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3 The Assimilation of Immigrants in the U.S. Labor Market

Robert J. LaLonde and Robert H. Topel

The popular image of new immigrants to the United States, impoverished but with great expectations of the future, is now part of our national culture. Since nearly all Americans are descended from immigrants, the "assimilation" of immigrant stock into the U.S. labor market is largely an accepted fact.[1] As a generalization, the children of immigrants, and later generations, do well.[2] The path to this prosperity is not well understood, however. One possibility, implied by the work of Chiswick (1978) and others, is that new immigrants rapidly accumulate skills—language, culture, and other dimensions of human capital—that are specific to the American labor market. Thus, the earnings of the typical immigrant rise quickly after arrival and eventually equal (or overtake) the earnings of similar nonimmigrants. Another possibility is that the

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1. Sowell's *Ethnic America* (1983) is an important narrative of the experiences and assimilation of immigrant groups in the United States. A theme of Sowell's book is that the earnings of ethnic groups converge to the U.S. norm, at least across generations. Borjas (1990) argues, however, that differences in the earnings of U.S. ethnic groups reflect previous differences in the earnings of first-generation immigrants.

2. Japanese immigrants are a prime example of intergenerational mobility. Most Japanese immigrants had limited formal education and arrived as contract laborers in Hawaii. Many later migrated to the mainland. By 1940, the children of these immigrants (Nisei) had completed more years of schooling, on average, than white natives of the same age (U.S. Census of Population, 1940). Despite the dislocations of the 1940s, Japanese Americans are now among the most prosperous ethnic groups in the United States.

assimilation of immigrant families is mainly intergenerational. On this view, immigrants themselves realize only modest earnings growth after arrival in the United States, but their native offspring prosper.

This paper studies the intragenerational assimilation of immigrants to the United States, relying on wage and earnings data from the 1970 and 1980 Censuses of Population. It is well known that in individual Censuses the average earnings of immigrants rise rapidly with time in the United States. New arrivals have substantially lower average earnings than observationally similar immigrants who arrived earlier. One interpretation of this finding is that the earnings of the typical immigrant rise with time in the United States, so that intragenerational assimilation is important. An alternative interpretation is that the average productivity ("quality") of immigrant cohorts has declined over time. Earlier arrival cohorts earn more because of higher average skills, not because of assimilation. At least for recent data, this interpretation of the evidence is consistent with changes in immigration law such as the 1965 Amendments to the Immigration and Nationality Act, which shifted the emphasis from national origins quotas to family preferences in admission decisions.

These alternative hypotheses about the assimilation process cannot be distinguished in a single cross section of earnings data. To break that deadlock, Borjas (1985) charted the earnings growth of immigrant arrival cohorts between 1969 and 1979. He concluded that assimilation is a much less important contributor to earnings growth than would be implied by cross-sectional earnings comparisons. He attributed the difference between the time-series and the cross-sectional estimates of assimilation to "a precipitous decline in the 'quality' of immigrants admitted to this country since 1950" (p. 463). The implication of his findings is that the assimilation of immigrant families to the American labor market is mainly due to intergenerational mobility; the assimilation of immigrants themselves is both slow and numerically small. This conclusion is important since it virtually reverses popular and strongly held conceptions about immigrants: they do not assimilate as much as we thought, and they have been getting worse over time.

This paper reassesses the evidence on immigrant assimilation and changes in immigrant quality over time. Our estimates of assimilation are based on the relative earnings of different immigrant cohorts in the 1970 and 1980 U.S. Censuses as well as on *changes* in the average earnings of these cohorts during the 1970s. We have two main findings. First, for most ethnic groups we find very strong evidence of assimilation. The first ten years of experience in the U.S. labor market raise earning capacity of a typical new immigrant by over 20 percent, holding experience and education constant. This estimate is not much different than what cross-sectional earnings comparisons would predict, so that we find little evidence of declining immigrant quality within the ethnic groups that we study. In this sense our conclusions are substantially different than those of Borjas (1985). We also provide evidence in the conclusion that

overall immigrant quality *did* decline, but largely as a result of changes in the ethnic composition of new immigrants to the United States. Recent immigrants are from source countries with lower average amounts of human capital, but immigrants from those countries do assimilate into the American labor market.

Our second finding is that relative earnings of immigrants are sensitive to aggregate factors that have increased the inequality of wages in the United States. After peaking in the early 1970s, relative wages of less-skilled workers have steadily declined. Since immigrants are typically less skilled than the representative native, this change in relative wages had a disproportionate effect on immigrant earnings. We estimate that changes in the relative returns to skills during the 1970s reduced the relative wages of some less-skilled immigrant groups by between 5 and 10 percent. That decline in immigrant earning power partly offset the wage gains that immigrants received from assimilation. Thus, estimates of immigrant assimilation understate the true amount of human capital accumulation experienced by the typical immigrant. This evidence also reflects on the issue of declining "quality" of immigrants. Among less-skilled immigrant groups such as Mexicans, our evidence is that immigrant wages would have declined even if immigrant quality had remained unchanged. This implies that some of the concern about declining immigrant quality is unwarranted.

The paper is organized as follows. The next section provides some empirical foundation for the problem we study, showing trends in immigration, the relative earnings and educational attainment of immigrants, and trends in wage inequality in the U.S. labor market. Section 3.2 describes our empirical methods for isolating the effect of assimilation on earning capacity. Section 3.3 provides initial estimates of assimilation based on both cross-sectional and synthetic panel estimates of immigrants' earnings growth. Section 3.4 evaluates the effect of aggregate labor market conditions on immigrants' wages, and section 3.5 concludes.

3.1 Background: Patterns of Immigration and Earnings

One of the most striking features of immigration into the United States during the 1970s was the change in the countries from which immigrants migrated. As shown in the first row of table 3.1, in the 1970s, 18 percent of immigrants arrived from either Europe, Canada, or Australia, 23 percent from South and East Asia, 27 percent from Mexico, and 18 percent from Latin America or the Caribbean.[3] Those percentages represent a significant departure from the corresponding percentages of immigrants arriving in the United

3. For the purposes of this paper, we consider immigrants from the Middle East as coming from Afghanistan, Pakistan, Iran, and North Africa as well as those countries normally considered the Middle East. Other immigrants come primarily from sub-Saharan Africa and the South Pacific.

Table 3.1 **Where Do Immigrants Come From? (percentage from region during decade)**

Decade Arrived: Census File	Place of Origin					
	Europe	Asia	Middle East	Mexico	Latin America	Other
1970s:						
1980	18	23	6	27	18	7
1960s:						
1970	40	13	4	12	27	4
1980	34	12	4	17	26	6
1950s:						
1970	69	6	2	11	9	3
1980	63	6	3	14	8	6
Before 1950:						
1970	79	6	1	7	4	3
1980	68	6	1	10	6	9

Note: The place of origin categories are defined as follows: *Europe* encompasses all European countries and also includes the Soviet Union, Canada, Australia, and New Zealand; *Asia* encompasses South and East Asia; *Middle East* encompasses North Africa and Southwest Asia, including Pakistan (see no. 3); *Latin America* encompasses all of Central and South America (except Mexico) and the Caribbean; *Other* encompasses sub-Saharan Africa and all other areas. *Census File* refers to Public Use Census File used to tabulate the percentages in the table.

States during the 1950s, when approximately two-thirds of all immigrants arrived from Europe, Canada, or Australia. By contrast, only 6 percent arrived from South or East Asia, only 14 percent from Mexico, and only 8 percent from Latin America and the Caribbean.

Those changes in the source countries of immigrants also entailed changes in the skills that immigrants brought to the U.S. labor market. As shown in table 3.2, European immigrants typically have slightly less education than comparably aged natives; Asian immigrants typically have more education than natives; and Mexican immigrants typically have substantially less education than natives or even Hispanic natives. Such differences in observable skills suggest that the skill distribution of the immigrant work force has changed with the changing ethnic composition of immigrant flows. Thus, if the average education of new immigrant cohorts were fixed at 1980 levels, the change in relative immigrant shares from the 1950s to the 1970s, shown in table 3.1, would reduce average immigrant years of schooling by about two years, from 12.5 to 10.4.

Changes in the immigrant skill distribution potentially confound efforts to estimate the rate of assimilation of immigrants into the U.S. labor market, as differences in the relative earnings of recent and earlier immigrants may reflect differences in skills and not time spent in the United States. That consideration would be particularly important if, for each ethnic group, the skills of successive immigrant cohorts had declined. However, as shown by table 3.2, statis-

Table 3.2 **Years of Completed Schooling (means for selected immigrant groups, 1970 and 1980 Censuses)**

Place of Origin and Age Cohort	Years in the United States				
	0–5	6–10	11–15	16–20	Natives
European					
1970:					
25–34	12.0	11.4	11.3	12.4	12.3
35–44	11.0	11.1	11.0	11.0	11.7
45–54	9.4	9.9	10.7	11.0	11.2
1980:					
25–34	13.9	11.7	11.6	13.2	13.5
35–44	13.7	11.6	12.3	12.4	13.0
45–54	12.1	9.9	10.4	11.8	12.3
Asian					
1970:					
25–34	15.8	15.2	15.5	12.5	12.3
35–44	14.2	14.0	14.1	12.2	11.7
45–54	10.8	13.0	14.0	9.5	11.2
1980:					
25–34	14.4	15.3	15.2	15.2	13.5
35–44	13.9	16.2	16.7	16.0	13.0
45–54	13.0	13.7	13.9	15.4	12.3
Mexican					
1970:					
25–34	6.5	7.1	7.6	8.2	10.2[a]
35–44	5.5	5.7	6.3	6.5	9.0[a]
45–54	3.4	5.3	6.0	6.1	8.2[a]
1980:					
25–34	7.0	7.2	7.6	10.2	11.9[a]
35–44	6.1	6.2	6.5	7.4	10.9[a]
45–54	5.5	5.3	5.9	5.7	9.6[a]

Source: Public Use Files, 1970 and 1980 Census. For selection criteria, see the appendix.

Note: For place of origin, see the note to table 3.1.

[a]The figure is the mean years of completed schooling for Hispanic natives.

tics on educational attainment suggest little change over time in the skills of different immigrant cohorts. In fact, recent European and Mexican immigrants in 1980 have completed more years of schooling than their counterparts in 1970. That finding suggests that changes in the skill distribution of immigrants largely reflect changes in the ethnic composition of immigrant flows and not changes in skills within each ethnic group.

The earnings of different immigrant groups reflect the differences in their observed skills. As shown in table 3.3, relative earnings vary significantly with the source country of the immigrant. Among recent arrivals, immigrants of European ancestry have the highest earnings and Mexicans the lowest. That

Table 3.3 **Relative Wages of Male Immigrants (differences in mean log weekly wages)**

Place of Origin and Age Cohort	Years in the United States			
	1–5	6–10	11–15	16–20
All immigrants				
1970:				
25–34	−.19	−.01	.01	.08
35–44	−.22	−.08	.04	.08
1980:				
25–34	−.33	−.20	−.09	.02
35–44	−.28	−.21	−.08	.01
45–54	−.37	−.40	−.21	−.05
Europe				
1970:				
25–34	0	.13	.09	.15
35–44	−.05	.09	.12	.16
1980:				
25–34	−.04	.01	.08	.05
35–44	.10	−.08	.08	.11
45–54	−.05	−.14	−.07	.08
Asia				
1970:				
25–34	−.19	.12	.14	−.22
35–44	−.16	−.03	.19	0
1980:				
25–34	−.20	.03	.14	.21
35–44	.31	.06	.19	.20
45–54	−.37	−.22	−.06	.27
Mexico				
1970:				
25–34	−.63	−.34	−.33	−.25
35–44	−.80	−.55	−.31	−.33
1980:				
25–34	−.58	−.44	−.26	−.16
35–44	−.90	−.72	−.55	−.36
45–54	−.81	−.89	−.60	−.53
Latin America				
1970:				
25–34	−.32	−.09	−.02	−.02
35–44	−.37	−.18	−.18	.10
1980:				
25–34	−.52	−.25	−.16	.05
35–44	−.46	−.33	−.32	−.03
45–54	−.69	−.61	−.38	−.21

Source: U.S. Census 1970 and 1980 Public Use Files.

Note: Estimates are differences between mean log weekly earnings of immigrants and natives in the indicated age category. The mean log weekly earnings of natives are 5.02 for 25–34-year-olds in 1970; 5.16 for 35–44-year-olds in 1970; and 5.65 for 25–34-year-olds, and 5.88 for both 35–44-year-olds and 45–54-year-olds in 1980. The appendix discusses the sample.

finding indicates that the increased shares of Mexican and other similarly skilled immigrants reduced the average earnings of recent immigrants.

Because a large share of earlier immigrants came from high-wage groups, whereas recent immigrants have come from low-wage groups, it would *appear* in cross-sectional data as though relative earnings of immigrants rose with time in the United States. Thus, among immigrants aged 35–44 in 1970, those who arrived after 1964 earn 22 percent less than similarly aged natives, while those who have been in the country for eleven to fifteen years have reached earnings parity with natives. But if the skills of the immigrant work force have also changed, evidence of assimilation should be less apparent and less systematic when we compare the relative earnings of the same cohort across Census years. Thus, by 1980, the same 1970 cohort of 35–44-year-olds is 45–54 years old and has been in the United States for eleven to fifteen years. That group still earns 21 percent less than natives, which is virtually the same as the 22 percent difference experienced in 1970. This supports the contention that the increase in earnings with time spent in the United States largely reflects changes in immigrant quality rather than assimilation.

In addition to the decline in immigrant skills, changes in the U.S. labor market may have reduced the relative earnings of new immigrants. Beginning in the late 1960s, the U.S. labor market has shown a pronounced trend toward increased earnings inequality. As documented by Juhn, Murphy, and Pierce (1989), this trend has meant significantly lower relative earnings for less-skilled workers. The potential effect of increased inequality on the earnings of immigrants is illustrated in figure 3.1. The figure shows that, during the 1970s, the earnings of workers below the median grew more slowly than the earnings of workers at or above the median. The potential effect on certain immigrant groups is implied by their relative positions in the earnings distribution. For example, the median earnings of Mexican immigrants who arrived between 1965 and 1969 was at the eleventh percentile of the 1970 native earnings distribution. Over the decade, persons at the eleventh percentile experienced a 13 percent *decline* in their relative earnings, so we would predict a substantial decline in the relative earnings of Mexican immigrants between 1970 and 1980. By contrast, the 1970 median earnings of European immigrants who arrived between 1950 and 1959 was at the fifty-fourth percentile of native distribution. For Europeans, figure 3.1 implies only a negligible effect of increasing wage inequality on the relative earnings of a representative immigrant.

3.2 Methodology

To estimate the rate of assimilation of new immigrants, we begin with a standard econometric model of wage determination based on cross-sectional data for each Census year, 1970 and 1980:

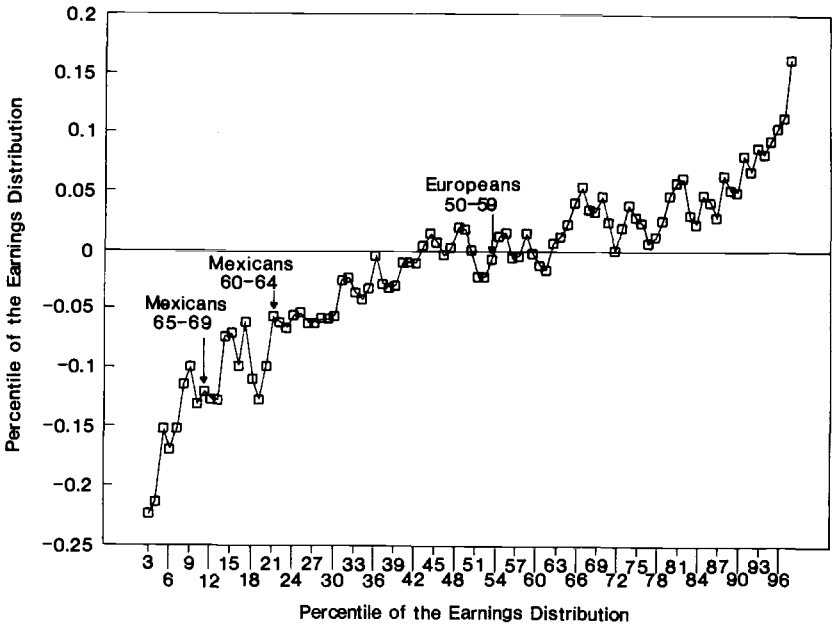

Fig. 3.1 Growth in earnings, 1969–79

Source: U.S. Census Microdata Files for 1970 and 1980.

Note: The figure shows the growth in weekly earnings of each percentile of the native earnings distribution between 1969 and 1979. Earnings changes are for males 25–44 in 1970 and expressed as the difference in log earnings relative to the median.

$$y_{it} = X_{it}\beta_t + \varepsilon_{it}, \tag{1}$$

$$\varepsilon_{it} = a_{it} + b_{it} + u_i. \tag{2}$$

In (1), y_{it} refers to the log weekly wage of an immigrant from arrival cohort i and Census year t. In the data, date of arrival in the United States is usually recorded in five-year intervals; for example, immigrants in the 1980 Census are recorded as having arrived in 1975–79 ($i = 75$), 1970–74 ($i = 70$), and so on. The vector X refers to a standard list of human capital controls. In writing (1), we have ignored differences among immigrants in place of origin. However, in the empirical work reported below, we allow the prices of these characteristics to vary by country of origin (ethnicity) and over time—but not across arrival cohorts of an ethnic group.[4] Thus, β_t may be different for Mexican immigrants than for Europeans but is restricted to have the same value for recent and earlier Mexican immigrants.

4. We impose this restriction as a matter of computational convenience. When β varies by both arrival cohort and ethnicity, sample sizes would be small.

Unobservable factors that affect earnings are decomposed in (2). The parameters a_{it} represent the average level of *accumulated*, U.S.-specific human capital embodied in members of arrival cohort i. We view these (unobserved) parameters as lying along a time-invariant assimilation profile. Assimilation occurs if the regression-adjusted earnings of a more recent immigrant cohort are smaller than the earnings of an earlier immigrant cohort, $a_{it} < a_{i-10,t}$, or if the regression-adjusted earnings of a cohort rise with time spent in the United States, $a_{it} < a_{i,t+10}$. Thus, a_{it} represents the main parameter of interest in this paper. The b_{it} represent time effects, attributable to overall labor market conditions, that may have differential effects on particular arrival cohorts. One interpretation of the b_{it} is that they are transitory fluctuations in the value of human capital for various cohorts and so have zero expected value over time. Alternatively, if there are permanent changes over time in the price of skills, the b_{it} may affect the assimilation profile experienced by the typical immigrant. Finally, u_i refers to the cohort-average value of other unobserved factors (talent or immigrant "quality") that affect productivity but are fixed within an arrival cohort.

It is important to highlight the meaning of *assimilation* implied by (1) and (2). In this framework, assimilation occurs if, between two observationally equivalent persons, the one with greater time in the United States typically earns more. This is a different conceptual experiment than the one that was carried out in table 3.3 above, where we asked whether immigrant earnings converged over time to those of comparably aged natives. The age of immigrants and natives was not held fixed for that calculation. Below, we highlight the empirical differences between these alternative definitions of *assimilation*.

It is obvious that, in a single cross section, say 1970, the parameters a_{it}, b_{it}, and u_i are not separately identified. The problem is the familiar one of identifying time (b_{it}), vintage (a_{it}), and cohort (u_i) effects from survey data (Griliches 1971). Thus, estimates of the degree of assimilation based on cross-sectional data must impose identifying assumptions. For example, compare the estimates of ε_{it} from equation (2) for immigrants who arrived in the United States between 1965 and 1969 ($i = 65$) to the corresponding estimate for those who arrived between 1955 and 1959 ($i = 55$). The estimated effect on earnings of ten years' residence in the United States is then

$$(3) \qquad \varepsilon_{55,t} - \varepsilon_{65,t} = a_{55,t} - a_{65,t} + b_{55,t} - b_{65,t} + u_{55} - u_{65}.$$

This is an unbiased estimate of assimilation so long as (i) there are no time effects on relative earnings for the two cohorts ($E[b_{55,t} - b_{65,t}] = 0$) and (ii) there are no differences between the cohorts in average levels of "talent" ($E[u_{55} - u_{65}] = 0$). Otherwise, estimates of (3) may either overstate or understate the amount of assimilation. For example, if the quality of new immigrants declined over the period 1955–69, then $E(u_{55} - u_{65}) > 0$, and (3) will overstate the rate of immigrant assimilation. This point is implicit in the ar-

guments of Borjas (1985). In contrast, if transitory changes in market conditions reduce the wages of less-skilled new immigrants proportionally more than their predecessors' wages, (3) will understate the degree of assimilation.

An alternative to the cross-sectional estimator (3) is to form a quasi panel by following the wage growth of an arrival cohort between the 1970 and the 1980 Censuses. In order to use this strategy, secular wage growth of the cohort must be indexed against that of some base group, n (natives, e.g.). Thus, assume that the base group earnings are determined by

$$y_{nt} = X_{nt}\theta_t + b_{nt} + u_n, \tag{4}$$

where b_{nt} and u_n are interpreted as above. A panel estimate of the magnitude of ten years' assimilation on the earning capacity of cohort i is

$$c_i = (\varepsilon_{i,80} - \varepsilon_{i,70}) - (\varepsilon_{n,80} - \varepsilon_{n,70}) = (a_{i,80} - a_{i,70} + b_{i,80} - b_{i,70}) - (b_{n,80} - b_{n,70}). \tag{5}$$

Notice that cohort effects, u_i, are eliminated from (5) owing to the differencing procedure. Thus, variation in immigrant quality over time will not affect the estimates. Yet assimilation in the sense of accumulating human capital is not identified without additional assumptions. The identifying assumption necessary to make (5) useful is that *relative* wage changes caused by changes in market conditions over the decade are factor neutral:

$$E(b_{i,80} - b_{i,70}) - E(b_{n,80} - b_{n,70}) = 0, \tag{6}$$

which is to say that there are no time effects on the relative wages of immigrants.

Evidence against this assumption was provided in figure 3.1 above, which documented that relative wage changes during the 1970s favored more-skilled workers. Since new immigrants are typically less skilled, this trend toward increased inequality means that inferences drawn from (5) may be sensitive to the choice of a base group, n. For example, if the base group is prime-aged native men, and if the relative wages of new immigrants fall relative to the typical native, then (6) will not be satisfied. In this case, equation (5) will understate the true amount of immigrant assimilation.

We adopt two methods of accounting for relative price changes in implementing (5) across Census years. First, we will present estimates of (5) for various immigrant groups, using different base groups, n, to normalize wage growth. An "optimal" base group is one that, on a priori grounds, would be similarly affected by changes in inequality or relative skill prices. Lacking strong theory or evidence on which group that would be, our strategy is to present alternatives. On the whole, our evidence is that inferences about assimilation are not highly sensitive to the choice of a base group.

Our second method adopts a less parametric approach to isolating the effect of changing relative prices. To focus on the essential idea, assume that $b_{n,80} - b_{n,70} = 0$, and rearrange (5):

$$c_i = (a_{i,80} + b_{i,80}) - (a_{i,70} + b_{i,70}). \tag{7}$$

Both terms in parentheses can be estimated, but their separate components are not identified without further assumptions. Thus, an estimate of (7) will understate the assimilation of cohort i if $b_{i,80} < b_{i,70}$. To estimate assimilation, we require an answer to the question, What would be the value of $a_{i,80} + b_{i,80}$ if no assimilation occurred between 1970 and 1980? If we had an estimator of this value, say $d_{i,80} = a_{i,70} + b_{i,80}$, then (7) could be decomposed as

$$\begin{aligned} c_i &= (a_{i,80} + b_{i,80} - d_{i,80}) + (d_{i,80} - a_{i,70} - b_{i,70}) \\ &= (a_{i,80} - a_{i,70}) + (b_{i,80} - b_{i,70}). \end{aligned} \tag{8}$$

The first term in brackets represents the change in earning capacity due to assimilation of human capital, while the second term represents the change caused by changing relative prices over time. We require an estimator for $d_{i,80}$ to achieve this decomposition.

Our estimator of $d_{i,80}$ builds on previous work on inequality and changes in skill prices by Juhn, Murphy, and Pierce (1989). Consider figure 3.2, which illustrates hypothetical distributions of ε_{nt}—the residual for the base population—in 1970 and 1980. The increase in wage inequality over this period is represented by a mean-preserving spread in the distribution of ε_{nt}. Also displayed in the figure is the mean value of $\varepsilon_{i,70}$ for a hypothetical immigrant group, which we assume is less skilled (on average) than the base population.

The assumption necessary to identify the effect of changing skill prices is that immigrants located at the kth percentile of the distribution of $\varepsilon_{n,70}$ are perfect substitutes for natives located at that percentile. Thus, in the absence of assimilation, they would experience the same change in relative wages as

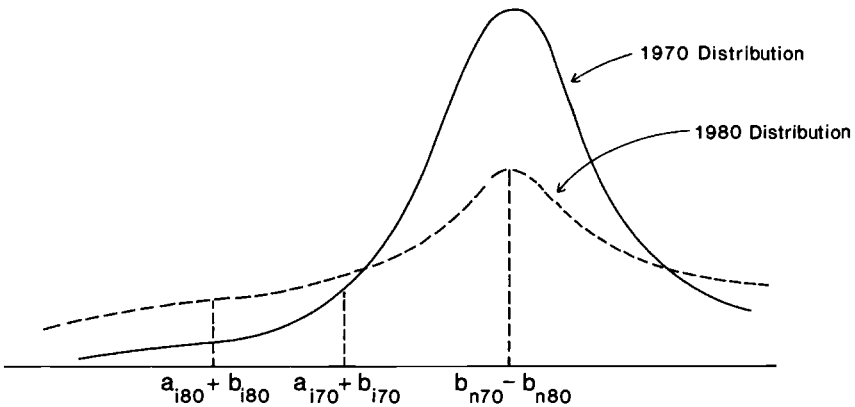

Fig. 3.2 Increased inequality in the unobserved component of wages and the changing skill prices for immigrants

the corresponding native at that percentile. In terms of figure 3.2, this implies that a mean-preserving spread of the 1970 distribution of native residuals ε_{nt} will cause the predicted value of $a_{i,70} + b_{i,80}$ to fall. More formally, if $f_{70}(k)$ is the density of immigrant residuals, $e_{i,70}$, located at the kth percentile of the distribution of $e_{n,70}$, the imputed value for $d_{i,80}$ is

$$d_{i,80} = \sum_{k=1}^{100} f_{70}(k)\varepsilon_{n,80}(k), \tag{9}$$

where $\varepsilon_{n,80}(k)$ is the value of the native residual, $\varepsilon_{n,80}$, at the kth percentile of the 1980 native residual distribution. Equation (9) is the predicted mean value of $a_{i,70} + b_{i,80}$ that would occur in the absence of assimilation. We infer that assimilation has occurred if the actual mean, $a_{i,80} + b_{i,80}$, exceeds the predicted mean, $d_{i,80}$.

The next section implements these procedures using the 1970 and 1980 Public Use Files of the U.S. Census.

3.3 Estimating the Model

Our data for the calculations that follow are drawn from the 1970 and 1980 1/100 Public Use Samples of the U.S. Census. The samples in each year consist of men between the ages of 16 and 64 who worked forty or more weeks during the preceding calendar year. Details concerning the sample selection criteria appear in the appendix. Our measure of wages is average weekly earnings, calculated as reported annual earnings divided by weeks worked. Because weeks worked is reported in intervals in 1970 but continuously in 1980, we calculated within-interval means from the 1980 data and used these values for weeks worked in both years.

To estimate the model, we regressed immigrants' log weekly earnings on years of schooling, separate quartics in experience (age − education − 6) for workers with twelve years or more and less than twelve years of completed schooling, an interaction between schooling and experience, and dummy variables for years since immigration. There are important differences across groups and over time in the returns to both schooling and experience, but these are not our main focus here. Estimates of these parameters appear in the appendix, and we will discuss them where they are relevant to inferences about assimilation. Our concern here is with the assimilation profiles implied by the coefficients associated with the dummy variables (or $\varepsilon_{i,t}$) for various immigrant groups.

Table 3.4 presents estimates of $\varepsilon_{i,t}$ for various immigrant groups in 1970 and 1980. In these calculations, the normalizing base group (n) for within-cohort growth is immigrants from the same source country who have been in the country for more than thirty years.[5] We have two reasons for this choice.

5. For 1970, the comparison group is immigrants who have been in the United States for more than thirty-five years. The intervals used by the Bureau of the Census to record arrival time do not

Table 3.4 **Difference between Weekly Wages of Immigrant Cohort and Earlier Arrivals**

Place of Origin: Census Year	Years in the United States				
	0–5	6–10	11–15	16–20	21–30
Europe:					
1970	−.21	−.11	−.10	−.05	.02
	(.02)	(.02)	(.02)	(.02)	(.02)
1980	−.20	−.18	−.12	−.07	−.05
	(.03)	(.03)	(.02)	(.02)	(.02)
Asia:					
1970	−.32	−.11	−.08	−.13	−.04
	(.06)	(.08)	(.07)	(.08)	(.06)
1980	−.40	−.25	−.14	−.04	0
	(.05)	(.05)	(.06)	(.06)	(.06)
Middle East:					
1970	−.66	−.43	−.29	−.45	−.09
	(.13)	(.14)	(.13)	(.15)	(.15)
1980	−.53	−.27	−.24	−.15	−.14
	(.14)	(.14)	(.14)	(.15)	(.14)
Mexico:					
1970	−.34	−.19	−.08	−.12	−.13
	(.06)	(.06)	(.06)	(.06)	(.06)
1980	−.35	−.24	−.14	−.03	.06
	(.05)	(.05)	(.05)	(.06)	(.05)
Latin America:					
1970	−.41	−.26	−.25	−.16	−.15
	(.06)	(.06)	(.06)	(.07)	(.07)
1980	−.46	−.30	−.22	−.11	−.12
	(.06)	(.06)	(.06)	(.06)	(.06)

Source: Calculations using 1970 and 1980 Census Public Use Files.

Note: The estimates are based on cross-sectional regressions of log weekly earnings on years of schooling, separate quartics in experience for more-educated and lesser-educated persons, an interaction between schooling and experience, and dummy variables for years since immigration. The figures in the table measure the difference between log weekly earnings of each immigrant cohort and immigrants of similar ethnicity who had been in the United States for more than thirty years (thirty-five years for 1970). The numbers in parentheses are the standard errors. For the place of origin, see the note to table 3.1.

The first is the presumed similarity of human capital of immigrants from the same source countries. Thus, we expect equation (5), which requires that relative skill prices of immigrants and the base group remain unchanged, to be the most valid in this case. The second reason is related to assimilation itself. To the extent that assimilation occurs, the "most assimilated" immigrants will be those who have been in the United States the longest. Earnings of new

allow us to distinguish persons arriving twenty-six to thirty years from those arriving thirty-one to thirty-five years before the survey. However, the latter interval corresponds to the years 1935–39, during which relatively few persons emigrated to the United States.

immigrants should be measured relative to that group. Implicit in these arguments is the assumption that, after controlling for schooling, experience, and ethnicity, immigrants who arrived before 1950 (for the 1980 data) and before 1935 (for the 1970 data) have similar abilities, u_n.

The striking feature of the estimates in table 3.4 is the similarity between the cross-sectional assimilation profiles in 1970 and 1980. That similarity in cross-sectional growth implies similar within-cohort growth as well. Consider Mexican immigrants. According to the 1970 data, a typical Mexican immigrant who arrived between 1965 and 1969 earned about 34 percent less than his observably similar countryman who arrived before 1935. The corresponding estimate for 1980 is 35 percent. Further, using the 1970 cross section, we would have predicted that these immigrants would experience relative wage growth of about 26 percent over the next decade ($\varepsilon_{55,70} - \varepsilon_{65,70} = -.08 + .34 = .26$). In fact, this cohort's relative wage growth over the decade was 20 percent ($\varepsilon_{65,80} - \varepsilon_{65,70} = -.14 + .34 = .20$). For Mexicans, this evidence suggests a relatively stable assimilation process that is accurately represented in cross-sectional data and that is largely uncontaminated by changes in immigrant quality over time.

Similar calculations for other immigrant cohorts are summarized in table 3.5, which shows estimates of the effect of ten years' assimilation on the relative earnings of immigrants. The first two columns ("Between-Cohort Growth") report cross-sectional estimates of assimilation for each Census year, using equation (3) above. Thus, the estimates in column 1 are values of $\varepsilon_{i-10,70} - \varepsilon_{i,70}$, while column 2 reports values of $\varepsilon_{i,80} - \varepsilon_{i+10,80}$. Columns 3–5 report quasi-panel estimates of within-cohort assimilation, based on equation (5); using alternative base populations to normalize wage growth. In column 3, the base group (n) is early immigrants from the same source countries. The column 4 base group is U.S. Hispanic natives (e.g., native Hispanics are used as a base population for Mexican and other Hispanic immigrants), and column 5 normalizes by the full native sample, regardless of ethnicity.

For every immigrant category in the table, the cross-sectional estimates imply substantial assimilation. In each category, the largest relative wage gains are for the most recent immigrants. For example, among Asians who arrived in the United States between 1965 and 1969, the 1970 cross section predicts that ten years of assimilation will raise relative earnings by about 23 percent (subject to the log approximation), while the 1980 data indicate a gain of 25 percent. In the 1970 data, these relative wage gains are predicted to die out rapidly with time in the United States, but the 1980 data indicate a more sustained assimilation profile in most cases. Thus, the 1970 data predict zero growth for the 1960–64 Asian cohort, while the 1980 data imply a wage gain of 21 percent in this group.

The most noteworthy aspect of the estimates in table 3.5 is the correspondence between the within-cohort and the cross-sectional estimates of assimilation. In fact, we find that within-cohort assimilation sometimes *exceeds* that

Table 3.5 **Estimated Effects of Ten Years' Assimilation on the Relative Earnings of Immigrants, Cross-Sectional and Synthetic Panel Methods**

	Between-Cohort Growth		Within-Cohort Growth by Base Group		
Immigrant Group: Arrival Cohort	1970 Data	1980 Data	Early Immigrants	Native Hispanics	Natives
Europe:					
1965–69	.11	.08	.08	. . .	.10
	(.02)	(.03)	(.03)		(.02)
1960–64	.06	.11	.04	. . .	.05
	(.02)	(.03)	(.03)		(.02)
1950–59	.09	.04	.02	. . .	.04
	(.02)	(.02)	(.02)		(.02)
Asia:					
1965–69	.23	.25	.24	. . .	.31
	(.05)	(.03)	(.09)		(.04)
1960–64	−.02	.21	.10	. . .	.22
	(.07)	(.04)	(.09)		(.05)
1950–59	.06	.11	.10	. . .	.24
	(.05)	(.04)	(.09)		(.05)
Middle East:					
1965–69	.37	.29	.42	. . .	.30
	(.09)	(.07)	(.20)		(.08)
1960–64	−.02	.12	.28	. . .	.17
	(.11)	(.09)	(.21)		(.10)
1950–59	.27	.06	.20	. . .	.09
	(.12)	(.08)	(.19)		(.08)
Mexico:					
1965–69	.26	.22	.21	.23	.21
	(.05)	(.03)	(.09)	(.05)	(.05)
1960–64	.07	.22	.17	.19	.18
	(.05)	(.04)	(.09)	(.05)	(.05)
1950–59	−.03	.15	.16	.17	.16
	(.05)	(.03)	(.08)	(.04)	(.04)
Latin America:					
1965–69	.16	.24	.19	.10	.14
	(.03)	(.03)	(.09)	(.03)	(.03)
1960–64	.10	.20	.15	.06	.11
	(.05)	(.03)	(.09)	(.03)	(.03)
1950–59	.07	.05	.10	.02	.06
	(.05)	(.03)	(.09)	(.05)	(.04)

Note: Columns 1 and 2 apply eq. (3) to the 1970 and 1980 estimates shown by table 3.4. Columns 3–5 apply eq. (5) across Census years. In the calculations for cols. 4 and 5, experience and education are held constant at the native means for 1980. For the place of origin, see the note to table 3.1. See also the note to table 3.4.

which would be predicted from cross-sectional data. Consider Mexicans who arrived in the United States between 1960 and 1964. The 1970 cross section predicts that their wages would grow by 7 percent relative to Mexicans who arrived between 1950 and 1954. But the actual relative wage growth between 1969 and 1979 for this cohort was about 17 percent. This pattern holds up across most immigrant groups, indicating to us that immigrant assimilation is a significant phenomenon. It is perhaps *more* significant than what would be predicted from cross-sectional data.

The estimates of within-cohort growth in column 3 of table 3.5 are benchmarked against the wage growth of early immigrants because we assume that relative price changes are least important for this group. To check the sensitivity of the results to this assumption, columns 4 and 5 of table 3.5 benchmark wage growth against natives of the same ethnic background (col. 4) and against all natives (col. 5). There is not much change in the results: quasi-panel estimates show substantial assimilation over the decade, for every immigrant group.[6] From the evidence in table 3.5, we conclude that immigrant assimilation—in the sense of rising relative wages with time in the United States—is an important determinant of immigrant earning capacity. Further, we find no significant evidence of a decline in immigrant quality within these immigrant groups. This is not to say that the overall quality of immigrants has not declined, however, since the relative importance of different source countries has shifted over time. We will return to this point in our concluding remarks.

The results in table 3.5 differ from those of Borjas (1985), who for most immigrant groups found substantially less assimilation over time than in the 1980 cross section. Borjas's sample selection criteria and specification differ from ours in three basic ways. First, he specifies that earnings profiles follow a quadratic in experience, whereas we estimate an experience quartic. Second, his sample consists of 18–54-year-olds in 1970 but 28–64-year-olds in 1980. We use 16–64-year-olds in both years.

The third difference between Borjas's analysis and ours is in the definition of the *left-out group* against which earnings differentials are to be measured. In our analysis, the base group in both 1970 and 1980 is immigrants who have been in the country for thirty years or more. In effect, we assume that assimilation can occur for up to thirty years and that the immigrants from the 1980 Census of a particular ethnic background (and level of schooling and experience) who arrived before 1950 are of comparable average "quality" to similar immigrants from the 1970 Census who arrived before 1940. In Borjas's anal-

6. To facilitate comparison, we also adopt Borjas's strategy of estimating wage growth for an individual with fixed characteristics. Thus, let $y_{it} = X_i\beta_t + \varepsilon_{it}$ and $y_{nt} = X_i\theta_t + e_{nt}$, where X_i is the mean level of observables for natives. The reported estimate of growth is then $g_i = y_{i80} - y_{i70} - (y_{n80} - y_{n70})$. This differs from eq. (5) in that it includes the change in relative prices of observables in the calculation: $g_i = e_{i,80} - e_{i,70} + X_i[\beta_{80} - \beta_{70} - (\theta_{80} - \theta_{70})]$. If the relative prices of immigrant skills (β) fall over the decade, then $g_i < c_i$ given by (5).

ysis, the left-out group in 1980 is also immigrants with thirty years or more in the United States, but in 1970 the left-out group is immigrants with only twenty years of U.S. experience. Thus, ignoring other regressors, Borjas would estimate the assimilation of persons arriving between 1965 and 1969 ($i = 65$) as

$$(\varepsilon_{65,80} - \varepsilon_{50,80}) - (\varepsilon_{65,70} - \varepsilon_{50,70}),$$

whereas our estimate would be

$$(\varepsilon_{65,80} - \varepsilon_{50,80}) - (\varepsilon_{65,70} - \varepsilon_{40,70}).$$

From the same data, our estimate will be larger so long as

$$\varepsilon_{40,70} - \varepsilon_{50,70} > 0, \tag{10}$$

or so long as relative earnings growth continues between twenty and thirty years in the United States. In effect, Borjas's specification restricts (10) to equal zero, which amounts to assuming no assimilation for this group.

The upshot is that Borjas uses a fixed cohort—persons who arrived before 1950—to normalize earnings in both Census years. Since that cohort has approximately fixed quality,[7] the key implicit assumption is that persons arriving before 1950 experienced no more earnings growth. In contrast, we allow for such growth, but we must assume that the cohorts arriving before 1940 and before 1950 are of similar qualities.

Table 3.6 shows how the foregoing differences between Borjas's study and ours affect the conclusions one draws from Census data. The estimates in the table are for Mexican immigrants. The top panel imposes all Borjas's selection criteria and restrictions, and we come close to reproducing his results. For example, within-cohort estimates of assimilation are only about half the between-cohort estimates implied by the 1980 cross section. Borjas would attribute this difference to declining immigrant quality over time. The second panel drops the restriction that there is no assimilation beyond twenty years. Relaxing this restriction on the 1970 model causes the within-cohort estimates of assimilation to increase substantially. For example, in the restricted estimates in the top panel, immigrants arriving between 1965 and 1969 experience a .16 increase in relative log wages during the 1970s. They experienced a .26 increase according to the estimates in the second panel, which is nearly equal to the estimates from the cross-sectional data. In the unrestricted estimates, there is simply no evidence of declining quality.

The last two panels of table 3.6 show that the other variations in sample selection and specification have little effect on these conclusions. The last

7. This statement ignores participation decisions. Yet it turns out that declines in labor force participation between 1970 and 1980 were concentrated on less-skilled workers, whose relative wages fell. To the extent that less-skilled persons leave the labor force, the cohort of persons who arrived before 1950 and who continue to work will have rising average "quality." This will also serve to underestimate the amount of assimilation using the methods described here.

Table 3.6 **Comparison to Borjas's (1985) Estimates of Mexican Immigrant Assimilation**

	Year of Arrival	Between-Cohort Growth, 1980	Within-Cohort Growth, 1970–80
Borjas sample, experience quadratic: Omitted group is > 30 years in 1980, > 20 years in 1970	1965–69	.293	.158
	1960–64	.248	.060
	1950–59	.128	.124
	Average	.223	.114
Borjas sample, experience quadratic: Omitted group is > 30 years in 1980, > 30 years in 1970	1965–69	.293	.256
	1960–64	.248	.156
	1950–59	.128	.217
	Average	.223	.209
Borjas sample, experience quartic: Omitted group is > 30 years in 1980, > 30 years in 1970	1965–69	.296	.319
	1960–64	.250	.224
	1950–59	.125	.265
	Average	.223	.269
Full sample, experience quartic: Omitted group is > 30 years in 1980, > 30 years in 1970	1965–69	.217	.206
	1960–64	.215	.168
	1950–59	.146	.156
	Average	.193	.177

Note: Borjas sample refers to individuals between the ages of 18 and 54 in 1970 and 28 and 64 in 1980. *Omitted group* refers to the immigrant cohort against which the other immigrants' wages are gauged in estimating the 1970 and 1980 cross-sectional regressions. Other selection criteria are the same as in our earlier analysis.

panel corresponds to our unrestricted sample and specification, and it shows that the cross-sectional and panel estimates of assimilation are very similar.

The results in table 3.5 above also stand in contrast to the erratic patterns of within-cohort wage growth documented in table 3.3 above. Those calculations suggested that cross-sectional estimates of assimilation are partly an illusion, perhaps accounted for by changing characteristics of immigrants over time. The difference in interpretation can be reconciled, in part, by taking note of two facts. First, immigrants are less skilled than natives. They enter the U.S. labor market with fewer years of schooling and thus have, for a given age, more years of experience than the typical native. Given the concavity of earnings profiles, that fact implies slower wage growth for immigrants. Second, life-cycle earnings profiles are also flatter for less-skilled workers. Thus, even for immigrants and natives with the same number of years of experience, the typical immigrant will have slower earnings growth. Since table 3.3 allows both immigrants and natives to "age" from 1970 to 1980, both these effects imply smaller relative wage growth for immigrants than for the typical native. Thus, calculations like those in table 3.3 will understate the actual rate of immigrant assimilation.

Those points are illustrated by figure 3.3, which depicts the experience–log

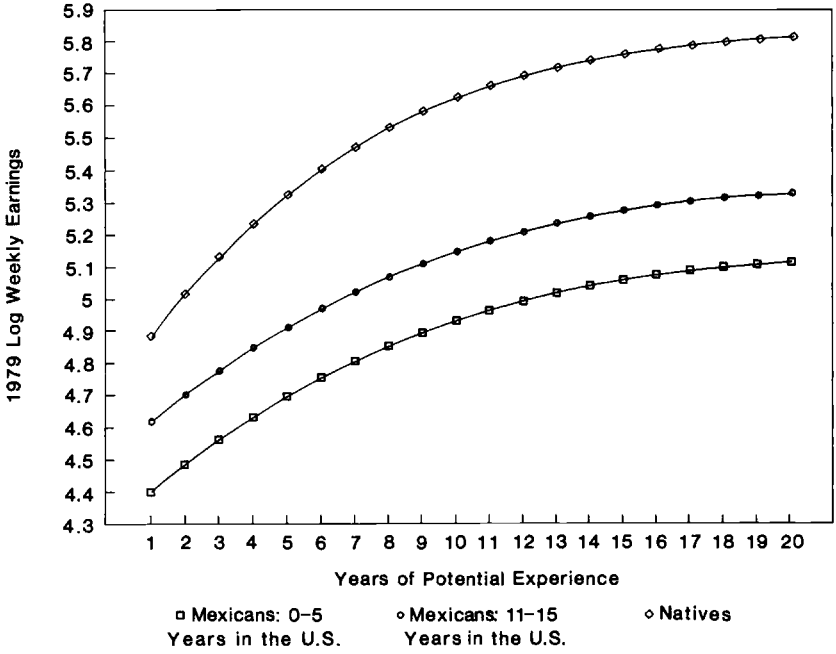

Fig. 3.3 Natives' and Mexican immigrants' earnings

earnings profiles for three groups: natives with 12.3 years of schooling, Mexicans with 6.5 years of schooling and zero to five years in the United States, and Mexicans with 6.5 years of schooling and eleven to fifteen years in the United States.[8] As depicted in the figure, a recent Mexican immigrant just entering the labor market earns 50 percent less (subject to the log approximation) than a typical native worker. As that immigrant ages, he moves up the experience-earnings profile because of human capital gains associated with labor market experience, and he also jumps up to a 20 percent higher profile because of the gains associated with time spent in the United States. Despite that jump, the Mexican immigrant's earnings remain approximately 50 percent behind the same group of natives because of the steepness of the native profile.

From this evidence, we conclude that immigrant and native wages do not necessarily converge over time. Lack of convergence is partly caused by differences in shapes of earnings profiles—immigrant profiles are flatter because immigrants are less skilled to start with. But this finding does not imply lack of assimilation. As we documented above, time in the United States has a

8. The years of schooling chosen for the natives and the Mexicans correspond to the mean years of schooling for 1970 25–34-year-olds in table 3.2 above.

strong positive effect on earning capacity, holding constant experience and education. The finding does imply that immigrants do not catch up with white natives, so the U.S. labor market is not a "melting pot" in which there are no ethnic wage differences in the long run. But that was known; for example, native Hispanics typically earn less than native whites for reasons unrelated to assimilation.[9]

3.4 Rising Inequality and Changes in Immigrant Wages

All the preceding results are based on the assumption that changes in the price of immigrants' unobservable skills, relative to a normalizing population, are negligible. In this case, within-cohort growth in relative wages identifies the accumulation of unobserved human capital. This assumption is open to question in light of the trend toward greater wage inequality in the United States, which has reduced the relative earning capacity of less-skilled groups. If market conditions caused the relative value of immigrants' skills to decline between 1970 and 1980, then panel estimates of wage growth will understate the true amount of immigrant assimilation. Our purpose in this section is to assess the importance of this effect.

Our main finding is that, although changes in inequality during the 1970s are unimportant for most immigrant groups, they did affect the relative wages of low-skilled immigrants, in some cases by a substantial amount. Table 3.7 illustrates this point. In the table, we apply the methods described in equations (8) and (9) and report adjusted estimates of relative wage growth for six immigrant cohorts that entered the United States between 1950 and 1969. Those estimates measure the change in relative earnings of immigrants that would have occurred in the 1970s in the absence of assimilation, based on the position of immigrants in the 1970 wage distribution. For purposes of these calculations, we applied (8) and (9) to weekly wages; we did not remove the effects of the observables, X. Also, to enhance the sample size for these calculations, we focused on only two immigrant aggregates: (i) the immigrant population with less than ten years of schooling and (ii) Mexican immigrants. The base group (n) for these comparisons is natives of the same age.

To illustrate the calculations, consider the Mexican cohort that arrived in 1965–69. In 1970, these individuals earned 71 percent (using the log approximation) less than a representative native of the same age (col. 1). If no assimilation had occurred, we estimate that persons in this cohort would have earned 79 percent less than a representative native in 1980 (col. 2). They actually earned 57 percent less, so our corrected estimate of growth in earning capacity is 23 percent (col. 5). Therefore, panel estimates of relative wage growth understate assimilation of this cohort by about 8 percent, owing to aggregate changes in relative wages that occurred over the decade.

9. Butcher (1990, tables II, IV, VII) reports similar results for black immigrants based on the 1980 Census.

Table 3.7 **Immigrant Wage Growth Relative to Natives with Adjustment for Changing Inequality, 1970–80**

Immigrant Group: Year of Arrival	(1) Relative Wage in 1970	(2) Predicted Relative Wage in 1980	(3) Relative Wage in 1980	(4) Relative Wage Growth (3) − (1)	(5) Corrected Growth (3) − (2)	(6) Effect of Changing Inequality (2) − (1)
Immigrants with < 10 years of schooling:						
1965–69	−.45	−.50	−.47	−.02	.03	−.05
1960–64	−.28	−.31	−.34	−.06	−.03	−.02
1950–59	−.10	−.10	−.23	−.13	−.13	.0
Mexican immigrants:						
1965–69	−.71	−.79	−.57	.14	.23	−.08
1960–64	−.44	−.49	−.41	.03	.08	−.05
1950–59	−.30	−.33	−.29	.01	.04	−.03

Note: Relative wage measures the difference between the log weekly earnings of immigrants aged 25–44 in 1970 and comparably aged natives. The predicted relative wages are computed as a weighted average of 1980 native wages, where the weights represent the immigrant cohort's density at each *k*th percentile of the native 1970 wage distribution.

Note the obvious point that the size of the inequality effect, shown in column 6 of table 3.7, depends on the size of the original wage differential in 1970. In fact, for the sample of immigrants with less than ten years of schooling, there are no adjustments to wage growth for arrivals between 1950 and 1959 (1965–69). Given the magnitudes of the adjustments for the other cohorts, our findings suggest that biases in assessing the role of assimilation that result from increasing wage inequality apply mainly to recent arrivals and others who earn substantially less than the typical native. The upshot is that inferences about assimilation from within-cohort wage growth may be sensitive to changes in relative wages caused by aggregate labor market conditions, especially among unskilled recent arrivals for whom assimilation is likely to be most rapid.

3.5 Conclusion

In this paper, we reexamined the evidence on immigrant assimilation to the U.S. labor market. For the immigrant groups that we studied, our evidence suggests substantial assimilation in the sense of sharply rising earning capacity after entering the United States, holding constant other observable factors that affect wages. Following fixed cohorts over time, our estimates of assimilation profiles roughly conform to estimates that can be derived from individual cross sections of Census data. In fact, the growth rates that we derive from synthetic panels across Census years sometimes exceed the rates implied by simple wage comparisons in a single cross section. Because of this, we conclude that there is no important evidence of declining immigrant "quality" within the groups that we have studied.

This is not to say that the *overall* quality of immigrants has not declined. As we showed in table 3.1 above, the distribution of immigrants by source countries has shifted over time, so the human capital of the average immigrant may have fallen because, say, Mexican immigrants bring a smaller stock of human capital than their European counterparts. In fact, the estimates of wage differentials between immigrants and natives in table 3.3 above strongly suggest this. To address this issue more directly, table 3.8 reproduces our calculations of between- and within-cohort wage growth on the sample of all immigrants, regardless of ethnic background. We perform the calculations both with and without experience and education controls, which turns out to make a difference.

Several points about these estimates are noteworthy. First, cross-sectional estimates of assimilation are relatively large when observable characteristics are excluded from the analysis. In the 1980 data, we estimate that ten years of U.S. experience for a new arrival would raise earnings by 31 percent. Because that value is substantially larger than the corresponding estimate of within-cohort wage growth (9 percent), cohort quality declined over time. Second, two-thirds of the difference between cross-sectional and within-cohort estimates of assimilation is accounted for by observables. After controlling for experience and education, estimates of within-cohort growth are only moderately smaller than the corresponding cross-sectional estimates. Thus, the unobservable skills of immigrants declined only modestly over time. Third, our findings on assimilation rates for each ethnic group indicate that changes in unobservables are accounted for by immigrants' ethnicity. Thus, we find no evidence that immigrants' unobserved skills have declined within ethnic groups. Immigrant skills declined because new immigrants are more likely to arrive from countries whose immigrants have always been relatively unskilled.

Finally, given important changes in relative wages of skilled and unskilled workers that occurred in the 1970s, panel estimates of assimilation will understate immigrant assimilation among less-skilled groups such as Mexicans. For relatively unskilled new arrivals to the United States, we estimate that these changes in skill prices may have reduced the wages of new immigrants relative to natives by as much as 8 percent. Thus, panel estimates of assimilation may be sensitive to "time effects" caused by economy-wide conditions.

Appendix

This study used the 1970 and 1980 Public Use Microdata Samples from the Censuses of Population and Housing (see U.S. Bureau of the Census 1970, 1980; for the technical documentation, see U.S. Bureau of the Census 1973, 1983). The estimates reported in the paper were derived from samples of 16–

Table 3.8 **Estimates of Immigrant Assimilation: Cross-sectional and Synthetic Panel Estimates from Pooled Sample of 1970 and 1980 Immigrants**

A. Effects of Years in the United States on Relative Wages

	Years in the United States				
Census Year	0–5	6–10	11–15	16–20	21–30
Without controls:					
1970	−.36	−.18	−.09	−.06	.07
	(.01)	(.02)	(.02)	(.02)	(.02)
1980	−.58	−.42	−.27	−.16	−.06
	(.02)	(.02)	(.02)	(.02)	(.02)
With controls for schooling and experience:					
1970	−.33	−.19	−.11	−.06	−.01
	(.01)	(.02)	(.02)	(.02)	(.01)
1980	−.39	−.29	−.19	−.10	−.03
	(.02)	(.02)	(.02)	(.02)	(.02)
With controls for schooling, experience, and place of origin:					
1970	−.27	−.12	−.10	−.07	−.01
	(.02)	(.02)	(.02)	(.02)	(.02)
1980	−.32	−.21	−.12	−.05	−.03
	(.02)	(.02)	(.02)	(.02)	(.02)

B. Estimated Effects of Ten Years' Residence in the United States from Cross-sectional and Within-Cohort Growth

	Between-Cohort Growth		
Year of Arrival	1970	1980	Within-Cohort Growth, 1970–80.
Without controls:			
1965–69	.24	.31	.09
1960–64	.13	.26	.02
1950–59	.15	.16	.01
With controls for schooling and experience:			
1965–69	.22	.21	.14
1960–64	.13	.19	.09
1950–59	.08	.12	.05
With controls for schooling, experience, and place of origin:			
1965–69	.17	.20	.14
1960–64	.06	.16	.07
1950–59	.08	.06	.05

Note: The figures in panel A are the estimated coefficients from a regression of log weekly earnings of immigrants on dummy variables for the time in the United States. The left out group is immigrants who have been in the United States for more than thirty years (thirty-five years in 1970). The controls in the second model are for years of schooling, separate quartics in experience for those with less than twelve and twelve or more years of schooling, and schooling and experience interacted. The figures in panel B are derived from those in panel A. Numbers in parentheses are standard errors.

64-year-old males who had worked forty or more weeks in 1979 (or 1969) as wage or salary employees or self-employed workers. Unpaid family members, persons with negative self-employment income, persons living in institutional or military quarters, and persons not in the 1980 (or 1970) civilian labor force were excluded from the sample.

Table 3.4 in the text presented the estimated coefficients for time in the United States corresponding to equations (1) and (2). The complete set of estimates corresponding to (1) and (2) is presented in table 3A.1. Besides controls for time in the United States, weekly earnings (annual earnings divided by weeks worked) for immigrants from a given source country were a function of years of completed schooling, a dummy variable indicating whether the workers had less than twelve or twelve or more years of schooling, and separate quartics in experience for each of those two educational groups. In those regressions, experience is measured as age minus schooling minus six. We chose the quartic specification for two reasons. First, the literature indicates that a standard quadratic earnings equation tends to overstate earnings of less-experienced workers (see Murphy and Welch 1990). Second, our data rejected the quadratic specification in favor of the quartic specification.

Table 3A.1 **Estimate of Earnings Equation (for table 3.4)**

Variable	Europeans	Asians	Mideasterners	Mexicans	Other Hispanics
	1970				
65–69	−.21	−.31	−.66	−.34	−.41
	(.02)	(.06)	(.13)	(.06)	(.06)
60–64	−.11	−.11	−.43	−.19	−.26
	(.02)	(.07)	(.14)	(.06)	(.06)
55–59	−.10	−.08	−.29	−.08	−.25
	(.02)	(.07)	(.13)	(.06)	(.06)
50–54	−.05	−.13	−.45	−.12	−.16
	(.02)	(.08)	(.14)	(.06)	(.07)
35–49	.02	−.04	−.09	−.13	−.16
	(.02)	(.06)	(.15)	(.06)	(.07)
grade	.064	.060	.026	.084	.10
	(.01)	(.03)	(.06)	(.02)	(.02)
HS × grade	.038	.060	.12	−.024	−.006
	(.01)	(.03)	(.07)	(.04)	(.02)
exp	.23	.22	.18	.18	.29
	(.02)	(.05)	(.1)	(.03)	(.03)
HS × exp	−.066	−.042	.020	.11	−.13
	(.02)	(.05)	(.1)	(.05)	(.04)
exp^2	−.010	−.009	−.007	−.007	−.015
	(.001)	(.003)	(.006)	(.002)	(.002)
HS × exp^2	.002	0	0	−.013	.007
	(.001)	(.004)	(.008)	(.004)	(.003)

Table 3A.1 (continued)

Variable	Europeans	Asians	Mideasterners	Mexicans	Other Hispanics
exp^3	.00019	.00018	.00010	.00013	.00033
	(.00002)	(.00007)	(.0002)	(.00004)	(.00006)
HS × exp^3	−.00002	.00004	.00003	.00044	−.00015
	(.00004)	(.0001)	(.0002)	(.00014)	(.00009)
exp^4	−.0000013	−.0000013	-5.6×10^{-7}	-8.7×10^{-7}	-2.6×10^{-6}
	(2.0×10^{-7})	(6.0×10^{-7})	(.000001)	(4.0×10^{-7})	(5.0×10^{-7})
HS × exp^4	-7.4×10^{-8}	-5.8×10^{-7}	-4.9×10^{-7}	-4.6×10^{-6}	1.2×10^{-6}
	(4.0×10^{-7})	(.000001)	(.000002)	(2.0×10^{-6})	(9.9×10^{-7})
grade × exp	−.0010	−.0011	−.0005	−.0014	−.0028
	(.0003)	(.0008)	(.002)	(.0005)	(.0007)
HS × grade × exp	.0001	.0013	−.0024	.0013	.0017
	(.0004)	(.001)	(.002)	(.002)	(.0009)
HS graduate	.01	−.29	−1.45	.01	.58
	(.17)	(.46)	(.92)	(.49)	(.34)
Intercept	2.95	2.64	3.82	2.85	2.49
	(.14)	(.39)	(.79)	(.22)	(.28)
Mean standard error	.34	.36	.45	.37	.32
Adjusted R^2	.19	.32	.26	.18	.19
N	13,923	1,752	540	2,060	2,800
			1980		
65–69	−.20	−.40	−.53	−.35	−.46
	(.03)	(.06)	(.13)	(.06)	(.06)
60–64	−.18	−.25	−.27	−.24	−.30
	(.03)	(.05)	(.1)	(.05)	(.06)
55–59	−.12	−.14	−.24	−.14	−.22
	(.02)	(.06)	(.1)	(.05)	(.06)
50–54	−.07	−.039	−.15	−.026	−.11
	(.02)	(.06)	(.1)	(.06)	(.06)
35–49	−.05	0	−.15	.058	−.12
	(.02)	(.06)	(.1)	(.05)	(.06)
grade	.079	.034	.276	.046	.064
	(.01)	(.03)	(.06)	(.01)	(.02)
HS × grade	.009	.082	−.182	.026	.04
	(.02)	(.03)	(.07)	(.02)	(.02)
exp	.22	.15	.38	.095	.19
	(.02)	(.04)	(.08)	(.02)	(.03)
HS × exp	−.068	.039	−.332	.053	−.072
	(.02)	(.04)	(.09)	(.04)	(.03)
exp^2	−.010	−.0062	−.018	−.003	−.009
	(.001)	(.002)	(.006)	(.001)	(.002)
HS × exp^2	.0024	−.0051	−.021	−.004	.005
	(.002)	(.003)	(.007)	(.003)	(.002)
exp^3	.00020	.00010	.00042	.00007	.00020
	(.00003)	(.00006)	(.0002)	(.00004)	(.00004)
HS × exp^3	−.000026	.00021	−.00064	.00017	−.00013
	(.00005)	(.00008)	(.0002)	(.0001)	(.00007)
exp^4	-1.6×10^{-6}	-6.0×10^{-7}	-3.6×10^{-6}	$-.4.0 \times 10^{-7}$	-1.5×10^{-6}
	(3.0×10^{-7})	(6.0×10^{-7})	(2.0×10^{-6})	(3.0×10^{-7})	(4.0×10^{-7})

(*continued*)

Table 3A.1 (continued)

Variable	Europeans	Asians	Mideasterners	Mexicans	Other Hispanics
HS × exp^4	-7.9×10^{-8}	-2.5×10^{-6}	6.8×10^{-6}	-2.0×10^{-6}	1.1×10^{-6}
	(5.0×10^{-7})	(9.0×10^{-7})	(2.0×10^{-6})	(1.0×10^{-6})	(8.0×10^{-7})
grade × exp	−.0012	−.0007	−.0065	0	−.0011
	(.0004)	(.0008)	(.0021)	(.0004)	(.0006)
HS × grade × exp	.0007	−.0005	.0061	−.0015	0
	(.0005)	(.0009)	(.0023)	(.0011)	(.0007)
HS graduate	.27	−.84	2.7	−.37	−.16
	(.21)	(.35)	(.84)	(.29)	(.27)
Intercept	3.49	4.16	1.31	4.36	3.84
	(.18)	(.33)	(.80)	(.16)	(.23)
Mean standard error	.41	.41	.60	.53	.46
Adjusted R^2	.21	.29	.25	.12	.21
N	11,102	4,342	1,145	5,404	5,069

Note: Standard errors are given in parentheses.

References

Borjas, George. 1985. Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants. *Journal of Labor Economics* 4(October):463–89.

———. 1990. The Intergenerational Mobility of Immigrants. Working paper. University of California, San Diego, February.

Butcher, Kristin. 1990. Black Immigrants to the United States: A Comparison with Native Blacks and Other Immigrants. Industrial Relations Section Working Paper no. 268. Princeton University, August.

Chiswick, Barry. 1978. The Effect of Americanization on the Earnings of Foreign-born Men. *Journal of Political Economy* 86(October):897–921.

Griliches, Zvi. 1971. Introduction: Hedonic Price Indexes Revisited. In *Price Indexes and Quality Change*, ed. Zvi Griliches. Cambridge, Mass.: Harvard University Press.

Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce. 1989. Wage Inequality and the Rise in Returns to Skill. University of Chicago, December. Typescript.

Murphy, Kevin M., and Finis Welch. 1990. Empirical Age-Earnings Profiles. *Journal of Labor Economics* 8(April):202–29.

Sowell, Thomas. 1983. *Ethnic America*. New York: Basic.

U.S. Bureau of the Census. 1970. Census of Population and Housing: United States Public Use Microdata Sample. County Group Sample, 1% Sample. Washington, D.C.

———. 1973. *Technical Documentation for the 1970 Census of Population and Housing*. Public Use Samples. Washington, D.C.: U.S. Government Printing Office.

———. 1980. Census of Population and Housing: United States Public Use Microdata Sample (B Sample), 1% Sample (1 CPSR 8170). Washington, D.C.

———. 1983. *Technical Documentation for the 1980 Census of Population and Housing*. Public Use Samples. Washington, D.C.: U.S. Government Printing Office.