1
Recent Loss of Freedom	= 1 if the country had a competitive party system at the beginning of the period but had a non-competitive party system at the end of the period; 0 otherwise. Source: CNTSA.	.20	-	-	0
Number of Assassinations	Number of politically motivated murders or attempted murders of high government officials or politicians in 1950-1973. Source: CNTSA.	3.27	0	22	12
Income Inequality	Ratio of household income of the top 10 percent of the households to the income of the bottom 20 percent of the households. Source: World Bank (various issues) and United Nations (1977).	7.50	1.42	30.0	5.91
Distance from U.S.	Number of air miles (in thousands) between the country's capital and the nearest U.S. gateway (Los Angeles, Miami, or New York). Source: Airline Offices.	3.37	.18	7.49	-
English Proficiency	Fraction of 1975-80 cohort of immigrants who speak English well or very well. Source: 5/100 A Sample of the 1980 U.S. Census.	.74	.24	1.00	-
Age at Migration	Mean age at migration. Source: 5/100 A Sample of the 1980 U.S. Census.	24.56	12.40	32.40	-

TABLE 4
(continued)

Variable	Definition and Source	Mean	Minimum	Maximum	U.S. Value
ℓn (per capita GNP)	(ℓn) 1980 Per Capita GNP in dollars. Source: U.S. Arms Control and Disarmament Agency (1984).	8.17	5.42	9.62	9.39
Rate of Change in Per Capita GNP	Annual rate of change in per capita GNP between 1963 and 1980, defined by: $\ell n\ (GNP_{1980}/GNP_{1963})/17$. Source: U.S. Arms Control and Disarmament Agency (1975, 1984).	.03	.004	.07	.02
Rate of Change in Central Government Expenditures	Annual Change in the Percentage of GNP that is accounted for by central government expenditures, defined by $(GOVT_{1980}-GOVT_{1950})/30$, where $GOVT_t$ is the percent of GNP attributable to central government expenditures in year t. Source: CNTSA and U.S. Arms Control and Disarmament Agency (1984).	.41	-1.69	2.08	.26
Change in Quota	Change in fraction of population eligible for migration to the U.S., defined by (20000/1979 population) ÷ (QUOTA/1950 population), where 20,000 is the maximum number of visas allocated to the country after 1965, and QUOTA is the number of visas allocated prior to 1965. Source: U.S. Immigration and Naturalization Service (1965).	38.90	.28	149.67	-

TABLE 5

DETERMINANTS OF THE ENTRY WAGE DIFFERENTIAL BETWEEN THE 1979 IMMIGRANT COHORT AND NATIVES[a]

Country of Origin Characteristics	Regression 1	2	3	4
Intercept	-.2214 (-3.88)	.1838 (1.06)	-.9934 (-3.41)	-.9469 (-3.30)
Politically Competitive System	.2743 (4.49)	.1306 (2.01)	.1101 (2.16)	.1264 (2.39)
Recent Loss of Freedom	-.0010 (-.01)	-.0511 (-.75)	-.0062 (-.12)	.0136 (.25)
Number of Assassinations	-.0072 (-1.20)	-.0028 (-.54)	.0021 (.51)	.0044 (.92)
Income Inequality	-.0084 (-1.78)	-.0038 (-.89)	.0039 (1.02)	.0046 (1.13)
Distance from U.S.	-	-.0114 (-.89)	-.0031 (-.31)	.0018 (.09)
English Proficiency	-	.2596 (2.20)	.1980 (2.12)	.2030 (2.21)
Mean Age at Migration	-	-.0217 (-3.55)	-.0149 (-2.99)	-.0119 (2.28)
ℓn (per capita GNP)	-	-	.1164 (4.57)	.1015 (3.77)
Country in Asia or Africa	-	-	-	-.1145 (-1.58)
Country in North or South America	-	-	-	-.0640 (-.73)
R^2	.504	.681	.808	.826

[a]The t-ratios are presented in parentheses.

TABLE 6

DETERMINANTS OF THE RATE OF ASSIMILATION[a]

Country of Origin Characteristics	Regression 1	2	3	4
Intercept	.0076 (2.96)	-.0240 (-3.88)	-.0237 (-1.50)	-.0280 (-2.32)
Politically Competitive System	-.0029 (-1.06)	-.0068 (-2.66)	-.0068 (-2.60)	-.0091 (-4.28)
Recent Loss of Freedom	.0063 (1.81)	.0029 (1.21)	.0030 (1.15)	.0021 (1.06)
Number of Assassinations	.0008 (2.68)	.0006 (2.36)	.0006 (2.14)	.0008 (3.07)
Income Inequality	-.0001 (-.50)	-.00002 (-.11)	-.00002 (-.10)	.0002 (.90)
Distance from U.S.	-	.0003 (.74)	.0003 (.70)	-.0027 (-2.89)
English Proficiency	-	.0138 (3.27)	.0138 (3.20)	.0122 (3.70)
Mean Age at Migration	-	.0009 (4.28)	.0009 (3.95)	.0009 (4.72)
ℓn (per capita GNP)	-	-	-.00002 (-.01)	.0021 (1.83)
Country in Asia or Africa	-	-	-	.0151 (5.11)
Country in North or South America	-	-	-	-.0080 (-2.08)
R^2	.302	.704	.704	.842

[a]The t-ratios are presented in parentheses.

TABLE 7

DETERMINANTS OF THE RATE OF CHANGE IN COHORT QUALITY

Country of Origin Characteristics	Regression 1	2	3	4
Intercept	-.3194 (-3.19)	-.9951 (-3.97)	-1.1779 (-4.08)	-2.2202 (-4.69)
Politically Competitive System	.1760 (2.54)	.1075 (1.60)	.0712 (.97)	.0630 (.70)
Recent Loss of Freedom	.1256 (1.67)	.1468 (2.16)	.1272 (1.81)	.1310 (1.33)
Number of Assassinations	.0077 (1.19)	.0156 (2.32)	.0122 (1.69)	.0256 (2.00)
Rate of Change in Central Government Expenditures	.0698 (1.60)	.0699 (1.75)	.0641 (1.60)	-.0099 (-.21)
Rate of Change in Per Capita GNP	4.7010 (2.27)	3.0956 (1.60)	1.1567 (.46)	-1.5321 (-.50)
ℓn (per capita GNP)	-	.0889 (1.93)	.1186 (3.22)	.2443 (4.15)
Country in Asia or Africa	-	-	.1374 (1.42)	-
Country in North or South America	-	-	.0274 (.41)	-
Change in Quota	-	-	-	.0034 (2.26)
R^2	.284	.418	.453	.581

[a]The t-ratios are presented in parentheses.

TABLE 8

PROBIT REGRESSIONS ON THE EMIGRATION RATE[a]

Country of Origin Characteristics	Regression 1	Regression 2
Intercept	-.6060 (-1.30)	-1.1614 (-2.46)
Politically Competitive System	.1206 (1.13)	.0801 (.81)
Recent Loss of Freedom	.1096 (.95)	-.0365 (-.32)
Number of Assassinations	-.0245 (-2.65)	-.0337 (-3.65)
Income Inequality	-.0113 (-1.51)	-.0145 (-2.00)
Distance from U.S.	-.1332 (-6.11)	-.1271 (-2.68)
English Proficiency	.1661 (.94)	.0488 (.30)
ℓn (per capita GNP)	-.1130 (-2.14)	-.0441 (-.83)
Country in Asia or Africa	-	.3386 (2.19)
Country in North or South America	-	.2923 (1.52)
χ^2	98.45	108.82

[a]The dependent variable is the probability that an individual migrated to the United States in 1951-1980, and is given by the second column of Table 2. The t-ratios are presented in parentheses.

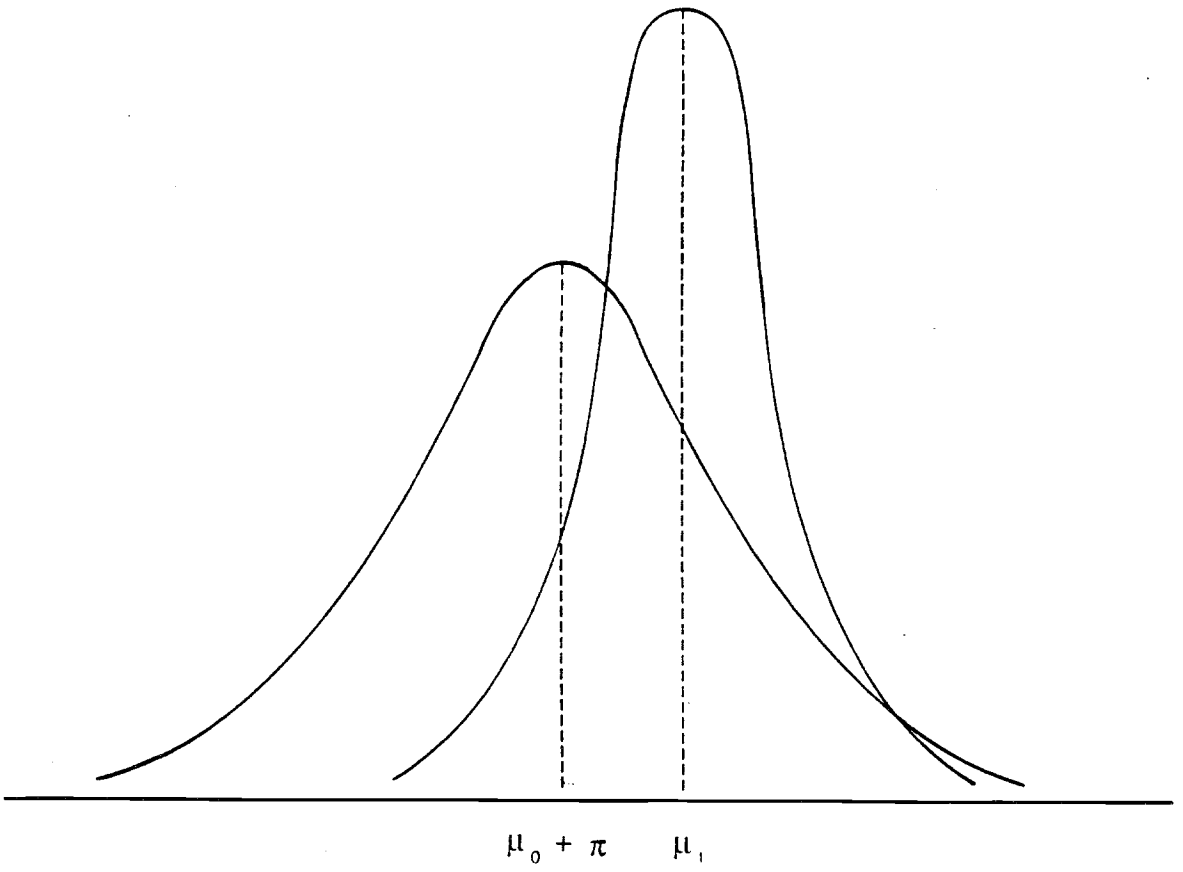

Figure 1