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Estimating Immigrant Assimilation Rates with Synthetic Panel Data

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ABSTRACT

Biases in OLS estimates of the return to education can also affect estimates of relative earnings. This paper explores the extent of bias in the OLS measurements of immigrant relative earnings, using a synthetic panel of immigrants from the 1970 and 1980 Censuses. Synthetic panel estimates imply that OLS underestimates relative immigrant earnings in both 1970 and 1980. Rates of relative earnings growth for newly arrived immigrants are often large and significantly positive. Assimilation rates for immigrant groups who have been in the country longer are smaller and often insignificant, but these are mostly groups who had already surpassed native earnings in 1970.

1 Introduction

In any discussion of immigration policy, it is useful to know how well immigrants adjust to conditions in the United States labor market. While most researchers agree that immigrants begin their stay in the U.S. at an earnings disadvantage, they disagree over the rate at which immigrants 'assimilate,' or catch up to the earnings of the native-born. This chapter presents unbiased estimates of immigrant assimilation rates during the 1970's for several different immigrant groups. To accomplish this, I use an empirical technique, the synthetic panel methodology of Deaton[1985], on cohort data from the Public Use Samples of the 1970 and 1980 U.S. Censuses. The estimates imply that ordinary least squares underestimates relative immigrant earnings in both 1970 and 1980. As a result, of all the immigrant groups in this study, only the Cubans, Indians, and Fillipinos face an earnings disadvantage in 1970. My results imply that rates of relative earnings growth for newly arrived immigrants are often large and significantly positive. Assimilation rates for immigrant groups who have been in the country longer are smaller and often insignificant, but these are mostly groups who had already surpassed native earnings in 1970.

Barry Chiswick [1978] describes the economic obstacles and adjustments facing immigrants in terms of human capital theory. Immigrants have lower initial productivity, so the story goes, because much of their human capital, accumulated in the country of origin (schooling, market skills, and job skills) transfers imperfectly into the U.S. market.

This initial earnings disadvantage, however, may be overcome as an immigrant adjusts to his new environment. The growth rate of immigrant earnings reflects both the return to job experience (increased skill and efficiency on the job) and the accumulation of cultural and market skills. Thus the growth rate of earnings should be larger for immigrants than for the native-born. If immigrants are positively selected for qualities which will make them economically successful, they will eventually surpass the earnings of the native-born. The recent debate in the literature on immigrant earnings centers on the accurate measurement of immigrant relative earnings and the rate at which immigrants overtake native earnings.

2 Left-out Variables and the Chiswick-Borjas Debate

Research into the earnings of recent U.S. immigrants defines immigrant assimilation rates in terms of the human capital earnings function of equation 1 :

(1) $Y(i,c,t)= X(i,c,t)\beta(t) + U(i,c,t) + e(i,c,t)$.

Equation 1 is typically estimated on some pooled sample of immigrant and native workers. In equation 1, i indexes the individual, c indexes the particular immigrant group or cohort to which the individual belongs (to be defined later), and t is time. $Y(i,c,t)$ is log earnings, $X(i,c,t)$ is a vector of human capital and demographic variables (plus a constant), $\beta(t)$ is a vector of coefficients, and $e(i,c,t)$ is a white noise error term. $U(i,c,t)$ is some unobserved variable, 'ability,' that affects earnings.[1]

The concept of immigrant assimilation arises from the observation that this unexplained component of immigrant earnings is on average different from zero, and that it grows over time. To better understand the debate over immigrant assimilation, it is helpful to decompose U(i,c,t) into a time-invariant component and a time-varying component :

$$(2)\ U(i,c,t)= q(i,c) + a(i,c,t) \quad .$$

The time-invariant component of unexplained earnings, q(i,c), is called 'quality' in the literature. 'Quality' includes the initial earnings disadvantages faced by newly arrived immigrants, and therefore may be negative. The time-varying component, a(i,c,t), is called 'assimilation,' and its rate of change is called the assimilation rate.[2] Growth in a(i,c,t) reflects the economic adjustments of immigrants to conditions in the U.S. labor market. Substitution of equation 2 into 1 yields

$$(3)\ Y(i,c,t)= X(i,c,t)\beta(t) + q(i,c) +a(i,c,t) + e(i,c,t).$$

Much of the literature on immigrant assimilation rates centers on the search for a specification that will capture the changes in unexplained earnings over an immigrant's stay in the U.S. In his seminal work on the subject, Chiswick[1978] added to equation 3 a single immigrant dummy (I(i,c)), to capture immigrant quality q(i,c), and a variable for years-since-migration (YSM(i,c)), to capture assimilation a(i,c,t).

$$(4)\ Y(i,c)= X(i,c)\beta + d_1 I(i,c) + d_2 YSM(i,c) + e(i,c).$$

In Chiswick's cross-section regression results (based on the 1970 Census), d_1 and d_2 are significantly negative and positive, respectively. The finding that immigrants who had been in the country longer had higher earnings led Chiswick to conclude that U(i,c,t), the unexplained component of immigrant earnings, is negative for newly-arrived immigrants, but becomes positive with time in the U.S. - white immigrants catch and surpass native-born earnings within about 15 years.

Chiswick's use of cross-section data to make inferences about rates of earnings growth is flawed. Borjas[1985] pointed out that a decline in immigrant 'quality' over successive cohorts would also explain the higher unexplained earnings of earlier immigrant cohorts. In other words, Borjas asserted that equation 4 was misspecified; the single immigrant dummy I(i,c), which forces immigrant 'quality' q to be equal across immigrant cohorts, should be replaced by a vector of immigrant cohort dummies D(i,c). A single cross-section cannot, however, untangle Chiswick's assimilation and Borjas's cohort quality effects : the variables used to capture them, YSM(i,c) and D(i,c), are perfectly collinear. Borjas uses the 1970 and 1980 Census cross-sections to sort out the two effects. In place of Chiswick's immigrant dummy and years-since-migration variable, he uses a vector of cohort[3] dummy variables (D(i,c)) to capture each cohort's average unexplained earnings at a point in time.

(5) $Y(i,c,t)= X(i,c,t)\beta(t) + D(i,c)\gamma(t) + e(i,c,t)$.

γ is a vector of coefficients. It equals fixed cohort 'quality' q(c) plus assimilation a(c,t). Using this methodology, Borjas estimated relative earnings for each cohort in 1970 and 1980. The change in relative earnings over the decade of the seventies represents pure assimilation effects for that cohort. His results suggested that, at least for some ethnic groups, the unexplained component of earnings had grown little over the decade. Assimilation rates for these groups were small or zero.[4]

Both Chiswick's and Borjas's specifications are alike in a fundamentally important way : they use cohort-specific variables (e.g. YSM, cohort dummies) to explain individual -specific 'quality' and assimilation. Thus these specifications can only imperfectly control for the unobserved variables affecting immigrant earnings. At best, they can capture average cohort 'quality' and assimilation. Given the care taken in the literature on the return to schooling[5] to control for individual-specific ability, one expects that unobserved individual ability may bias any ordinary least squares estimates of returns to schooling and experience.

Panel data, by allowing the use of individuals as their own controls, would make possible a thorough investigation of the reliability of the cross-section estimates. Unfortunately, only one panel of U.S. immigrants exists (Jasso and Rosenzweig[1986]), and it contains no earnings variable. However, a relatively new empirical technique, the construction of a synthetic panel from a time series of cross-sections (Deaton[1985]) offers a way to control for the possible biases in the cross-section. The next section discusses the application of synthetic panel methodology to immigrant earnings.

3 Empirical Strategy

3.1 The Bias in the Least Squares Estimates

This research builds on the cross-section model (equation 5) of Borjas[1985]. A cohort is defined as those immigrants born in the same country, who enter the U.S. in a certain time period, and are in the same age group.[6] In the data there are also cohorts of controls, native-born white non-hispanic males. The log of real earnings of individual i of cohort c at time t is a function of a vector of schooling and demographic variables X(i,c,t), a vector of cohort dummies D(i,c), unobserved 'ability' u(i,c,t), and a random shock e(i,c,t). X includes a constant, so there is no dummy variable for the native-born cohort.

$$(6)\quad Y(i,c,t) = X(i,c,t)\beta(t) + D(i,c)\gamma(t) + u(i,c,t) + e(i,c,t).$$

Note that u(i,c,t) is the deviation of individual U(i,c,t) from the cohort population mean, U(c,t), which is captured by the cohort dummies:

$$u(i,c,t) = U(i,c,t) - U(c,t) = q(i,c) - q(c) + a(i,c,t) - a(c,t) .$$

If unobserved 'quality' and assimilation were cohort-specific fixed effects (that is, q(i,c)=q(c) and a(i,c,t)=a(c,t)), the cohort dummies would perfectly control for left-out ability; a(i,c) would be zero and there would be no bias in the cross-section. As noted in the last section, however, if these left-out variables are individual-specific, and correlated with regressors X(i,c,t), the coefficient estimates from the cross-section will be biased.

The coefficient estimates of $\gamma(t)$ will be biased to the extent that the cohort dummies covary with X(i,c). If X and u are correlated, what is the effect on our estimates of γ? The bias of the ordinary least squares estimate for γ can be written

$$E(\gamma-\gamma_0)= -E(D'D-D'X(X'X)^{-1}X'D)^{-1}D'X(X'X)^{-1}X'u$$

If X and u are correlated, then the last part of the above expression, $X(X'X)^{-1}X'u$, is the prediction of a given u for each observation. γ is biased to the extent that the cohort dummies covary with X, and that X covaries with u.

A simple example will make the direction of the possible bias clear. Consider the case of left-out variables bias on the least squares estimate of the return to education X. For illustration, consider the case where X'u is negative. Figure 1 illustrates the resulting direction of bias. Three points are displayed on the graph in Y-X space. Point N is the coordinate of native mean log earnings and education. Points I_1 and I_2 are the mean coordinates for two immigrant cohorts. The true regression line is depicted passing through N, but is also shifted by the cohort dummies to pass through the other cohort means.

If, because of left-out variables bias, the estimated return to education is underestimated, the biased line in figure 1 results. Not only is the estimate of the return to education biased; the estimated cohort dummies, or the shifters of the line, will also be biased. The dummy for cohort I_1, whose mean education level is above the native mean, will be overestimated; The dummy for cohort I_2, whose mean education level is below the native mean, will be underestimated.

There are no strong priors for the sign of the correlation between the regressors X and the left-out variable u. Griliches[1977] points out that an optimization model of education choice may imply either positive or negative correlations between education and left-out 'ability.' In an empirical example, he demonstrates that the direction of the bias on the OLS return to education may indeed be negative. Like Griliches' 'ability,' individual-specific 'quality' (q(i,c)-q(c)) may be negatively correlated with education. Similarly, the individual-specific deviation from cohort assimilation (a(i,c,t)-a(c,t)) may well be negatively correlated to education - the low education members of a particular cohort may experience the fastest growth in their relative earnings over time. The direction of the bias resulting from the correlation of education and u(i,c,t) depends on the signs of the correlation of education with both individual 'quality' and assimilation.

3.2 Synthetic Panel Methodology

Corresponding to equation 6, there is an equation based on cohort population means :

$$(7)\ Y(c,t)= X(c,t)\beta(t) + D(c)\gamma(t) + e(c,t)$$

The estimation of equation 7 raises an important problem. Note that individual-specific 'ability' drops out when we look at population means. We can now treat 'ability' as a cohort-specific effect. In order to carry out fixed effects estimation, however, there must be at least two observations for each fixed effect : otherwise, the model exhausts the degrees of freedom. How do we generate multiple observations? In most panel studies, the fixed effect is assumed to be common to the same individual at two or more points in time. It is important to understand why this common assumption is inappropriate to this particular problem. The assimilation literature begins with the observation that average cohort 'ability' grows over time; the assimilation rate is defined as the growth rate of 'ability' over time. One cannot therefore assume that it is a fixed effect in the usual sense.

Fortunately, the way I have defined my cohorts suggests a solution to this problem. Immigrant cohorts are usually defined by country of origin and year of immigration; it is the 'quality' and assimilation of cohorts defined in this way which is the focus of recent research. The cohorts in this study are broken down by age as well as by country of birth and year of immigration. Each country-year of immigration pair generates two or three observations : a younger cohort (age 18-30 in 1970), a middle-aged cohort (age 31-42 in 1970), and an older cohort (age 35-44 in 1970). If we assume that the younger and older immigrant cohorts from the same country, who arrived in the same year, have the same average 'ability,' then we can treat 'ability' as a fixed effect across cohorts <u>in the same cross-section</u>. In effect, cohorts in the same immigrant group-year of immigration pairing must serve as controls for one another. To the extent that this assumption is violated, the synthetic panel estimates will be biased, in much the same way the individual-level estimates of equation 6 are biased. The possibility of this bias is discussed in the next section.

We do not know the cohort population means in equation 7, and must therefore use error-ridden estimates of them. This implies errors-in-variables estimation, where all of the variables (except the dummies) are measured with error. Deaton[1985] derives the appropriate method-of-moments estimator and its covariance matrix; its derivation will not be reproduced here. The estimator is given by equation (8):

$$(8)\ \beta = (\bar{X}'\bar{X}-NS)^{-1}(\bar{X}'\bar{Y}-Ns) \quad .$$

$\bar{X}'\bar{X}$ is the moment matrix of cohort means of the regressors, $X'\bar{Y}$ is the is the matrix of covariances between the cohort means Y and the regressors, N is the number of cohorts, S is the estimated variance-covariance matrix of the measurement errors in the regressors, and s is the matrix of estimated covariances between the measurement errors in the regressors and Y. Cohort sample sizes differ in the data, leading to wide ranges of measurement error variances; the cohort observations are therefore weighted by the square root of the sample size.

Because individual u(i,c,t) does not appear in equation 7, the synthetic panel estimates of the fixed effects in equation 7 are consistent estimates of mean cohort 'ability.' One wonders, however, what happens to the variation in unobserved 'ability.' The answer lies in the fact that we must estimate the measurement error variances and covariances (S and s in equation 8) from the cohort samples. The variation in individual 'ability' becomes part of the estimate of the variance of the measurement error in Y, and the covariance of 'ability' with X becomes part of the estimate of the covariance between the measurement errors of Y and X. By estimating the model on cohort means, we transform the individual variation in unobserved 'ability' from a source of bias into a source of measurement error.

Once we have obtained consistent estimates of mean cohort 'ability' in 1970 and 1980, we can use them to investigate the rate of assimilation. A comparison of the estimates of cohort 'ability' from the 1970 and 1980 Census cross-sections yields an estimate of assimilation over the decade of the seventies :

$$(7) \quad \gamma_{80}(c) - \gamma_{70}(c) \quad .$$

Assimilation rates can be calculated for each cohort. A comparison of average ability across cohorts and over time provides insights into cohort assimilation rates.

4 Data

The data are drawn from the 1970 Census A, B, and C Public Use Samples, and 1980 Census A, B, and C Public Use Samples. They represent 3% and 7% subsamples of the U.S. population, respectively. The native-born cohorts are drawn from a subsample of the census data in order to keep them of manageable size. The individual observations meet the following selection criteria :

1)Male, age 18-54 in 1970 Census, and 28-64 in the 1980 census.

2)positive wage and salary or non-farm self-employment earnings.

3)full-time workers (i.e. 35+ hours a week and 30+ weeks a year).

4)Wage greater than one-half the contemporary minimum, and less than 100 dollars. This rule excludes outliers.

5)Not in school in 1970. In 1980, not in school, and greater than ten years experience. Experience is calculated as Age minus minus Education minus six. If experience in 1980 is less than ten, the individual is likely to have been in school in 1970. Since we wish to hold the composition of the cohort constant from 1970 to 1980, we must exclude those who were in school in 1970 from the 1980 cohort.

Both censuses allow us to identify the time of immigration and the country of birth, and thus to track cohorts from 1970 to 1980. Cohorts are defined by country of birth, year of immigration, and age group. For example, one cohort was born in Mexico, entered the U.S. between 1960 and 1964, and was 18-30 years old in 1970 (or 28-40 years old for the same cohort defined in 1980). Each country-year of immigration pairing yields three cohorts, a younger one (ages 18-30 in 1970), a middle-aged one (age 31-42 in 1970), and an older one (ages 43-54 in 1970). In order for a country-year of immigration pairing to qualify for inclusion in the sample, two of its three cohorts must be large enough to yield tight estimates of cohort population means. A minimum cohort size of forty yields 106 immigrant cohort observations and acceptably tight[7] cohort means estimates.

103 immigrant cohorts from 20 countries qualified for inclusion in the sample. In addition, I include three cohorts of native-born non-hispanic white males as controls. Table 1 lists the cohorts. Also presented are estimates of mean log-earnings, age and education in 1970 and 1980. All earnings are expressed in 1982 dollars.

The sample is overwhelmingly European and Canadian; 70 of the 103 immigrant observations are from these regions. Asia is under-represented; only India and the Philippines, both of them 1965-69 cohorts, are represented.[8] The rest of the observations are Latin American.

The European cohorts tend to be older and earn more than the Latin American cohorts. The oldest cohort is Poland 1950-59, and the youngest (and poorest) is Mexico 1965-69. India 1965-69 is notable for its high levels of education. All of the Mexican cohorts, and Portugal 1965-69, have low levels of education (4.6 to 9.1 years).

In the last section the assumption was made that each of the age groups from the same country of origin-year of immigration cohort have the same unmeasured 'ability.' The unbiasedness of the synthetic panel estimates hinges on this assumption. A glance at the education levels in table 1 shows that the age groups within the various country of origin-year of immigration cohorts have different levels of education. Do the different levels of education indicate different underlying levels of unmeasured 'ability?' Not necessarily. The differences in average education among different age groups reflects the different environmental factors that determine the education choices of the cohort members. For example, economic incentives, the accessability of schooling, and availability of financing change over time, often allowing each new generation better access to schooling, and correspondingly higher average education levels. In the 1970 sample, 26 of the 40 cohorts in table 1 display this pattern of declining education levels with age. Of the remaining 14 cohorts, 11 reflect the unfinished schooling of the youngest cohort: the education levels of the 18-30 year olds are slightly smaller than those of the next older age group. The same age patterns in education are evident in the 1980 sample as well. Thus, the differences in average education among the various age cohorts can be explained by improvements in the educational systems of the countries of origin, and need not be an indication of different average levels of left-out ability.

The last three columns of table 1 presents changes in cohort mean age, education, and log earnings over the decade of the seventies. All but eleven of the cohorts show significantly positive real earnings growth over the decade of the seventies. These eleven cohorts (from the United Kingdom, Canada, Netherlands, France, Poland, Greece, Mexico, and the Dominican Republic) are generally older (ages 43-54). The biggest gainers are all later immigrants, and younger age groups : Poland, India, United Kingdom, and Argentina, all 1965-69 and age 18-35 cohorts. All of these groups have 50% higher real earnings in 1980 than in 1970. India's 31-42 year olds also experience a large increase in real income, of 54%. A analysis of immigrant earnings growth based only on table 1 would conclude that earnings grow rapidly among young immigrants who have just arrived in the U.S., and level off with age.

A caveat about cohort composition is in order. If there were no changes in cohort composition over the course of the seventies, we would expect (neglecting mortality) the 1980 immigrant cohort sample sizes to be seven-thirds larger than the 1970 cohort sample sizes (the 1980 census was a 7% sample, the 1970 census a 3% sample). We would also expect the average age of the cohorts to increase by 10 years over the decade. An examination of the cohort sizes (table 1) in 1970 and 1980 suggests that some cohorts have grown while others have shrunk. For example, some cohort samples barely double in size (UK 1965-69, all age groups, and Poland 1950-59, age 43-54), while many more than double in size (Greece 1965-69, both younger age groups, and Cuba 1965-69, both younger age groups, to name two). The most notable cohorts in this regard are the Philippine 1965-69 younger cohort (grows by 650%) and the Mexican 1965-69 younger cohort (grows by 550%). The t-statistics in the second to last column of table 1, calculated for the null hypothesis that the average cohort population age has increased by 10 years, also suggests that the cohorts' composition is not stable over the decade. For 23 of the 106 cohorts, the hypothesis that the underlying cohort population mean has grown by ten years is rejected. Average education is significantly higher in 1980 for 48 of 106 cohorts. This may reflect education obtained during the 1970's or the remigration of less educated immigrants.[9] Obviously, some cohorts have grown or shrunk substantially over the decade; any results must be tempered by the knowledge that the 1970 and 1980 cohorts differ in some way.

Recent research suggests that return migration and the increased coverage of illegal aliens in the 1980 Census affect the composition of observed immigrant cohorts over time. Jasso and Rosenzweig[1982] estimate emigration rates for several immigrant groups of anywhere between 20 and 50 percent during the 1970's. The estimates from Jasso and Rosenzweig[1986] suggest that the most economically successful immigrants (defined by occupational achievement) remigrate. If so, remigration imparts a downward bias on the estimated assimilation rates of equation 7. Passel and Woodrow[1984] estimate that 2 million illegal aliens were counted in the 1980 census. According to several theories illegal immigrant earnings should be lower : presumably, illegal immigrants must take low paying, low profile jobs to avoid detection, and have less bargaining power in their jobs. Massey[1987] finds no significant differences between the earnings of illegal and legal immigrants. Bean, Lowell, and Taylor[1988], however, find that Mexican illegals earn slightly less than their legal counterparts. If illegals earn less than similar legal immigrants, their presence in the 1980 cohorts will bias the assimilation rate estimates downward. Both the presence of illegal aliens and remigration may bias the estimates downward; the estimates should thus be considered lower bounds on the true rates of assimilation.

A comparison of mean earnings over the decade of the seventies suggests that virtually all of the immigrant cohorts in table 1 have larger mean real earnings in 1980 than in 1970. However, a glance at the data for native-born earnings (the last two lines of table 1) shows substantial real earnings growth for the native-born as well. Also, there have been significant changes in cohort mean age and education. Our interest is in immigrant economic performance relative to native workers of similar age and education. The relevant question is not : have immigrant earnings grown? It is : controlling for education and age, have immigrant earnings grown relative to native-born earnings? The next section addresses this question.

5 Empirical Results

The first column of table 2 presents weighted method-of-moments (WMOM) estimates of equation 7, estimated on 1970 cohort data. The coefficients on age and age squared reflect a standard concave earnings profile (they are jointly significant : $\chi^2(2)=1172.7$) The return to education is 9.1%. The coefficients on the country dummies represent that immigrant group's earnings relative to the earnings of similar native-born workers. 27 of 38 dummies are statistically significant, and many are relatively large. They are jointly significant ($\chi^2(38)=882.1$) in the 1970 equations. In these estimates, the Phillipines 1965-69, India 1965-69, and Cuba 1965-69 are at the greatest disadvantage relative to native workers (-22.9%, -16.0%, and -11.1%, respectively). Portugal 1965-69, Italy 1960-64, and Italy 1950-59, enjoy the largest earnings advantages over the native-born (44.2%, 46.5%, and 42.6%, respectively). Year of immigration (or years since migration) is related to relative earnings in 1970. Nine of the fifteen 1965-69 cohorts, but only one of the thirteen 1950-59 cohorts, have insignificant or negative fixed effects. This echoes the result of Chiswick[1978] : immigrants who have been in the country longer have higher earnings relative to the native-born.

For comparison, the second column of table 2 presents ordinary least squares (OLS) estimates of equation 6 on the same data set. Thirty-four of the 38 cohort coefficient estimates are smaller than their method-of-moments counterparts. To understand the difference in estimates, look at the education coefficients. The estimated return to education is smaller in the OLS estimates than for the WMOM estimates. This implies that the OLS education estimate is biased downward : there is some left-out variable, negatively related to earnings, which is positively related to education within cohorts. The bias on the cohort coefficient estimates was discussed in section 3 : those cohorts whose mean education is above mean native education will have upwardly biased relative earnings estimates; those whose mean cohort education is below the native mean will have downwardly biased estimates.

30 of the 38 cohorts in the 1970 study have mean education which is significantly different from native mean education. Of these 30 cohorts, 25 are biased in the direction predicted by the above simple rule. For example, India 1965-69 and Phillipines 1965-69 both have high education levels (16.7 and 14.9 years, respectively). Consequently, the estimated relative earnings coefficients for both cohorts are larger in the OLS estimates than in the WMOM estimates (the Indian coefficient increases from -.160

to -.065, the Phillipine coefficient from -.299 to -.264). On the other end of the education distribution lie the three Mexican cohorts, whose mean education levels range from 6.6 to 7.1 years. Estimated relative earnings for these three cohorts are consequently smaller in the OLS estimates than in the WMOM estimates. The three coefficients decrease from .140 to -.099, from .251 to .007, and from .258 to .041. Overall, 34 out of 38 OLS estimates of 1970 cohort relative earnings are biased downward.

The 1970 estimates suggest that there is some left-out variable biasing the OLS-estimated returns to education downwards, and thus affecting the cohort relative earnings estimates, in some cases substantially. The weighted method-of-moments estimates reflect the cross-section pattern first noticed by Chiswick[1978] : immigrants who have been in the country longer have higher relative earnings.

Of course, we cannot conclude from one cross-section that immigrant earnings are growing with time in the U.S. As Borjas[1985] pointed out, we need to examine relative earnings in at least two points in time. Table 3 presents WMOM and OLS estimates for the 1980 cohort sample. The first column displays the WMOM estimates. The estimated return to education is 7.0%. The WMOM estimated fixed effects suggest a general improvement in the relative earnings of immigrants over the decade. None of the fixed effects are negative; only three (Phillipines 1965-69, Cuba 1965-69, and the Dominican Republic 1965-69) are insignificant at conventional levels. The Portugese and Canadian cohorts have the highest relative earnings, in excess of 40%.

Column two of table 3 presents the OLS analog to the 1980 WMOM estimates. The estimated return to education (5.7%) is lower than the WMOM estimate. As was the case in the 1970 estimates, the return to education is biased downwards in the OLS regression. 34 of the 38 cohorts have mean education levels are significantly different from the native mean. Of these 34 cohorts, 28 are biased in the direction predicted by the simple rule applied to the 1970 cohorts. Since most cohorts have lower education levels than the native-born, every estimate of 1980 cohort relative earnings is biased downward.

OLS estimates of immigrant relative earnings, on average, underestimate immigrant relative earnings in 1970 and 1980. Immigrants earn more relative to natives of similar age and education than ordinary least squares estimates would suggest. This is in part attributable to the combination of a downward bias on the estimated returns to education, coupled with relatively low levels of education among many immigrant groups. The effect of this bias on assimilation rate estimates is indeterminate. Table 4 shows the change in relative earnings from 1970 to 1980, or the 'rate of assimilation.' Column 1 displays the rates calculated from the WMOM estimates. Only 9 of 38 cohorts have assimilation rates that are significant : All 9 are positive and large, and most immigrated between 1965 an 1969 (except Cuba 1960-64). India 1965-69 had the largest relative earnings gains (44.9%), followed by the Phillipines 1965-69 (34.0%). Cuba 1965-69, India 1965-69, and the Phillipines 1965-69 fit the classic Chiswick scenario :

each faced a relative earnings disadvantage in 1970, and overcame it by 1980. Most of the other immigrant cohorts already enjoyed an earnings advantage in 1970; if their relative earnings grew, they only increased an already existent advantage.

The second column of table 4 presents the OLS assimilation rate estimates. Twenty-three of the 38 estimates are smaller than their WMOM counterparts; 15 are larger. Among those cohorts whose rates of assimilation are underestimated by the OLS procedure are the British, German, and Canadian immigrant cohorts. The Italian and Mexican cohorts have lower rates of assimilation in the WMOM estimates than in the OLS estimates.

One possible objection to this methodology centers on the assumption it imposes about rates of return to education and the age-earnings profile. Borjas[1985] allows rates of return to education and experience to differ across immigrant groups; the estimates presented here impose identical rates of return across immigrant and native-born workers. Because each cohort contributes at most only three observations to the synthetic panel, the data do not afford enough degrees of freedom to allow rates of return to education and experience to vary across each immigrant group. The restriction can be relaxed, however. For example, one might divide the cohort observations into two groups : cohorts from third world countries (India, the Phillipines, Mexico, Cuba, Jamaica, Dominican Republic, Argentina, and Colombia), and all others. The rates of return to education and experience can be allowed to vary between (but not within) these larger groupings. This procedure was carried out; the resulting[10] assimilation rate estimates appear in column three of table 4. The resulting estimates raise several concerns about the estimates in column one. First, notice that the assimilation rates in column three are more precisely estimated than in column 1; twenty-six of 38 rates are significantly different from zero. Second, all of the assimilation rate estimates for the third world cohorts, whose rates of return to education and age were allowed to differ, are larger, many substantially so. For example, the estimate for India 1965-69 increases from 44.9% to 72.2%, and the Cuban estimates double and triple in size. All of the estimates for the developed country immigrants, whose rates of return to education and age were constrained to equal the native rates, decreased. None of the estimates decreased substantially; the exception was Portugal 1965-69, which fell from .1% to -6.0%. Although the WMOM estimates appear to be sensitive to the specification of the rates of return to education and age, the change increased the number of immigrant cohorts whose assimilation rates were positive and significant.[11]

The estimates of column three suggest that different returns to education and age may affect the results significantly. A second concern was mentioned in section 3. Differences in composition between the 1980 and 1970 cohorts, due to remigration and illegal immigration, may bias estimated immigrant assimilation rates. As a rough check, I calculated the correlation coefficient between cohort population growth rates and estimated cohort assimilation rates. Cohort growth was calculated as the percentage growth of the cohort sample sizes (from table 1), adjusted for the different census sampling rates. The correlation between cohort population growth and cohort assimilation is .19, and is statistically insignificant. There seem to be no relationship between cohort compositional changes and the estimated assimilation rates. A simple correlation coefficient is inconclusive, of course, but it may point to any obvious relationships between cohort composition and assimilation rates.

6 Conclusions

Recent estimates of immigrant assimilation rates, based on individual-level cross-section data, are subject to biases from left-out variables, referred to in the migration literature as 'quality' or 'ability.' In this paper, I have used the synthetic panel methodology of Deaton[1985] to consistently estimate immigrant 'quality' in 1970 and 1980. The estimates imply that ordinary least squares underestimates relative immigrant earnings in both 1970 and 1980. According to the Weighted Method of Moments estimates, of all the immigrant groups in this study, only the Cubans, Indians, and Fillipinos faced an earnings disadvantage in 1970. My results imply that assimilation rates for newly arrived immigrants are often large and significantly positive. Immigration rates for immigrant groups who have been in the country longer are smaller and often insignificant, but these are mostly groups who had already surpassed native earnings in 1970. The synthetic panel estimates were somewhat sensitive to restrictive assumptions about rates of return to education and experience. The results of this study confirm Chiswick's[1978] original finding of significant relative earnings growth for newly-arrived immigrant groups, although they face a smaller initial earnings disadvantage than Chiswick found. Crucial to the consistency of the synthetic panel estimates is the assumption that the older and younger cohorts, from the same country who arrived in the same time period, have the same population mean 'quality.'

Of course, generating consistent estimates of immigrant 'quality' does not explain why some immigrants adjust more quickly to the U.S. market than others. Research into the relationship between country of origin characteristics and immigrant performance (Jasso and Rosenzweig[1985] and Borjas[1987]) has addressed this important question. Consistent estimates of immigrant relative earnings, however, allow researchers to delve into the more interesting questions about immigrant earnings, and may enable them to begin to investigate the nature and extent of the biases arising from changes in cohort composition over time.

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ENDNOTES

[1]Since we do not know what U(i,c,t) is, the label 'ability' is arbitrary. U(i,c,t) could just as well be 'discrimination,' and is certainly a combination of several different things.

[2]$a(i,c,t_0) = 0$, where t_0 it the year of immigration for cohort c.

[3]Borjas's cohorts were defined by year of immigration and ethnic group (White, Black, Asian, Cuban, Mexican, and Other Hispanic).

[4]There are several other suggested specifications for the unexplained component of immigrant earnings. Borjas[1987] added to Chiswick's specification (equation 4) variables for year of entry into the U.S., and again used 1970 and 1980 cross-sections to sort out cohort and assimilation effects. Jasso and Rosenzweig[1986] suggested country of origin characteristics to explain immigrant earnings.

[5]See Griliches[1977], [1979], Chamberlain and Griliches[1975].

[6]For example, one cohort contains all male Mexican immigrants, who entered the U.S. between 1965 and 1969 and who were between the ages of 18 and 30 in 1970.

[7]A minimum cohort size of 100 did not add to the efficiency of the estimates. I did not experiment with smaller minimum cohort sizes.

[8]The 1970 Census did not distinguish between mainland China, Taiwan, and Hong Kong. Only one cohort, therefore, can be constructed from these countries. I thus chose to exclude the

Chinese cohorts from my data.

[9]Some of the general increase in education is attributable to differences in the education coding maximum in the two Censuses. In 1970, education levels of 16 years or higher were reported as one category; in 1980, the upper limit was raised to 18. This alone may account for much of the increase in cohort average education, particularly for highly educated cohorts like the Indians.

[10]For the 1970 data, the rates of return for the two groupings were jointly significantly different from one another ($\chi^2(3)=800.0$). In the 1980 data, equality of the rates of return to education and experience was also rejected ($\chi^2(3)=47.4$).

[11]There is another possible objection to the methodology employed here. Recall that the cohorts in this study include males ages 18-54 in 1970 and 28-64 in 1980. In 1970, the schooling decisions of the younger members of the cohorts will affect average cohort earnings. In 1980, the retirement decisions of the older members of the cohorts may affect cohort earnings as well. In order to insulate the estimates from the schooling and retirement decisions of the cohort members, the sample was restricted to ages 23-51 in 1970 and ages 33-61 in 1980. Assimilation rates are slightly larger using the smaller sample, but the qualitative results do not change.

TABLE 1

1970 and 1980 Cohort Means, Changes from 1970 to 1980(tstats)

Country	Year of Imm	Age Grp	1970 Cohort Means N	lnY	AGE	EDUC	1980 Cohort Means N	lnY	AGE	EDUC	Change from 1970 to 1980 lnY	AGE*	EDUC
UK	65-69	18-30	180	9.9	27.3	14.2	345	10.4	37.3	15.1	0.50	10.00	0.89
											(9.77)	(-0.02)	(3.11)
		31-42	247	10.1	35.4	13.8	493	10.4	45.6	14.8	0.32	10.22	0.93
											(8.60)	(0.83)	(3.79)
		43-54	90	10.2	47.5	13.6	167	10.3	57.0	14.1	0.12	9.51	0.48
											(1.71)	(-1.20)	(1.26)
	60-64	18-30	77	9.8	26.6	12.8	212	10.2	36.3	13.9	0.42	9.69	1.04
											(5.98)	(-0.76)	(2.91)
		31-42	225	10.2	36.5	13.5	543	10.4	46.1	14.5	0.21	9.58	0.96
											(5.15)	(-1.55)	(3.95)
		43-54	105	10.2	47.5	12.7	213	10.2	57.3	13.6	0.05	9.78	0.91
											(0.83)	(-0.57)	(2.45)
	50-59	18-30	111	9.7	25.0	12.6	383	10.1	34.9	13.5	0.45	9.84	0.84
											(8.33)	(-0.43)	(3.65)
		31-42	297	10.2	37.6	13.0	642	10.3	47.5	13.8	0.18	9.99	0.84
											(4.78)	(-0.06)	(4.13)
		43-54	331	10.1	47.6	12.9	636	10.2	57.0	13.3	0.12	9.38	0.42
											(3.52)	(-2.95)	(2.08)
IRELAND	60-64	18-30	59	9.9	27.5	11.1	183	10.1	36.8	11.7	0.26	9.24	0.51
											(4.17)	(-1.90)	(1.23)
		31-42	77	9.8	35.2	10.4	185	10.1	45.1	12.2	0.28	9.92	1.76
											(3.83)	(-0.18)	(3.49)
	50-59	31-42	188	10.0	36.8	11.3	515	10.2	46.6	12.0	0.20	9.73	0.69
											(5.24)	(-0.92)	(2.67)
		43-54	106	9.9	47.2	10.3	217	10.0	56.7	11.2	0.13	9.48	0.85
											(2.28)	(-1.37)	(2.33)
NETHERL	50-59	18-30	51	9.7	25.2	12.1	174	10.1	34.5	13.0	0.41	9.25	0.93
											(5.67)	(-1.45)	(2.44)
		31-42	126	10.1	37.2	12.6	313	10.3	47.1	13.6	0.16	9.89	1.05
											(3.10)	(-0.32)	(3.03)
		43-54	107	10.0	47.9	12.2	226	10.1	57.4	13.0	0.11	9.49	0.72
											(1.74)	(-1.35)	(1.65)
FRANCE	50-59	31-42	76	10.0	37.3	12.1	164	10.3	47.0	12.9	0.28	9.79	0.80
											(3.62)	(-0.43)	(1.40)
		43-54	40	10.1	46.3	12.6	93	10.1	56.3	13.1	0.06	10.05	0.50
											(0.65)	(0.09)	(0.62)
GERMANY	65-69	18-30	100	9.8	27.4	12.9	264	10.2	36.1	13.6	0.39	8.68	0.67
											(5.90)	(-3.91)	(1.79)
		31-42	125	10.1	34.9	13.6	221	10.4	45.2	14.3	0.32	10.30	0.70
											(5.87)	(0.80)	(1.59)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten

TABLE 1(cont'd)

1970 and 1980 Cohort Means, Changes in Means from 1970 to 1980 (tstats)

Country	Year of Imm	Age Grp*	1970 Cohort Means N	lnY	AGE	EDUC	1980 Cohort Means N	lnY	AGE	EDUC	Change from 1970 to 1980 lnY	AGE*	EDUC
GERMANY	60-64	18-30	126	9.9	27.6	11.7	382	10.2	36.7	12.7	0.30	9.10	1.04
											(5.94)	(-3.12)	(3.89)
		31-42	220	10.1	35.6	12.1	548	10.3	45.4	13.2	0.22	9.79	1.12
											(5.51)	(-0.78)	(4.19)
		43-54	60	10.0	48.2	12.6	115	10.2	56.8	13.0	0.20	8.57	0.48
											(2.29)	(-2.82)	(0.85)
	50-59	18-30	395	9.7	24.8	12.3	1384	10.1	34.2	13.0	0.40	9.39	0.68
											(14.5)	(-3.33)	(5.28)
		31-42	625	10.1	37.1	12.0	1629	10.3	46.8	12.7	0.17	9.75	0.71
											(7.66)	(-1.55)	(4.78)
		43-54	369	10.1	47.4	11.8	783	10.2	57.0	12.3	0.08	9.63	0.44
											(2.61)	(-1.90)	(2.08)
POLAND	65-69	18-30	58	9.6	24.8	10.8	140	10.1	34.8	11.2	0.50	9.95	0.37
											(7.14)	(-0.08)	(0.74)
		31-42	49	9.7	36.6	10.7	158	10.1	46.7	11.9	0.34	10.17	1.21
											(3.91)	(0.29)	(1.64)
		43-54	49	9.7	47.4	9.6	110	9.9	57.8	10.3	0.22	10.47	0.70
											(2.54)	(0.84)	(0.97)
	60-64	18-30	40	9.8	24.5	10.5	122	10.1	34.5	11.3	0.31	9.90	0.82
											(3.71)	(-0.16)	(1.74)
		31-42	82	9.9	36.9	9.9	199	10.0	46.8	11.3	0.11	9.84	1.39
											(1.83)	(-0.37)	(2.71)
		43-54	90	9.8	48.3	8.9	223	9.9	57.7	10.3	0.16	9.35	1.38
											(2.89)	(-1.62)	(2.80)
	50-59	18-30	46	9.8	27.4	12.7	132	10.2	36.8	13.3	0.41	9.46	0.60
											(4.93)	(-1.07)	(1.07)
		31-42	159	10.0	37.8	10.3	391	10.2	47.6	11.8	0.14	9.83	1.49
											(3.18)	(-0.51)	(4.11)
		43-54	495	9.9	48.1	9.5	981	10.0	57.7	10.1	0.15	9.64	0.59
											(5.99)	(-2.11)	(2.67)
HUNGARY	50-59	18-30	89	9.8	27.4	11.9	208	10.2	36.8	13.0	0.32	9.42	1.02
											(4.76)	(-1.47)	(2.47)
		31-42	244	10.0	36.1	12.0	678	10.2	46.1	12.6	0.12	10.00	0.69
											(3.33)	(0.02)	(2.63)
		43-54	154	9.9	47.3	12.2	324	10.1	57.3	12.8	0.16	9.91	0.60
											(3.00)	(-0.31)	(1.51)
YUGO	65-69	18-30	62	9.5	25.8	9.8	274	10.0	35.2	10.9	0.47	9.38	1.04
											(7.02)	(-1.31)	(2.09)
		31-42	63	9.6	36.6	11.2	190	10.0	46.0	10.3	0.43	9.33	-.93
											(6.37)	(-1.33)	(-1.4)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten.

TABLE 1(cont'd)

1970 and 1980 Cohort Means, Changes in Means from 1970 to 1980 (tstats)

Country	Year of Imm	Age Grp*	1970 Cohort Means N	lnY	AGE	EDUC	1980 Cohort Means N	lnY	AGE	EDUC	Change from 1970 to 1980 lnY	AGE*	EDUC
YUGO	50-59	18-30	40	9.9	27.6	11.8	152	10.2	37.2	13.0	0.29	9.50	1.20
											(4.66)	(-1.08)	(2.18)
		31-42	185	10.0	36.6	9.8	435	10.2	46.6	10.8	0.22	10.00	1.01
											(5.12)	(0.00)	(2.97)
		43-54	150	9.9	47.9	9.5	322	10.1	57.4	10.0	0.14	9.52	0.58
											(2.99)	(-1.61)	(1.32)
GREECE	65-69	18-30	108	9.4	25.3	10.0	422	9.8	35.0	10.0	0.38	9.65	-.02
											(6.22)	(-0.89)	(-.05)
		31-42	130	9.5	35.8	8.9	325	9.8	46.0	9.1	0.29	10.17	0.21
											(5.14)	(0.46)	(0.50)
		43-54	60	9.3	47.6	7.3	111	9.6	57.2	7.7	0.30	9.60	0.37
											(3.80)	(-0.75)	(0.62)
	50-59	18-30	46	9.6	27.0	11.2	143	10.0	36.2	12.3	0.40	9.29	1.11
											(4.57)	(-1.32)	(1.76)
		31-42	241	9.9	36.8	10.8	551	10.1	46.4	11.2	0.18	9.58	0.40
											(4.05)	(-1.63)	(1.23)
		43-54	114	9.8	47.2	10.0	228	10.0	56.8	10.8	0.12	9.65	0.80
											(1.68)	(-0.92)	(1.52)
ITALY	65-69	18-30	254	9.5	25.4	8.3	805	9.9	34.5	9.4	0.40	9.09	1.08
											(11.8)	(-3.66)	(4.05)
		31-42	220	9.6	36.0	7.5	539	9.9	46.1	8.1	0.27	10.16	0.53
											(7.64)	(0.60)	(1.62)
		43-54	109	9.6	47.2	6.2	226	9.8	57.0	6.7	0.14	9.79	0.48
											(2.97)	(-0.56)	(1.03)
	60-64	18-30	134	9.7	26.1	8.6	555	10.0	35.4	9.9	0.23	9.24	1.36
											(5.34)	(-2.32)	(4.06)
		31-42	296	9.8	36.0	7.7	670	10.0	45.8	8.6	0.19	9.83	0.87
											(5.95)	(-0.79)	(3.05)
		43-54	97	9.7	47.7	7.0	227	9.8	57.2	8.1	0.08	9.46	1.14
											(1.39)	(-1.33)	(2.27)
	50-59	18-30	307	9.7	26.0	10.5	983	10.0	35.3	11.7	0.33	9.31	1.16
											(10.8)	(-3.16)	(5.77)
		31-42	539	9.9	36.5	8.5	1344	10.0	46.4	9.2	0.16	9.89	0.74
											(6.79)	(-0.62)	(3.62)
		43-54	364	9.8	47.9	7.4	849	9.9	57.2	9.0	0.11	9.26	1.53
											(3.38)	(-3.63)	(5.50)
PORT	65-69	18-30	75	9.4	25.1	6.6	325	9.8	34.6	7.0	0.41	9.50	0.39
											(8.03)	(-1.02)	(0.81)
		31-42	73	9.5	36.9	5.3	276	9.8	46.1	5.9	0.26	9.17	0.62
											(4.70)	(-1.81)	(1.09)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten.

TABLE 1(cont'd)

1970 and 1980 Cohort Means, Changes in Means from 1970 to 1980 (tstats)

Country	Year of Imm	Age Grp*	1970 Cohort Means N	lnY	AGE	EDUC	1980 Cohort Means N	lnY	AGE	EDUC	Change from 1970 to 1980 lnY	AGE*	EDUC
PORT	65-69	43-54	66	9.4	48.2	4.6	178	9.6	57.3	4.3	0.15	9.12	-.33
											(2.40)	(-1.87)	(-.57)
INDIA	65-69	18-30	99	9.8	27.3	16.7	400	10.5	37.6	18.0	0.69	10.30	1.33
											(12.3)	(1.45)	(4.32)
		31-42	110	9.9	35.0	16.8	300	10.5	44.7	18.4	0.54	9.77	1.68
											(9.19)	(-0.69)	(5.35)
PHILIPP	65-69	18-30	134	9.5	26.6	15.0	853	9.9	35.5	14.1	0.43	8.85	-.97
											(8.31)	(-4.09)	(-3.1)
		31-42	155	9.7	35.5	15.3	472	10.1	45.4	15.4	0.41	9.83	0.08
											(7.25)	(-0.53)	(0.24)
		43-54	45	9.5	47.2	12.9	146	9.9	56.9	12.8	0.35	9.70	-.13
											(3.43)	(-0.55)	(-.14)
CANADA	65-69	18-30	174	9.8	26.0	12.4	342	10.2	35.4	12.5	0.42	9.39	0.14
											(8.61)	(-1.98)	(0.40)
		31-42	224	10.1	36.0	12.5	370	10.3	45.9	12.6	0.18	9.87	0.14
											(3.83)	(-0.45)	(0.45)
		43-54	82	10.0	47.9	11.9	133	10.1	57.2	11.6	0.07	9.31	-.34
											(0.83)	(-1.39)	(-.63)
	60-64	18-30	168	9.8	26.6	10.7	395	10.1	35.9	12.3	0.29	9.37	1.54
											(6.28)	(-2.24)	(5.04)
		31-42	265	10.1	36.1	11.7	630	10.3	46.0	12.7	0.18	9.87	1.05
											(4.35)	(-0.53)	(3.54)
		43-54	124	10.0	47.6	11.2	256	10.1	57.4	11.9	0.11	9.87	0.70
											(1.69)	(-0.36)	(1.75)
	50-59	18-30	206	9.7	25.1	12.2	689	10.1	34.6	12.9	0.38	9.49	0.66
											(9.16)	(-1.93)	(3.30)
		31-42	381	10.1	37.2	11.5	853	10.3	47.2	12.6	0.17	9.98	1.07
											(4.99)	(-0.09)	(4.66)
		43-54	437	10.1	48.2	11.7	802	10.2	57.2	12.1	0.10	9.01	0.41
											(3.06)	(-5.12)	(1.86)
MEXICO	65-69	18-30	558	9.2	24.4	7.2	3190	9.6	33.4	7.0	0.45	8.93	-.20
											(20.6)	(-6.76)	(-1.1)
		31-42	234	9.2	35.9	6.2	908	9.6	44.9	6.0	0.33	9.03	-.15
											(9.18)	(-4.08)	(-.47)
		43-54	102	9.2	48.0	4.6	245	9.4	57.1	4.8	0.23	9.05	0.22
											(4.41)	(-2.48)	(0.45)
	60-64	18-30	331	9.4	25.5	7.8	1509	9.7	34.9	7.9	0.30	9.39	0.07
											(9.80)	(-2.89)	(0.31)
		31-42	419	9.4	35.7	6.2	1271	9.7	45.5	6.1	0.24	9.79	-.02
											(8.20)	(-1.10)	(-.09)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten.

TABLE 1(cont'd)

1970 and 1980 Cohort Means, Changes in Means from 1970 to 1980 (tstats)

Country	Year of Imm	Age Grp*	1970 Cohort Means N	lnY	AGE	EDUC	1980 Cohort Means N	lnY	AGE	EDUC	Change from 1970 to 1980 lnY	AGE*	EDUC
MEXICO	60-64	43-54	139	9.3	47.3	5.2	412	9.4	56.7	5.4	0.08	9.39	0.18
											(1.68)	(-2.09)	(0.44)
	50-59	18-30	307	9.4	25.5	9.1	1271	9.8	34.6	9.9	0.41	9.08	0.78
											(13.1)	(-4.16)	(3.28)
		31-42	687	9.6	36.9	6.7	1947	9.8	46.6	7.4	0.21	9.73	0.72
											(9.10)	(-1.87)	(3.72)
		43-54	404	9.5	47.3	6.2	1049	9.6	57.1	6.3	0.12	9.79	0.07
											(3.86)	(-1.16)	(0.27)
CUBA	65-69	18-30	105	9.3	25.8	10.8	324	9.7	35.7	10.9	0.35	9.91	0.15
											(6.67)	(-0.21)	(0.36)
		31-42	448	9.4	36.6	9.6	1291	9.7	46.5	10.4	0.31	9.93	0.76
											(10.9)	(-0.37)	(3.23)
		43-54	305	9.4	47.6	9.6	798	9.7	57.6	10.1	0.28	10.01	0.49
											(8.24)	(0.05)	(1.58)
	60-64	18-30	334	9.6	25.8	12.0	920	10.0	35.3	12.8	0.45	9.54	0.83
											(13.3)	(-2.28)	(4.06)
		31-42	427	9.8	37.1	12.0	1031	10.0	46.5	12.7	0.23	9.41	0.74
											(6.69)	(-2.99)	(3.01)
		43-54	370	9.6	48.2	12.1	906	9.9	57.7	12.5	0.23	9.51	0.43
											(6.19)	(-2.39)	(1.55)
	50-59	18-30	84	9.6	26.2	11.8	216	10.0	36.1	12.4	0.36	9.91	0.56
											(5.20)	(-0.21)	(1.42)
		31-42	188	9.7	36.8	10.2	608	9.9	47.0	11.5	0.16	10.22	1.29
											(3.49)	(0.80)	(4.12)
		43-54	186	9.6	47.5	10.2	366	9.8	57.4	10.9	0.22	9.91	0.78
											(4.38)	(-0.31)	(2.07)
JAMAICA	65-69	18-30	56	9.4	26.0	11.0	215	9.8	35.3	11.6	0.44	9.36	0.64
											(6.38)	(-1.25)	(1.31)
		31-42	56	9.6	36.5	11.1	239	9.8	46.2	11.5	0.28	9.64	0.42
											(4.27)	(-0.68)	(0.82)
DOMREP	60-64	18-30	45	9.3	26.4	9.2	101	9.6	36.1	10.2	0.31	9.74	1.00
											(3.82)	(-0.46)	(1.65)
		31-42	57	9.4	35.8	7.2	132	9.6	45.7	8.9	0.17	9.82	1.62
											(1.83)	(-0.35)	(2.44)
ARGENT	65-69	18-30	44	9.5	26.9	12.9	115	10.0	36.1	12.6	0.49	9.18	-.24
											(4.84)	(-1.58)	(-.36)
		31-42	59	9.8	36.4	11.9	134	10.1	45.9	12.7	0.27	9.55	0.78
											(2.77)	(-0.87)	(1.12)
COLOMB	65-69	18-30	77	9.4	25.4	10.6	269	9.8	35.5	12.0	0.44	10.13	1.32
											(7.17)	(0.31)	(3.16)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten.

TABLE 1(cont'd)

1970 and 1980 Cohort Means, Changes in Means from 1970 to 1980 (tstats)

Country	Year of Imm	Age Grp*	1970 Cohort Means				1980 Cohort Means				Change from 1970 to 1980		
			N	lnY	AGE	EDUC	N	lnY	AGE	EDUC	lnY	AGE*	EDUC
COLOMB	65-69	31-42	81	9.6	36.2	11.2	220	9.8	45.6	11.9	0.14	9.36	0.62
											(2.09)	(-1.43)	(1.15)
	60-64	18-30	46	9.6	26.7	11.9	145	9.9	36.7	12.7	0.33	10.02	0.82
											(3.85)	(0.05)	(1.59)
		31-42	62	9.8	35.3	12.3	178	10.0	44.9	12.4	0.23	9.58	0.11
											(2.71)	(-0.84)	(0.20)
NATIVE		18-30	14775	9.5	24.8	12.5	32069	9.8	34.8	12.7	0.36	9.92	0.26
											(65.4)	(-2.40)	(10.8)
		31-42	15263	9.8	36.7	12.2	29014	9.9	46.5	12.7	0.13	9.75	0.46
											(22.2)	(-7.19)	(15.4)
		43-54	17376	9.8	48.4	11.6	23174	9.9	57.6	12.0	0.10	9.26	0.41
											(17.0)	(-22.5)	(13.4)

* - the t-statistic for the change in age is calculated for the null hypothesis that the true change in age equals ten.

TABLE 2

OLS and Weighted Method-of-moments Estimates, 1970 Sample

Variable		Wtd.Method of Moments Coef.	Tstat	OLS Coef.	Tstat
CONSTANT		6.602	(32.4)	6.918	(242.)
AGE		0.099	(26.3)	0.108	(68.1)
AGESQ/100		-0.115	(21.9)	-0.127	(59.7)
EDUCATION		0.091	(5.94)	0.054	(87.0)
UK	65-69	0.210	(4.06)	0.222	(10.3)
UK	60-64	0.295	(5.54)	0.275	(11.3)
UK	50-59	0.276	(6.96)	0.266	(14.7)
IRELAND	60-64	0.350	(3.98)	0.207	(4.93)
IRELAND	50-59	0.284	(4.81)	0.185	(6.48)
NETHERL	50-59	0.291	(4.72)	0.232	(8.01)
FRANCE	50-59	0.266	(2.94)	0.179	(3.94)
GERMANY	65-69	0.218	(3.30)	0.189	(5.80)
GERMANY	60-64	0.354	(6.91)	0.290	(11.9)
GERMANY	50-59	0.287	(10.5)	0.254	(19.1)
POLAND	65-69	0.226	(2.53)	0.067	(1.72)
POLAND	60-64	0.384	(4.71)	0.214	(6.38)
POLAND	50-59	0.346	(7.20)	0.234	(12.6)
HUNGARY	50-59	0.272	(5.82)	0.216	(9.73)
YUGOSLA	65-69	0.162	(1.75)	0.009	(.21)
YUGOSLA	50-59	0.441	(6.98)	0.300	(11.9)
GREECE	65-69	0.114	(1.43)	-0.073	(2.56)
GREECE	50-59	0.287	(5.06)	0.172	(7.03)
ITALY	65-69	0.354	(4.20)	0.138	(6.71)
ITALY	60-64	0.465	(5.66)	0.252	(11.7)
ITALY	50-59	0.426	(6.97)	0.267	(18.6)
PORTUGA	65-69	0.442	(3.51)	0.119	(3.53)
INDIA	65-69	-0.160	(1.71)	-0.065	(1.91)
PHILIPP	65-69	-0.299	(4.38)	-0.264	(9.85)
CANADA	65-69	0.307	(6.54)	0.260	(11.6)
CANADA	60-64	0.383	(8.29)	0.301	(14.5)
CANADA	50-59	0.334	(10.4)	0.289	(18.7)
MEXICO	65-69	0.140	(1.47)	-0.099	(5.88)
MEXICO	60-64	0.251	(2.68)	0.007	(.44)
MEXICO	50-59	0.258	(3.12)	0.041	(3.02)
CUBA	65-69	-0.111	(2.23)	-0.236	(14.0)
CUBA	60-64	-0.002	(.07)	-0.038	(2.61)
CUBA	50-59	0.082	(1.51)	-0.030	(1.32)
JAMAICA	65-69	0.013	(.14)	-0.125	(2.71)
DOMREP	60-64	0.173	(1.46)	-0.080	(1.65)
ARGENTI	65-69	0.060	(.62)	-0.037	(.77)
COLOMBI	65-69	0.074	(.91)	-0.053	(1.36)
COLOMBI	60-64	0.112	(1.19)	0.010	(.22)

TABLE 3

OLS and Weighted Method-of-moments Estimates, 1980 Sample

Variable		Wtd.Method of Moments		OLS	
		Coef.	Tstat	Coef.	Tstat
CONSTANT		7.879	(64.5)	7.815	(224.)
AGE		0.048	(12.5)	0.058	(37.0)
AGESQ/100		-0.048	(11.3)	-0.060	(34.9)
EDUCATION		0.070	(9.33)	0.057	(129.)
UK	65-69	0.428	(10.6)	0.353	(20.6)
UK	60-64	0.378	(9.62)	0.295	(16.9)
UK	50-59	0.361	(12.3)	0.300	(22.4)
IRELAND	60-64	0.390	(6.83)	0.236	(8.37)
IRELAND	50-59	0.341	(8.57)	0.236	(11.8)
NETHERL	50-59	0.356	(8.10)	0.245	(12.1)
FRANCE	50-59	0.424	(6.22)	0.259	(7.70)
GERMANY	65-69	0.412	(8.16)	0.303	(12.3)
GERMANY	60-64	0.416	(11.7)	0.323	(19.2)
GERMANY	50-59	0.313	(17.2)	0.269	(30.1)
POLAND	65-69	0.389	(6.65)	0.209	(7.81)
POLAND	60-64	0.348	(6.86)	0.190	(8.20)
POLAND	50-59	0.369	(12.3)	0.280	(19.9)
HUNGARY	50-59	0.308	(9.35)	0.220	(14.1)
YUGOSLA	65-69	0.409	(7.78)	0.258	(10.3)
YUGOSLA	50-59	0.471	(11.9)	0.346	(19.2)
GREECE	65-69	0.230	(5.01)	0.081	(4.38)
GREECE	50-59	0.341	(8.86)	0.221	(12.4)
ITALY	65-69	0.353	(8.47)	0.225	(16.3)
ITALY	60-64	0.369	(9.31)	0.243	(16.9)
ITALY	50-59	0.344	(12.4)	0.258	(26.3)
PORTUGA	65-69	0.442	(6.97)	0.245	(12.5)
INDIA	65-69	0.289	(4.92)	0.254	(12.3)
PHILIPP	65-69	0.041	(1.28)	-0.016	(1.10)
CANADA	65-69	0.443	(11.2)	0.330	(17.7)
CANADA	60-64	0.380	(11.9)	0.290	(19.1)
CANADA	50-59	0.353	(15.1)	0.292	(25.9)
MEXICO	65-69	0.197	(4.07)	0.087	(9.76)
MEXICO	60-64	0.205	(4.33)	0.082	(8.10)
MEXICO	50-59	0.218	(5.66)	0.116	(13.3)
CUBA	65-69	0.011	(.42)	-0.075	(6.68)
CUBA	60-64	0.125	(5.90)	0.072	(7.06)
CUBA	50-59	0.127	(3.77)	0.024	(1.51)
JAMAICA	65-69	0.143	(2.77)	0.001	(.03)
DOMREP	60-64	0.116	(1.54)	-0.107	(3.03)
ARGENTI	65-69	0.301	(4.33)	0.124	(3.62)
COLOMBI	65-69	0.106	(2.15)	-0.026	(1.08)
COLOMBI	60-64	0.222	(3.65)	0.065	(2.18)

TABLE 4

Assimilation Rate Estimates

Cohort		WMOM Assim. Rate	WMOM Tstat	OLS Assim. Rate	OLS Tstat	WMOM (diff. returns to education) Assim. Rate	WMOM (diff. returns to education) Tstat
UK	65-69	0.218	(3.33)	0.131	(4.75)	0.204	(2.19)
UK	60-64	0.083	(1.25)	0.020	(.66)	0.065	(1.46)
UK	50-59	0.086	(1.73)	0.034	(1.50)	0.074	(2.49)
IRELAND	60-64	0.041	(.39)	0.029	(.58)	-0.001	(2.57)
IRELAND	50-59	0.058	(.81)	0.051	(1.45)	0.030	(2.59)
NETHERL	50-59	0.065	(.86)	0.013	(.36)	0.040	(2.50)
FRANCE	50-59	0.158	(1.40)	0.081	(1.43)	0.122	(2.78)
GERMANY	65-69	0.194	(2.34)	0.114	(2.79)	0.173	(2.83)
GERMANY	60-64	0.062	(.99)	0.032	(1.10)	0.039	(1.83)
GERMANY	50-59	0.026	(.80)	0.015	(.93)	0.015	(2.10)
POLAND	65-69	0.163	(1.53)	0.142	(2.99)	0.116	(4.09)
POLAND	60-64	-0.036	(.38)	-0.024	(.59)	-0.082	(2.35)
POLAND	50-59	0.023	(.41)	0.046	(1.98)	-0.005	(3.45)
HUNGARY	50-59	0.036	(.63)	0.004	(.16)	0.015	(1.38)
YUGOSLA	65-69	0.248	(2.33)	0.249	(4.94)	0.213	(4.99)
YUGOSLA	50-59	0.030	(.40)	0.046	(1.47)	-0.006	(2.06)
GREECE	65-69	0.116	(1.26)	0.154	(4.54)	0.076	(3.68)
GREECE	50-59	0.055	(.80)	0.049	(1.62)	0.024	(1.17)
ITALY	65-69	-0.001	(.02)	0.087	(3.53)	-0.045	(1.74)
ITALY	60-64	-0.095	(1.04)	-0.009	(.36)	-0.138	(.29)
ITALY	50-59	-0.083	(1.24)	-0.008	(.49)	-0.115	(.19)
PORTUGA	65-69	0.001	(.01)	0.127	(3.25)	-0.060	(2.54)
INDIA	65-69	0.449	(4.06)	0.319	(8.03)	0.722	(6.74)
PHILIPP	65-69	0.340	(4.51)	0.249	(8.19)	0.370	(7.40)
CANADA	65-69	0.136	(2.21)	0.070	(2.40)	0.114	(2.78)
CANADA	60-64	-0.003	(.05)	-0.011	(.43)	-0.029	(.08)
CANADA	50-59	0.019	(.48)	0.003	(.16)	0.004	(2.08)
MEXICO	65-69	0.057	(.54)	0.186	(9.76)	0.103	(1.25)
MEXICO	60-64	-0.046	(.44)	0.074	(3.77)	0.016	(.21)
MEXICO	50-59	-0.040	(.44)	0.075	(4.61)	0.075	(1.19)
CUBA	65-69	0.123	(2.16)	0.161	(7.96)	0.238	(6.31)
CUBA	60-64	0.127	(3.44)	0.111	(6.18)	0.268	(8.06)
CUBA	50-59	0.045	(.70)	0.054	(1.95)	0.196	(4.78)
JAMAICA	65-69	0.130	(1.20)	0.126	(2.39)	0.277	(4.12)
DOMREP	60-64	-0.056	(.40)	-0.027	(.46)	0.140	(1.51)
ARGENTI	65-69	0.241	(2.03)	0.161	(2.73)	0.354	(4.65)
COLOMBI	65-69	0.033	(.34)	0.026	(.57)	0.219	(3.51)
COLOMBI	60-64	0.111	(.99)	0.055	(.99)	0.244	(3.51)