THE EFFECT OF CHANGES IN THE U.S. WAGE STRUCTURE ON RECENT IMMIGRANTS' EARNINGS

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Abstract—Since recent immigrants tend to earn less than natives, their relative earnings have been adversely affected by an increase in the return to labor market skills over the past three decades. Using longitudinal Social Security records matched to cross-sections of the SIPP and CPS, I estimate the return to skills rose by 41% between 1980 and 1997. This reduced the relative earnings of immigrants who arrived in the 1980s and early 1990s by 10 to 15 percentage points. Examining solely the earnings of recent immigrants may lead to an overly pessimistic picture of their actual labor market skills.

I. Introduction

NEARLY 17 million foreigners have been granted permanent residency status in the United States since 1990. The widely held support for persistently high levels of immigration rests in large part on the perception that past immigrant generations successfully assimilated into the U.S. labor market and culture. Analyses of both cross–sectional data from the decennial U.S. Census and recently available longitudinal data from Social Security earnings histories indicate that the earnings and educational disadvantages of new immigrants relative to native-born workers have steadily increased during nearly all of the post–World War II period, and some evidence suggests that recent waves of immigrants experience slower rates of wage growth than earlier waves did. These trends have led to recent policy initiatives to encourage more high–skilled immigration and restrict means-tested welfare benefits that are otherwise available to the American-born poor and their children.

The source and implications of the decline in immigrant earnings among new arrivals are still open to debate. A significant part of the decline was caused by a shift in the national origin composition of immigrant groups, as immigration from Europe declined and immigration from poorer countries in Latin America and Asia increased substantially. Compared to their earlier-arriving counterparts, recent waves of immigrants generally have more limited English proficiency and lower educational attainment and went to schools of worse quality. Because of differences in labor market institutions and the level of economic development, they likely found it more difficult to transfer their home-country labor market skills to the United States.[1]

Some of the decline in immigrant earnings, however, reflects changes in the rewards to skill rather than changes in the skill level of immigrants themselves. During the past thirty years, the United States has experienced a historic rise in earnings inequality. Researchers have proposed various causal factors underlying this change in the wage structure, such as technological changes that benefited skilled workers, increased trade with developing countries that reduced firms' demand for lower-skilled workers, and institutional changes in the labor market, such as declines in unionization and in the inflation-adjusted minimum wage.[2] Many of these factors imply that the return paid to labor market skills increased in the 1980s and 1990s. Since immigrants, particularly recent arrivals, have on average fewer labor market skills than native-born workers, increases in the return to skills will increase the earnings gap between immigrants and natives, just as they increase the earnings gap between high- and low–educated workers more generally. This paper argues that to meaningfully evaluate the relative earnings and skill levels of immigrants, it is crucial to take into account the effect of aggregate labor market changes.

I use new longitudinal earnings data from Social Security earnings records to estimate the change in the return to overall labor market skills between 1980 and 1997 and then use this estimate to ask what the earnings of immigrants who arrived in the United States between 1980 and 1994 would have been had the price of skill remained at its 1980 level. The change in the return to skills is identified by decomposing the variance in earnings within groups of native-born workers with similar educational attainment and labor market experience into a component based on skill and one based on luck or other nonproductivity influences. Under the assumption that the within-group variance in skills is constant over time, the return to skills is estimated from changes in the proportion of the total earnings variance attributable to the skill component. The results indicate that the return to skills rose by about 41%

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[1] For a selection of references on immigrant earnings in the United States, see Borjas (1985, 1995), Chiswick (1978), LaLonde and Topel (1992), Schoeni, McCarthy, and Vernez (1996), and Schoeni (1997). Studies that use longitudinal data from Social Security earnings records are Duleep and Dowhan (2002), Hu (2000), and Lubotsky (2007). Surveys are given in Borjas (1999) and LaLonde and Topel (1997).

[2] Among the many studies of changes in the wage structure are Bound and Johnson (1992), Katz and Murphy (1992), DiNardo, Fortin, and Lemieux (1996), Katz and Autor (1999), Card and DiNardo (2002), and Autor, Katz, and Kearney (2005).

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during this time period. Analyses of counterfactual measures of immigrant and native earnings under the assumption that the return to skills remained at its 1980 level indicate that by the late 1990s, the earnings of immigrants who arrived between 1980 and 1984, 1985 and 1989, and 1990 and 1994 would have been higher by 6.4, 11.8, and 17.4 percentage points, respectively. These differences are large and account for about 28% of the immigrant-native earnings difference within each cohort. Clearly changes in the U.S. wage structure had a sizable negative impact on the earnings of recent immigrants, leading these groups to appear to be less skilled than they actually were.

LaLonde and Topel (1992) examined immigrant earnings in the 1970s and were the first to decompose changes in the immigrant-native earnings gap into changes in skills and changes in the wage structure. Their method assumes that in the absence of skill assimilation, immigrant groups would experience the same change in earnings over the 1970s as did native-born workers who began the decade at the same point in the earnings distribution. The difference between the immigrant group's actual wage change and the counterfactual wage change is due to skill accumulation. Among their findings is that immigrants who arrived in the United States between 1965 and 1969 with less than ten years of schooling experienced a 2 percentage point decline in their wages relative to natives over the course of the 1970s, but that if not for changes in the wage structure, their earnings would have been five percentage points higher in 1980 than they actually were.

This study builds on LaLonde and Topel's work in two important ways. First, it examines immigrants who arrived between 1980 and 1997, when the largest changes in the wage structure occurred. Second, because this work is based on longitudinal earnings data from Social Security earning records, many problems encountered in past work can be overcome. Nearly all previous studies of U.S. immigrants follow synthetic arrival cohorts across decennial censuses. However, as many as one-third of immigrants to the United States eventually return to their home country; thus, immigrant earnings growth and the extent to which it is affected by changes in the wage structure will be confounded with changes caused by selective out-migration. Lubotsky (2007) finds that lower-earning immigrants are more likely to leave the United States, and as a consequence, a comparison of an entry cohort's earnings across censuses severely overstates the actual earnings growth experienced by immigrants who remained in the country. For example, the selective out-migration among low-educated immigrants in the 1970s means that the 2% earnings decline that LaLonde and Topel found and noted above is an overestimate of the earnings growth among low-educated immigrants who remained in the country. The 5% effect of changes in the wage structure applies to the larger group of migrants who were in the United States in 1970; the effect is smaller for the higher-earning subset of migrants who remained in the United States until 1980. The end result is that selective out-migration by low-earning immigrants leads to an overestimate of both the effect of wage growth among immigrants and the effect of changes in the wage structure. I avoid these confounding influences by using longitudinal earnings data.

Section II of the paper describes the matched Social Security earnings data, highlights some of their strengths and weaknesses, and provides an initial picture of the evolution of the immigrant-native earnings gap during the 1980s and 1990s. Section III presents a model of wage determination with a time-varying return to skills. This model formally shows how changes in the immigrant-native earnings gap confound immigrant assimilation—the process by which immigrants accumulate labor market skills over time relative to natives—and changes in the return to labor market skills. Section IV develops the research design to estimate the return to skills. Section V uses the estimates of the return to skills to calculate what the immigrant-native earnings gaps would have been if the return to skills had remained at its 1980 level. Section VI concludes.

II. Benefits to and Costs of Using Longitudinal Social Security Earnings Data

The composition of an immigrant arrival cohort changes over time as some immigrants return to their home country. If below-average-earning immigrants are more likely to leave, then estimates of immigrants' earnings trajectories from repeated cross-sectional data will confound the earnings growth among immigrants who remain in the country with the rise in earnings brought about by the departure of lower-earning immigrants. Hu (2000), Lubotsky (2007), and Edin, LaLonde, and Åslund (2001) provide evidence that this is in fact the case in the United States and Sweden. A second problem with repeated cross-sectional data is that coverage of illegal immigrants varies across decennial censuses and other cross-sectional surveys. Longitudinal data are necessary, therefore, to accurately estimate the earnings trajectory of immigrants who remain in the country and how changes in the wage structure influence earnings.

The longitudinal data used in this analysis are from the 1990 and 1991 Survey of Income and Program Participation (SIPP) linked by individuals' Social Security number to annual Social Security earnings records from 1951 to 1993, and the March Supplement to the 1994 Current Population Survey (CPS) linked to earnings records from 1951 to 1997. The earnings records are from reports made by employers to the Social Security Administration for the purpose of assessing Social Security taxes on employees. The Social Security records contain information on an individual's earnings and the number of quarters of covered employment in each year. Educational attainment, the date and place of birth, reported date of arrival in the United States, and other demographic information is available from the CPS or SIPP cross-sectional surveys. Individuals born outside the United States are classified as immigrants. People born abroad to American parents, born in Puerto Rico or other outlying areas of the United

TABLE 1.—CHARACTERISTICS OF PUBLIC USE SAMPLES BY DATA SOURCE AND PERIOD OF ARRIVAL

	1990 SIPP			1991 SIPP			1994 CPS				Pooled Sample			
	1980–1984 Arrivals	1985–1990 Arrivals	Native Born	1980–1984 Arrivals	1985–1991 Arrivals	Native Born	1980–1985 Arrivals	1986–1991 Arrivals	1992–1994 Arrivals	Native Born	1980–1985 Arrivals[a]	1986–1991 Arrivals[a]	1992–1994 Arrivals	Native Born
Fraction of sample	0.025	0.024	0.951	0.025	0.029	0.946	0.030	0.027	0.010	0.933	0.027	0.027	0.003	0.944
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)
Birth year	1955.9	1957.8	1952.1	1957.0	1957.6	1952.1	1956.9	1958.8	1957.4	1952.3	1956.6	1958.1	1957.4	1952.2
	(0.6)	(0.6)	(0.1)	(0.6)	(0.6)	(0.1)	(0.3)	(0.3)	(0.7)	(0.1)	(0.3)	(0.3)	(0.7)	(0.1)
White	0.571	0.643	0.877	0.580	0.556	0.880	0.615	0.630	0.597	0.872	0.590	0.607	0.597	0.876
	(0.031)	(0.029)	(0.003)	(0.035)	(0.033)	(0.004)	(0.018)	(0.018)	(0.031)	(0.003)	(0.016)	(0.016)	(0.031)	(0.002)
Never married	0.317	0.396	0.253	0.339	0.357	0.224	0.248	0.306	0.320	0.200	0.298	0.351	0.320	0.226
	(0.030)	(0.031)	(0.004)	(0.035)	(0.032)	(0.005)	(0.016)	(0.017)	(0.031)	(0.003)	(0.016)	(0.016)	(0.031)	(0.002)
Born in Mexico	0.211	0.286	0.000	0.255	0.224	0.000	0.319	0.269	0.209	0.000	0.265	0.258	0.209	0.000
	(0.024)	(0.025)	—	(0.031)	(0.028)	—	(0.016)	(0.016)	(0.028)	—	(0.014)	(0.014)	(0.028)	—
Less than high school diploma	0.323	0.360	0.145	0.256	0.298	0.139	0.387	0.342	0.306	0.127	0.326	0.331	0.296	0.137
	(0.030)	(0.027)	(0.004)	(0.030)	(0.030)	(0.004)	(0.018)	(0.017)	(0.031)	(0.002)	(0.015)	(0.015)	(0.031)	(0.002)
High school diploma only	0.222	0.199	0.350	0.290	0.244	0.345	0.223	0.218	0.173	0.344	0.243	0.222	0.173	0.346
	(0.025)	(0.025)	(0.005)	(0.032)	(0.029)	(0.005)	(0.014)	(0.015)	(0.023)	(0.003)	(0.014)	(0.014)	(0.023)	(0.003)
College degree	0.253	0.233	0.236	0.230	0.285	0.262	0.234	0.296	0.424	0.267	0.239	0.273	0.424	0.255
	(0.027)	(0.024)	(0.004)	(0.029)	(0.029)	(0.005)	(0.015)	(0.017)	(0.031)	(0.003)	(0.014)	(0.014)	(0.031)	(0.002)
Sample size	380	361	13,271	211	243	8,700	1,090	964	322	31,472	1,681	1,568	322	53,443

Samples drawn from public use files of the 1990 and 1991 Surveys of Income and Program Participation and the 1994 March Supplement to the Current Population Survey. Samples include men born between 1930 and 1969 and of age 25 to 64 at the survey date. Immigrants who report an arrival date prior to 1980 are excluded. All means are weighted; sample weights are standardized to sum to 1 within the three data sets. Sample sizes are unweighted. Standard errors of means in parentheses.

[a] In the pooled sample, the 1980–1985 cohort includes immigrants from the SIPP who report arriving in 1980–1984 and immigrants from the CPS who report arriving in 1980–1985. The 1986–1991 cohort includes immigrants from the SIPP who report arriving in 1985–1991 and immigrants from the CPS who report arriving in 1986–1991.

States, or who arrived in the United States prior to age 18 are not included in the sample I analyze here. Longitudinal information is not available on how many weeks or hours worked each year, whether individuals were self-employed, where they lived, and when and where they obtained schooling or job training. The Social Security data are confidential and are used through an arrangement with the Center for Economic Studies of the U.S. Census Bureau.

Before turning to the Social Security earnings records, it is useful to examine the characteristics of the associated public use samples. Table 1 shows selected characteristics of immigrants and natives by data source. The samples include all men born between 1930 and 1969. Since most men work full time, labor supply decisions do not pose as significant an issue as they would for an analysis of women. Men born before 1930 would be over 60 years old at the time of the 1990 survey; dropping older workers reduces the risk that nonrandom mortality would bias the sample of older workers in favor of the more healthy. Those born after 1969 would be under 25 years old at the time of the 1994 surveys and may have not completed their schooling. Immigrants who report that they arrived prior to the 1980 are dropped. The native born make up 95.1% and 94.6% of the two SIPP samples, respectively, and 93.3% of the CPS sample. In unreported tabulations, I find few instances where average characteristics are statistically different across the three surveys. In the analyses in the remainder of the paper, I pool individuals in the 1990 and 1991 SIPP and 1994 CPS.

Characteristics of the pooled sample are given in the right-most columns of table 1.[3] Natives are slightly older than the immigrants, more likely to be white, and married, and have a high school diploma or more education. Educational attainment rose across successive immigrant cohorts: 57.0% of the 1980–1985 arrivals has a high school diploma or less education, while only 46.9% of the 1992–1994 arrivals did so. Similarly, the fraction with a college degree or more education rose from 23.9% to 42.4%. Although these simple tabulations do not account for the fact that at the time of each survey, the earlier immigrant cohorts had been in the United States longer than the more recent ones, rising educational attainment is consistent with the rising cohort quality in the 1980s and 1990s found by Funkhouser and Trejo (1995) and Borjas and Friedberg (2006).

[3] The SIPP and CPS ask immigrants to report the year they arrived in the United States in intervals. The intervals given to respondents in the SIPP are not the same as those given to respondents in the CPS. In the pooled sample, therefore, the 1980–1985 cohort includes immigrants from the SIPP who report arriving in 1980–1984 and immigrants from the CPS who report arriving in 1980–1985. The 1986–1991 cohort includes immigrants from the SIPP who report arrving in 1985–1991 and immigrants from the CPS who report arriving in 1986–1991. This issue does not arise in the analyses of Social Security earnings data below, where I classify immigrants by their first year of covered earnings.

Each of the three cross-sectional surveys contains population weights. In table 1, I have rescaled these weights to have a mean of 1 within each cross-section. Thus, when weighted, each cross-section contributes equally to the pooled sample in the right-most columns.

The main benefit of using earnings data from the Social Security earnings records, rather than the more common practice of constructing synthetic cohorts from repeated cross-sections of the decennial census, is the ability to accurately measure the earnings progress of immigrants who remain in the United States. There are some important limitations of the longitudinal data, however. The first, and most important, limitation of the longitudinal data is that selective out-migration influences comparisons of earnings across immigrant arrival cohorts. Since the data are drawn from cross-sections of the 1990, 1991, and 1994 populations, they represent the group of immigrants who choose to stay in the United States until each particular survey date. The group of immigrants in the sample who arrived in 1980 is composed of people who chose to stay at least ten to fourteen years (depending on which of the three surveys they appear), while the group who arrived in 1990 may stay as short as a year before emigrating and still appear in the data. If immigrants with below-average earnings (or slower-than-average earnings growth) tend to leave the country sooner, then it will appear in these data as if earlier-arrival cohorts have a higher level (or a faster growth rate) of earnings. Thus, while longitudinal data allow an accurate measure of the earnings trajectory among immigrants from the same arrival cohort, earnings differences across cohorts could be due to differences in labor market skills or differential out-migration patterns. These issues are discussed more formally in Lubotsky (2007).

The second issue is that not all respondents in the three cross-sectional data sets are matched to earnings records. The primary reason for a nonmatch is that an individual (or the proxy respondent) refused to give his or her Social Security number to the survey interviewer. Social Security numbers that are provided are verified by Social Security Administration's Enumeration Verification System, a process that ensures that survey respondents are matched only to their own Social Security earnings record. The Social Security Administration is also able to look up the correct Social Security number for survey respondents who did not know their Social Security number or provided an incorrect number.[4] Thus, it is highly unlikely that an illegal immigrant who bought a Social Security card on the black market would be in the matched sample, much less matched to someone else's earnings history. The match rate for the native-born population is 84% in the CPS and 91% and 87% in the two SIPPs. The proportion of immigrants who arrived after 1980 who are matched is lower, with only 62% of immigrants in the CPS and 75% immigrants in the SIPP being matched to earnings records.

To partially correct for potential selection bias induced by nonrandom matches to Social Security earnings data, population weights are computed for the matched subsample to reflect the observable characteristics of the full sample in the household surveys. Specifically, let ω_i denote the population weight provided in the household survey for individual i and $p(x_i)$ denote the probability that a person with characteristics x_i is matched to an earnings record. If that observation is matched and used in the analysis, their final weight is given by $\omega_i/\hat{p}(x)$, the product of ω_i and the inverse of the estimated match probability. The probability of a match is estimated with a logit model in which the match probability is a function of observables recorded in the household survey, including educational attainment, a square in potential labor market experience, weeks and hours worked, a square in reported earnings, and indicators for Hispanics, nonwhites, Hispanic nonwhites, Asians, and those who did not work in the survey year or were self-employed or worked in agriculture, for the government, or in the private sector.[5] The logit model is estimated separately for each of the three household surveys, for natives, and for five-year immigrant arrival cohorts. Since earnings reported in the cross-sectional survey are used to construct the match probabilities, unobservable factors, such as motivation or ability, that are correlated with earnings and may be more prevalent among the matched subsample are incorporated to an extent into the final weights.

The third issue is that discrepancies between an immigrant's reported year of arrival in the United States in the CPS or SIPP survey and the first year of earnings in the Social Security system create difficulties in assigning immigrants to arrival cohorts. The CPS and SIPP surveys record the year immigrants arrived in the United States "to stay." However, 14% of immigrants in the matched data set have Social Security covered earnings prior to their reported date of arrival. This is likely the result of immigrants' moving back and forth between the United States and their birth country and reporting their most recent date of arrival in the CPS or SIPP survey.[6] Many immigrants do not have covered earnings until significantly after their reported date of arrival. This type of discrepancy is caused in part by immigrants who arrived in the United States illegally during the late 1970s or the first half of the 1980s and did not work in the covered sector but were granted amnesty through the 1986 Immigration Reform and Control Act (IRCA) and began working

[4] No attempt is made by the Census Bureau or Social Security Administration to match earnings data for individuals who refused to provide a Social Security number. I exclude from the sample a small number of additional respondents whose reported gender in the cross-sectional survey does not match that in the Social Security record or whose year of birth differed by more than two years in the two data sources.

[5] Some of the variable definitions differ in the CPS and SIPP samples. For example, the CPS model is based on earnings, weeks, and hours in the past year (1993), while the SIPP variables refer to the month prior to the interview. Nevo (2003) analyzes a more general case of using weights to adjust for selection bias.

[6] These discrepancies are most common among Latin Amercan and Canadian immigrants, groups that also have high emigration rates, and are less comon among Asian immigrants, who have low emigration rates. Immigrants with earnings prior to their reported date of arrival are also more likely to have a break in their earnings history prior to their reported date of arrival, consistent with being out of the United States during an entire calendar year. Nevertheless, it is difficult to know the extent to which back-and-forth migration is the root cause of these discrepancies.

TABLE 2.—AVERAGE IMMIGRANT AND NATIVE EARNINGS IN THE MARCH 1994 CPS AND SOCIAL SECURITY EARNINGS DATA

	1993 CPS Reported Earnings			1993 Social Security Earnings	
	Full Sample	Matched Subsample	Reweighted Subsample	Matched Subsample	Reweighted Subsample
Natives					
Log earnings	10.16	10.17	10.16	10.06	10.05
Sample size	27,052	22,781	22,781	21,296	21,296
Immigrants by their reported period of arrival					
1980–1985					
Log earnings	9.79	9.87	9.81	9.79	9.73
Earnings gap	−0.366	−0.295	−0.348	−0.271	−0.321
Standard error	(0.036)	(0.043)	(0.044)	(0.050)	(0.050)
Sample size	750	517	517	462	462
1986–1989	9.66	9.74	9.65	9.71	9.65
	−0.496	−0.430	−0.506	−0.351	−0.397
	(0.041)	(0.058)	(0.054)	(0.063)	(0.058)
	560	320	320	286	286
1990–1994	9.58	9.71	9.60	9.57	9.49
	−0.582	−0.453	−0.555	−0.491	−0.555
	(0.050)	(0.065)	(0.062)	(0.075)	(0.071)
	456	254	254	203	203

Data in the left three columns are from the public use version of the 1994 Current Population Survey, in which individuals report their wage and salary, self-employment, and farm income earned in 1993. These earnings are artificially top-coded at the 1993 Social Security maximum of $57,600. Data in the right two columns are from Social Security earnings records matched to individuals in the 1994 Current Population Survey. Top-coded observations in both data sets are multiplied by 1.38 to approximate the uncensored mean. Earnings gaps are computed as the difference in log earnings between each immigrant cohort and all natives. The means given in the first, second, and fourth columns are weighted by the CPS March Supplement weights only. The means in the third and fifth columns are reweighted as described in section II. Sample sizes are unweighted. Observations with annual earnings less than $1,000 ($1,993) are dropped. Standard errors of the earnings gap are given in parentheses.

in the covered sector at that time.[7] Significant compositional changes in arrival cohorts arise as earnings data become available for newly legalized immigrants. To avoid this problem and maintain consistent cohorts, in section V, I classify immigrants into one of three arrival cohorts based on their first year of covered earnings in the Social Security data (that is, in section V, I ignore the date immigrants report they arrived "to stay" in the SIPP or CPS).

The fourth issue with the Social Security earnings data is that only an individual's annual earnings that are covered by the Social Security system are recorded. An earnings record of 0 dollars in a given year reflects someone who was not employed that year, was outside the United States, or whose only earnings were from informal or other uncovered employment. Some people work entirely in the uncovered sector and thus will not have any Social Security earnings, though they may report their uncovered earnings in the census, CPS, or SIPP surveys. It is not possible to distinguish between immigrants who are legal residents of the United States and work in jobs not covered by the Social Security system and immigrants in the United States legally or illegally who work under the table and do not pay taxes on their earnings. Other workers may have earnings in both the covered and uncovered sectors; thus, their earnings in the longitudinal data set are only a portion of their total earnings.

The fifth and final issue with the Social Security data is that earnings are censored at the taxable earnings ceiling in each year.[8] In 1980 the tax ceiling was $25,900, and 16.1% of the sample was censored. Throughout the 1980s and 1990s, the tax ceiling was adjusted to keep up with inflation, and by 1997, the ceiling was $65,400 and 13.4% of the sample is censored. (Prior to the late 1970s, the tax ceiling was considerably lower, and in many years close to half of the sample has censored earnings.) Although the econometric procedures used below take into account the censored nature of the data, the fact that only a small proportion of the sample is censored in the 1980s and 1990s is an additional reason this study focuses on that period.

To gauge how well covered Social Security earnings reflect the more familiar earnings reported in the CPS, table 2 compares the full sample of workers in the March Supplement to the 1994 CPS (which records total earnings from 1993) with the 1993 Social Security earnings record. This comparison suggests that the issues of coverage and matching discussed above do not significantly detract from the benefits of using the longitudinal Social Security earnings data. The first two columns of table 2 display the average reported log earnings among the full sample and the subsample that is matched to Social Security earnings records, as well as the earnings gap between each immigrant cohort and natives, the standard error of the earnings gap, and the (unweighted) sample size. Because reported earnings in the CPS are heavily clustered at round numbers, a comparison of medians is problematic. Table 2 therefore reports means, after censoring CPS earnings at $57,600, the Social Security taxable maximum in 1993. Top-coded observations in both the CPS and longitudinal earnings records are multiplied by 1.38. This

[7] See Bean, Edmonston, and Passel (1990) and Smith and Edmonston (1997) for more information on IRCA and other changes in immigration law.

[8] A small number of observations from the two SIPP sources are above the tax ceiling in a few years. This may have arisen from people working two jobs during the year and the second employer overwithholding income for Social Security taxes. Since the reported earnings may still be censored, though at a higher level, earnings for these observations are replaced with the taxable maximum in that year.

TABLE 3.—IMMIGRANT-NATIVE DIFFERENCES IN MEDIAN LOG EARNINGS, BY ARRIVAL COHORT AND TIME SINCE ARRIVAL

	1980–1984 Arrivals		1985–1989 Arrivals		1990–1994 Arrivals	
Years since Arrival	Immigrant-Native Earnings Difference	Standard Error	Immigrant-Native Earnings Difference	Standard Error	Immigrant-Native Earnings Difference	Standard Error
1	−0.655	0.049	−0.546	0.039	−0.578	0.053
2	−0.510	0.049	−0.433	0.042	−0.531	0.059
3	−0.440	0.047	−0.407	0.043	−0.602	0.054
4	−0.449	0.045	−0.472	0.045	−0.600	0.064
5	−0.324	0.043	−0.423	0.046	−0.534	0.077
6	−0.295	0.050	−0.403	0.043	−0.617	0.101
7	−0.290	0.058	−0.352	0.046		
8	−0.237	0.055	−0.415	0.045		
9	−0.270	0.058	−0.421	0.057		
10	−0.280	0.062				
11	−0.287	0.055				
12	−0.319	0.060				
13	−0.352	0.057				
14	−0.313	0.070				
15	−0.232	0.086				

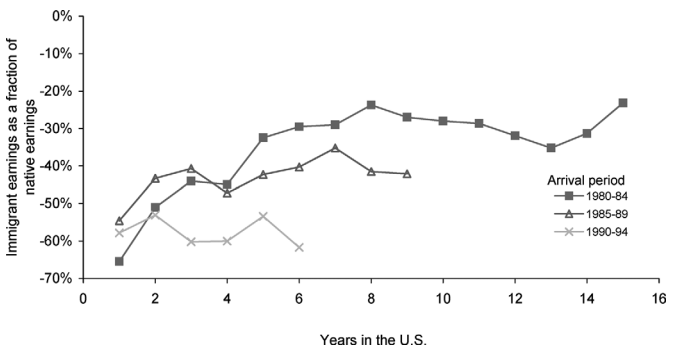
Data are from Social Security earnings records matched to individuals in the 1990 and 1991 SIPP and the 1994 CPS. Immigrant-native earnings gaps are based on cross-sectional LAD models that express the log of annual earnings as a function of immigrant status, potential experience, and calendar time. Observations are weighted as described in section II. The sample size of immigrants in the 1980–1984, 1985–1989, and 1990–1994 cohorts are 473, 839, and 366.

factor approximates the uncensored mean among the artificially top-coded observations in the 1994 CPS. As in table 1, immigrants are classified by their date of arrival reported in the CPS, since immigrants who are not matched to earnings data cannot be classified by my preferred method of classifying by their first year of covered earnings. Finally, observations with annual earnings below $1,000 are dropped from this table.

When CPS earnings data are used, the immigrant-native earnings gap is larger in the full CPS sample than in the subsample matched to Social Security earnings records, with the difference ranging from 6.7 to 12.8 percentage points. However, when the matched immigrants are reweighted to reflect the observable characteristics of the full CPS sample (column 3), the earnings of the matched sample are similar to those of the full sample, with the largest difference being 2.7 percentage points. The fourth column reports the earnings and earnings gaps based on the 1993 Social Security earnings record for the matched subsample. About 6.5% fewer natives have Social Security earnings than report earnings in the CPS ($= 1 - 21,296/22,781$), and average Social Security earnings among natives are about 11% lower than the reported earnings in the CPS. However, the earnings gaps between natives and immigrants based on Social Security earnings records are quite similar to those based on CPS-reported earnings: Using the weights to account for nonmatches (columns 3 and 5), the gap between immigrant and native earnings is larger in the CPS data by 2.8 and 10.9 percentage points among the 1980–1985 and 1986–1989 arrival cohorts; the two data sources give identical earnings gaps for the 1990–1994 arrival cohort. Although Social Security earnings data are not perfect, their use, rather than the familiar self-reported earnings in the CPS, does not systematically affect immigrant–native earnings comparisons.

This section concludes by presenting, in table 3 and figure 1, data on the relative earnings of immigrants who

FIGURE 1.—THE IMMIGRANT-NATIVE GAP IN MEDIAN ANNUAL EARNINGS, BY ARRIVAL COHORT AND TIME IN THE UNITED STATES



Data are from Social Security earnings records matched to individuals in the 1990 SIPP, the 1991 SIPP, and the 1994 SIPP. Immigrant-native earnings gaps are based on cross-sectional LAD models that express the log of annual earnings as a function of immigrant status, potential experience, and calendar time. Observations are weighted as described in section II. Point estimates and standard errors are given in table 3.

entered the United States between 1980 and 1984, 1985 and 1989, and 1990 and 1994, measured in the Social Security data. These are computed by estimating a series of cross–sectional median (or least absolute deviation) regressions of annual earnings on an immigrant dummy variable and quartics in calendar time and potential experience, by arrival cohort, for each year that the group has been in the United States. Arrival cohorts are determined by immigrants' first year of covered earnings. The group that arrived between 1980 and 1984 entered the labor market with earnings about 65% below those of natives, though within five years, the gap closed by 35 percentage points. This is an interesting group since it comprises an unusually large group of refugee immigrants from Afghanistan, Cambodia, Cuba, Ethiopia, Haiti, Laos, Vietnam, and former Soviet bloc countries. Indeed, in 1980 and 1981 over 366,000 refugees emigrated to the United States. The ratio of refugees to nonrefugee immigrants granted permanent residency averaged 8.8% and was

never higher than 14% between 1982 and 2006, but was nearly 33% in 1980 and 1981.[9] The fast rate of earnings growth among this group is consistent with data presented by Cortes (2004), who shows that between the 1980 and 1990 censuses, refugees had faster earnings growth than did other immigrants, possibly indicating that their low probability of leaving the United States led them to accumulate more U.S.-specific human capital. It is also possible that the faster rate of earnings growth among the 1980–1984 arrival cohort is an artifact of emigration among immigrants with slower-than-average earnings growth.

The group that entered in the second half of the 1980s includes a large proportion of immigrants who were possibly in the United States prior to that time, but were brought into the covered sector only with the 1986 amnesty. Their first recorded earnings were 55% below natives, and the earnings gap closed by about 12 percentage points over the next ten years. Finally, immigrants who entered in the early 1990s earned 58% less than natives on entry, and, unlike the earlier two arrival cohorts, their relative earnings did not change during their first six years in the United States.

III. Changes in the Structure of Wages and the Skills of Recent Immigrants

This section details the key identification problem addressed in this paper: how the earnings gaps just presented confound changes in the relative skills of immigrants with changes in the wage structure.

Define w_{ijt} to be the earnings of person i at time t, where j indexes native-born workers ($j = n$) and the three immigrant arrival cohorts ($j = c$). Suppose individual earnings are determined by a simple function of quartics in potential labor market experience and calendar time, a latent index of "skill" or "ability," a_{ijt}, and an unobservable term, ε_{ijt}, that represents measurement error and any nonproductivity-related influences on earnings. Specifically, earnings are given by

$$w_{ijt} = \alpha + \beta f(\text{Experience}_{ijt}) + \gamma f(\text{Year}_t) + \psi_t a_{ijt} + \varepsilon_{ijt}, \tag{1}$$

where β and γ are parameters in the experience and calendar-time quartics and ψ_t is the return to skills in period t. Most applications of such earnings functions treat educational attainment as a sufficient measure for an individual's skill level. Here it is useful to think about education as being one of many contributing factors to an individual's skill. Other influences are school quality, family and neighborhood characteristics, language fluency, health, and cognitive ability. Since the skill index is not observed, some normalization on the product $\psi_t a_{ijt}$ is required, and so the price of skill is set to 1 in 1980, the first year used in this study.

To model differences in skill levels between immigrants and natives, I follow the standard framework in the literature and express immigrants' skills as an additive function of a permanent arrival cohort effect, k_c, a time in the United States effect, y_{ct}, and an individual-specific skill component, η_{ict}, as follows:

$$a_{ict} = k_c + y_{ct} + \eta_{ict}. \tag{2}$$

The skills of native-born workers consist of only the individual component ($a_{int} = \eta_{int}$). The individual skill (η_{ijt}) and nonproductivity (ε_{ijt}) components are assumed to be independent of each other. The immigrant arrival cohort effect, k_c, and the assimilation effect, y_{ct}, measure the permanent and time-varying differences in immigrant and native labor market skills. k_c is negative if immigrants arrive in the United States with a lower skill level than natives; y_{ct} is 0 on arrival but becomes positive if immigrants accumulate skills faster than do natives. (With larger sample sizes and richer data on individual characteristics, one might want to generalize the model above by also allowing the skill components to vary by immigrants' country of origin, age at migration, social and employment connections, language ability, or refugee status, for example.)

Equations (1) and (2) are a single-index model of skills. Card and Lemieux (1996) explore a similar model in the context of black-white wage differentials and conclude that such a model provides a reasonably good descriptive device for changes in the wage structure during the 1980s. A key feature of single-index models is that in the absence of differential skill accumulation between groups of workers, groups with similar earnings in a base period will experience similar wage changes over time. This motivates LaLonde and Topel (1992) to measure immigrant skill accumulation in the 1970s as the difference between immigrant earnings growth and the earnings growth of natives who began the decade at a similar point in the earnings distribution.

To see this, and how changes in the price of skill affect the relative earnings of immigrants more generally, note that conditional on the age and period effects, the expected value of the earnings gap between new immigrants and native-born workers at time $t = 0$ (immigrants' year of arrival) is equal to the product of the skill gap on arrival and the return to skill that prevails at that time:

$$\begin{aligned} \text{GAP}_{c0} = {} & \text{E}(w_{ic0}|\text{Experience}_{ijt}, \text{Year}_{ijt}) \\ & -\text{E}(w_{in0}|\text{Experience}_{ijt}, \text{Year}_{ijt}) = \psi_0 k_c. \end{aligned} \tag{3}$$

Thus, even if all immigrant groups had the same permanent skill level ($k_c = k\ \forall c$), a rising price of skill over time would lead the observed earnings gaps between natives and new immigrants to rise across cohorts.[10]

The earnings gap between immigrant cohort c and natives at time $t = s$ incorporates the relative increase in immigrant skills due to labor market assimilation, y_{cs},

[9] These figures are from U.S. Department of Homeland Security (2007).

[10] I assume the nonproductivity component of earnings (ε_{ijt}) has a mean of 0 conditional on immigrant status, which implies the gap in average earnings on entry between natives and each entry cohorts is attributable to skill differences. I therefore do not address other sources of earnings differences, such as discrimination against immigrants.

$$\mathrm{GAP}_{cs} = \mathrm{E}(w_{ics}) - \mathrm{E}(w_{ins}) = \psi_s(\mathrm{k}_c + \mathrm{y}_{cs}), \tag{4}$$

where the expectations are conditional on experience and calendar time. The magnitude of immigrant-native earnings convergence between time $t = 0$ and $t = s$ is given by the difference in the earnings gaps at those times:

$$\begin{aligned}\Delta\mathrm{GAP}_c &= [\mathrm{E}(w_{ics}) - \mathrm{E}(w_{ins})] - [\mathrm{E}(w_{ic0}) - \mathrm{E}(w_{in0})] \\ &= (\psi_s - \psi_0)\mathrm{k}_c + \psi_s \mathrm{y}_{cs}.\end{aligned} \tag{5}$$

Without knowing how ψ_t changes over time, the process of assimilation cannot be identified from observed changes in the earnings gap between immigrants and natives. Increases in the return to skills will tend to depress the relative earnings of immigrants (as long as immigrants are less skilled than natives, on average) and make it appear that immigrants assimilate slower than they actually did.

LaLonde and Topel's measure of assimilation is essentially given by the product $\psi_s \mathrm{y}_{cs}$ in equation (5) (rather than simply y_{cs}). Since they consider earnings changes between two points in time, 1969 and 1979, this amounts to measuring skill accumulation in 1979 skill prices. Since this study uses eighteen years of annual data with immigrants observed during different periods of time, it is important to measure skill changes for all groups using a constant price of skill, and here the 1980 price is used.

Butcher and DiNardo (2002) take a complementary approach to the counterfactual change in immigrant earnings by estimating what the distribution of recent immigrants' earnings would look like if they faced the same return to observable characteristics, such as education, race, and ethnicity, as did recent immigrants in 1990. By focusing on changes in observables, Butcher and DiNardo are able to pinpoint the particular characteristics that have most influenced changes in the earnings gap. Indeed, they find that much of the decline in the relative earnings of recent immigrants can be attributed to changes in the return to observable characteristics, particularly race and ethnicity. LaLonde and Topel and this study analyze the total skill gap, which includes skills unmeasured by surveys.

IV. Identification of the Return to Skills between 1980 and 1997

Separating changes in earnings that result from changes in immigrants' relative skills from those that result from changes in the price of skill requires knowing how the price of skills evolved between 1980 and 1997. The return to skills is estimated from changes in the variance of native-born workers' earnings over time within narrowly defined education and experience cells. Natives alone are used to compute the return to skills because the large number of observations permits the sample to be broken down into skill groups with large sample sizes. The variance of immigrants' earnings depends on the permanent (k_c) and assimilation (y_{ct}) components in equation (2), and immigrant cells based on these characteristics, in addition to education and labor market experience, would be quite small. Since immigrants make up only about 12% of the workforce, the loss in efficiency from using only the sample of natives to estimate the return to skill is likely to be small.

Let m index one of thirty narrowly defined education and experience cells among natives. The five education groups are those without a high school diploma, high school graduates without any college, high school graduates with between one and three years of college, four-year college graduates, and those with any postgraduate education. The six five-year labor market entry cohorts are 1960–1964 to 1985–1989. From equation (1), the variance in earnings within group m in period t is given by

$$\mathrm{Var}(w_{imt}) = \psi_t^2 \mathrm{Var}(\mathrm{a}_{imt}) + \mathrm{Var}(\varepsilon_{imt}). \tag{6}$$

To identify the return to skills, the variance of the individual unobservable skill component ($a_{imt} = \eta_{imt}$) is assumed to be constant over time, though it may vary across groups ($\mathrm{var}(a_{imt}) = \sigma_{\eta_m}\ \forall t$). The variance of the nonproductivity component (ε_{imt}) is assumed to be constant across groups but may vary over time ($\mathrm{var}(\varepsilon_{imt}) = \sigma_{\varepsilon_t}\ \forall m$). This decomposition of the variance in earnings into a permanent and transitory component is common in the literature. However, most other studies use the time-series properties of the earnings variance as a source of identification (see, e.g., MaCurdy, 1982, and Moffitt & Gottschalk, 1995). The method used in this section is based on that developed by Chay and Lee (2000) and does not require the autocovariance structure of earnings to be known. Instead, the large cross–sectional sample size is exploited to identify the parameters through restrictions on the variance in earnings across skill groups.

Under these assumptions, the within-group variance in earnings can be written as

$$\mathrm{Var}(w_{imt}) = \psi_t^2 \sigma_{\eta_m} + \sigma_{\varepsilon_t}, \tag{7}$$

and the return-to-skills parameter ψ_t can be identified from changes over time in the within-group variances. In particular, increases in the return to skill lead to changes in the within-group earnings variance that are proportional to the permanent component of variance, σ_{η_j}. Increases in the noise or measurement error component lead to increases in earnings variance that are constant across groups.

The parameters in equation (7) are estimated with minimum distance methods. Let $h(\theta) = \psi_t^2 \sigma_{\eta_m} + \sigma_{\varepsilon_t}$ be the $(m \times t)$–row vector of the theoretical cell variances, stacked by group and time. θ is the set of $2t + m - 1$ parameters, ψ_t, σ_{η_m}, and σ_{ε_t} (where the return to skill in 1980 is normalized to be 1). The parameters are estimated by minimizing the distance between the empirical cell variances and their theoretical counterparts. Specifically, $\hat{\theta}$ is given by

$$\hat{\theta} = \mathrm{argmin}(\mathrm{Var}(w_{imt}) - h(\theta))' \mathrm{W} (\mathrm{Var}(w_{imt}) - h(\theta)), \tag{8}$$

where W is a diagonal weighting matrix. Altonji and Segal (1996) show that sampling error in the estimated earnings variances is correlated with sampling error in the estimated variance-covariance matrix of the cells. This may lead to a small sample bias in the estimated parameters if the inverse of the variance-covariance matrix is used as the weighting matrix in equation (8). To avoid this problem, the diagonal matrix of cell sample sizes is used as a weighting matrix. The variance of $\hat{\theta}$ is given by

$$\mathrm{Var}(\hat{\theta}) = (h'\mathrm{W}h')^{-1}h'\mathrm{W}\Omega\mathrm{W}h'(h'\mathrm{W}h')^{-1}, \quad (9)$$

where $h' = \partial h(\theta)/\partial\theta$ and Ω is an estimate of the variance-covariance matrix of the cells variances.

Since the earnings data are censored at the Social Security taxable maximum in each year, the observed earnings variance within the skill-group cells will be smaller than the true variance. Increases in the taxable maximum will tend to reduce the fraction censored and raise the observed variance in earnings. To estimate the within-group earnings variance while accounting for the top code, I ran a separate tobit model of log earnings on a constant term for each skill group in each year. If log earnings are normally distributed, this maximum likelihood procedure delivers an efficient and unbiased estimate of the earnings variance. The effect of possible misspecification of the earnings distribution is likely to be small, however, since the proportion of the sample that is censored is low and stable after 1980. Each tobit model is then bootstrapped to obtain an estimate of the variance-covariance matrix of the cell variances (Ω) that is robust to within-group serial correlation.

Before turning to the estimates of the return to skills, it is useful to examine some of the raw data on the variance in earnings. The panels in figure 2 plot the change in the estimated earnings variance for native-born high school and college graduates and the difference in median earnings between these two groups, from 1980 to 1997, for four cohorts of labor market entrants from 1965–1969 to 1980–1984. There is a clear upward trend in both the high school–college earnings gap and the variability in earnings among both groups. The variance in earnings is larger among college graduates than among high school graduates, and, consistent with the model above, the increase in the earnings variance over time is larger among the college educated.

The estimates of the return to skill and residual variance parameters from equation (7) are given in table 4. Figure 3 plots the point estimates and includes for reference the overall trend in the earnings gap between high school– and college-educated workers. The return to skills is estimated to have increased by 31.4% over the 1980s and then increased by another 10 percentage points over the 1990s. The residual variance increases sharply in 1981 (possibly due to the recession), but then declines smoothly until 1992, when it begins to increase.The high school–college earnings gap increased by 89% between 1980 and 1997, which indicates that the rising return to skills can explain only about 47% of the increase in the high school–college earnings gap, with the remainder potentially due to changes in the skill gap between high school and college graduates.[11] These estimates are similar in magnitude to those in Card and Lemieux (1996) and Chay and Lee (2000).

V. Estimates of the Immigrant-Native Skill Gap

This section uses the estimates of the return to skills to translate the observed immigrant-native earnings gap into a consistent measure of the immigrant-native skill gap. These tabulations are contained in table 5 and graphed in figure 4. The skill gap represents what the earnings gap would have been had the return to skills remained at its 1980 level throughout the sample period. The permanent skill gap, k_c, for each entry cohort is equal to the ratio of the average earnings gap during the immigrants' first full year of covered earnings to the average return to skill that prevailed during their first year. The first row of table 5 shows that the difference in log earnings between natives and immigrants who arrived between 1980 and 1984 was 0.655 during immigrants' first full year of covered earnings. The weighted average of the return to skills that prevailed during these immigrants' first year in the United States is 1.004.[12] The permanent skill gap among this group is therefore equal to $-0.655/1.004 = -0.652$, with a standard error of 0.053.[13]

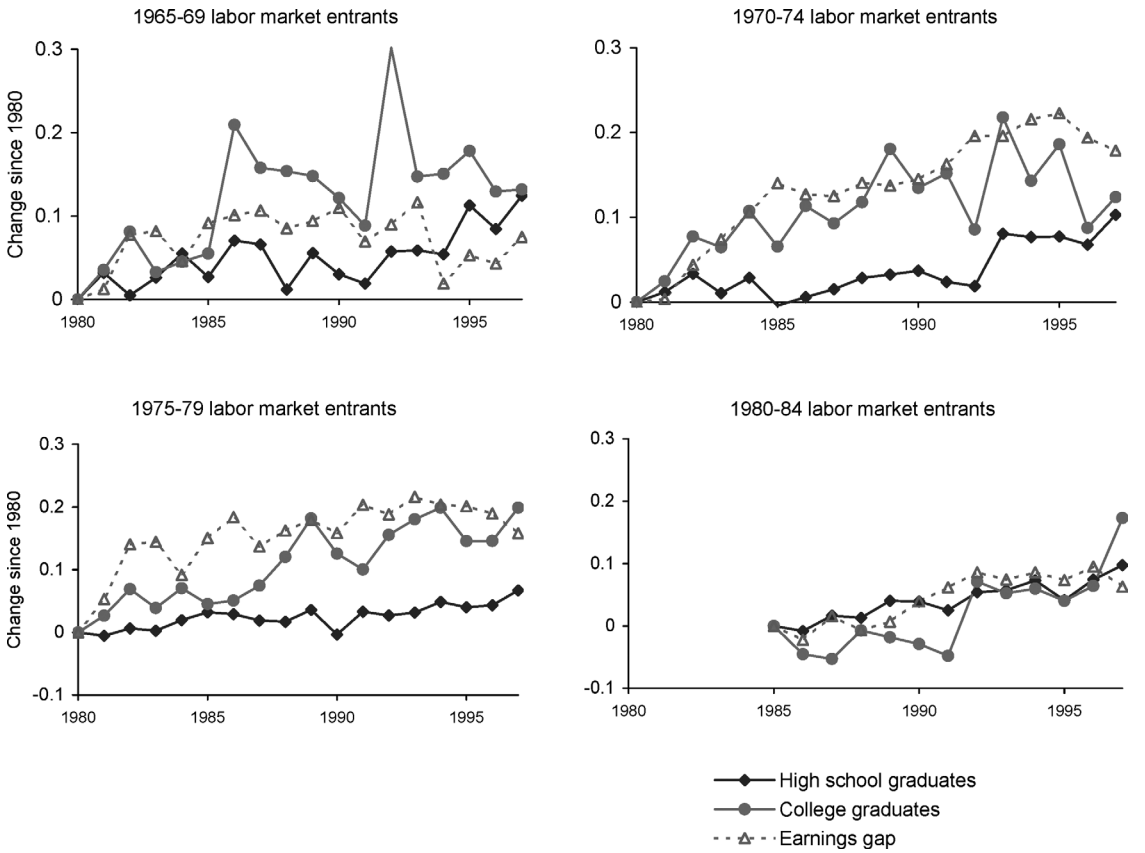
Increases in the return to skills after 1980 reduced the relative entry earnings of the 1985–1989 and 1990–1994 arrivals. During their first year in the United States, the 1985–1989 arrivals had an initial earnings gap of -0.546, approximately a 10 percentage point improvement relative to the entry earnings of the 1980–1984 arrivals. The price of skill that prevailed during the 1985–1989 arrivals' first year in the United States was 23.4% higher than the price of skills in 1980. Had the price of skills remained at its 1980 level, the immigrant-native earnings gap for the 1985–1989 arrivals would have been equal to $-0.546/1.234 = -0.442$, or about 10 percentage points smaller than what it actually was and 21 percentage points higher than the entry earnings of the 1980–1984 arrivals. The initial earnings gap among immigrants who arrived between 1990 and 1994 was -0.578. The return to skills that prevailed when these immigrants entered the United States was 34.8% higher than the 1980 return to skills.

[11] Some of the discrepancy between the increase in the college–high school earnings gap and the increase in the return to skills may reflect a failure of the single-index assumption underlying the identification strategy or a failure of the identifying assumptions in the model. Data access restrictions prevent me from exploring these possibilities further.

[12] That is, the weighted average return to skill that prevailed during the 1980–1984 arrivals' first year in the labor market is given by $\psi = \alpha_{80}\psi_{81} + \alpha_{81}\psi_{82} + \alpha_{82}\psi_{83} + \alpha_{83}\psi_{84} + \alpha_{84}\psi_{85}$, where the α's are the share of the 1980–1984 cohort that arrived in each year and the ψ's are the returns to skill in each year. Since it is not possible to know when during a given year a person arrived in the United States, I use only earnings histories beginning in the year immediately after individuals' first year with positive earnings.

[13] The standard error for the skill gap is computed by the delta method and assumes that estimates of the immigrant-native earnings gap and the return to skills are jointly normally distributed and are uncorrelated with one another.

FIGURE 2.—HIGH SCHOOL–COLLEGE EARNINGS GAP AND EARNINGS VARIANCE, 1980–1997, BY PERIOD OF LABOR MARKET ENTRY



Note: Data come from Social Security earnings records matched to native-born men in the 1990 and 1991 SIPP and the 1994 CPS. The solid lines plot the change in the variance in earnings of high school and college graduates, computed with tobit models as described in the text. The dotted line is the change in the earnings gap between high school and college graduates.

TABLE 4.—ESTIMATES OF THE RETURN TO SKILL AND RESIDUAL VARIANCE, 1980–1997

	Return to Skill		Residual Variance	
Year	Estimate	Standard Error	Estimate	Standard Error
1980	1.0000	–	0.2574	0.0040
1981	0.8895	0.0312	0.2910	0.0068
1982	1.0604	0.0289	0.2669	0.0065
1983	1.0362	0.0318	0.2823	0.0067
1984	1.0796	0.0348	0.2795	0.0084
1985	1.1460	0.0313	0.2499	0.0064
1986	1.2446	0.0391	0.2400	0.0083
1987	1.1797	0.0365	0.2518	0.0075
1988	1.2674	0.0375	0.2435	0.0078
1989	1.3141	0.0391	0.2375	0.0076
1990	1.3211	0.0402	0.2300	0.0077
1991	1.3008	0.0363	0.2345	0.0060
1992	1.3910	0.0417	0.2324	0.0080
1993	1.3970	0.0416	0.2458	0.0082
1994	1.3495	0.0430	0.2647	0.0083
1995	1.3983	0.0450	0.2581	0.0092
1996	1.3834	0.0471	0.2630	0.0100
1997	1.4140	0.0510	0.2721	0.0105
Average skill variance				
High school graduates			0.0773	0.0018
College graduates			0.1979	0.0061
Number of cells				525

Estimated based on analyses of Social Security earnings data matched to native-born men in the 1990 and 1991 SIPP and the 1994 CPS. See text for estimation details. The average skill variance for high school and college graduates is an unweighted average among the respective cells.

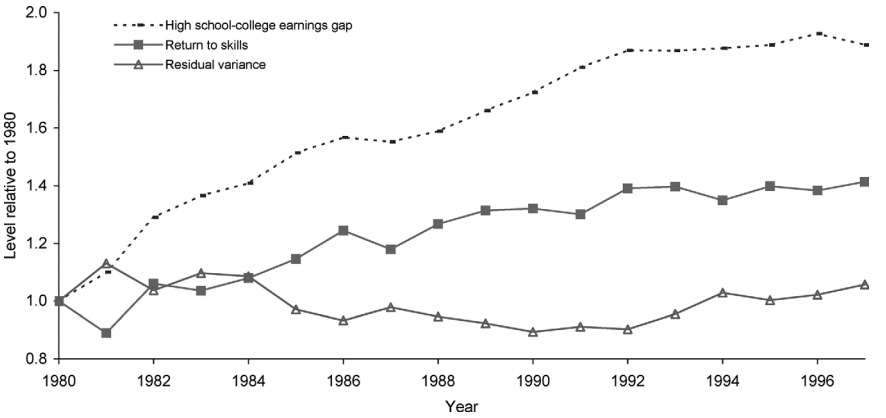
Had the price of skills remained at its 1980 level, their entry earnings would have been equal to $-0.578/1.348 = -0.429$ log points below that of natives. Increases in the return to skills reduced this group's entry earnings by about 15 percentage points. Notwithstanding the complications in making across-cohort comparisons with these longitudinal data, these tabulations indicate that the entry earnings of immigrants who arrived between 1985 and 1994 were noticeably lower than what they would have been if the return to skills had not changed.

The effect of additional U.S. labor market experience on the relative skills of immigrants is given by y_{cs}. The effect of five years of assimilation into the U.S. labor market by the 1980–1985 arrivals is computed as the ratio of their earnings gap after five years to the return to skills that prevailed during their fifth year, less their skill gap on entry—or, more generally,

$$y_{cs} = \frac{\widehat{GAP}_{cs}}{\hat{\psi}_s} - \widehat{k_c} \tag{10}$$

The difference in log earnings between natives and the 1980–1985 migrants after five years in the United States is -0.324, implying the earnings gap had closed by 0.330 log points

FIGURE 3.—HIGH SCHOOL–COLLEGE EARNINGS GAP, RETURN TO SKILLS, AND RESIDUAL VARIANCE



The level of the high school–college earnings gap is 27.9% in 1980; the level of the residual variance is 0.257. The high school–college earnings gap is computed from a series of median regressions that also condition on a quartic in potential labor market experience. See text for details.

TABLE 5.—IMMIGRANT-NATIVE SKILL DIFFERENCES, BY ARRIVAL COHORT AND TIME SINCE ARRIVAL

Years since Arrival	Immigrant-Native Earnings Difference	Average Return to Skill	Immigrant-Native Skill Difference	Standard Error of Skill Difference
		1980–1984 Arrivals		
1	−0.655	1.004	−0.652	0.053
2	−0.510	1.024	−0.498	0.050
3	−0.440	1.102	−0.399	0.043
4	−0.449	1.120	−0.401	0.042
5	−0.324	1.169	−0.278	0.038
6	−0.295	1.220	−0.242	0.041
7	−0.290	1.257	−0.231	0.047
8	−0.237	1.264	−0.188	0.044
9	−0.270	1.312	−0.206	0.045
10	−0.280	1.339	−0.209	0.047
11	−0.287	1.345	−0.213	0.041
12	−0.319	1.361	−0.235	0.044
13	−0.352	1.385	−0.254	0.042
14	−0.313	1.387	−0.226	0.051
15	−0.232	1.381	−0.168	0.063
		1985–1989 Arrivals		
1	−0.546	1.234	−0.442	0.034
2	−0.433	1.274	−0.340	0.035
3	−0.407	1.285	−0.317	0.035
4	−0.472	1.318	−0.358	0.035
5	−0.423	1.350	−0.313	0.035
6	−0.403	1.361	−0.296	0.033
7	−0.352	1.367	−0.257	0.035
8	−0.415	1.384	−0.300	0.033
9	−0.421	1.389	−0.303	0.042
		1990–1994 Arrivals		
1	−0.578	1.348	−0.429	0.041
2	−0.531	1.385	−0.383	0.043
3	−0.602	1.387	−0.434	0.041
4	−0.600	1.375	−0.437	0.049
5	−0.534	1.398	−0.382	0.056
6	−0.617	1.393	−0.443	0.074

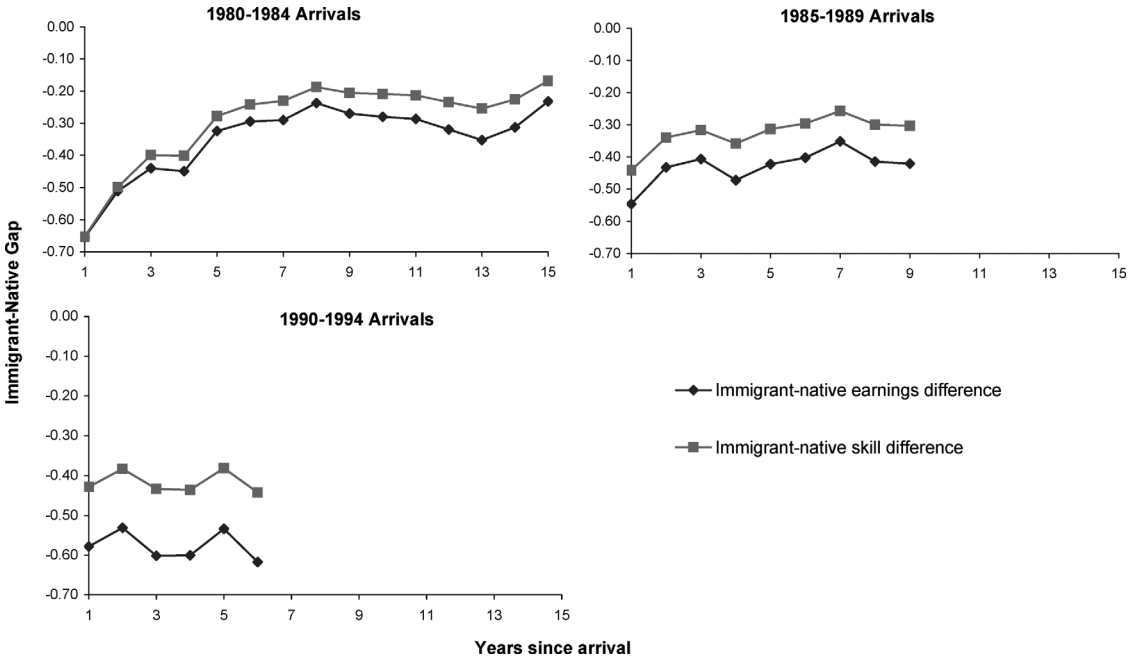
Estimates of the immigrant-native earnings difference are from table 3. The average return to skill is a weighted average of the return to skills presented in table 4, as described in section V. Standard error of the skill difference is calculated under the assumption that estimates of the earnings gap are uncorrelated with estimates of the return to skills.

since the group arrived in the United States. During the same period, however, the price of skills had risen by 16.4%, from 1.004 to 1.169. Had the price of skill remained at its 1980 level, however, the earnings gap would have been −0.278. That is, the earnings gap would have closed by 0.375 log points instead of by 0.330, or by about 4.5 percentage points faster than it actually did. More generally, table 5 and figure 4 show that the overall gap in skills, given by $k_c + y_s$, converged noticeably more quickly than did the overall gap in earnings. After arrivals had been in the United States for fifteen years, the difference in log earnings between natives and the 1980–1984 arrivals was −0.232. Had it not been for changes in the return to skills, the immigrant-native earnings gap would have been −0.168. This is a large difference: the 6.4 percentage point decline in the relative earnings of immigrants represents 28% of the observed immigrant-native earnings gap.

Much of the rise in the return to skills had already occurred by the time the 1985–1989 and 1990–1994 arrivals entered the labor market. Thus, increases in the return to skill had the primary effect of lowering their earnings level rather than its trajectory. After immigrants had been in the United States for nine years, the immigrant-native earnings gap among the 1985–1989 arrivals was −0.421. Had the return to skill remained at its 1980 level, the earnings gap would have been −0.303, or 0.118 smaller than what it actually was. This difference also represents 28% of the observed immigrant-native earnings gap. Finally, although the 1990–1994 arrivals show no clear assimilation pattern, the increases in the return to skill that largely occurred prior to their arrival had the effect of widening their earnings gap with natives by 26% to 28%. The standard errors on all of the skill gaps are tight enough to rule out that any of the cohorts eliminated their skill gap with natives during the sample frame.

Changes in the U.S. wage structure during the 1980s and 1990s were profound. Evaluated nine years after arrival, the increased return to skill reduced the relative earnings of immigrants who arrived in 1980–1984 and 1985–1989 by 6.4% and 11.8%; evaluated six years after immigrants' arrival, the relative earnings of the 1990–1994 arrivals were reduced by 17.4%. By comparison, LaLonde and Topel's (1992) calculations indicate that changes in the wage structure during the 1970s had considerably smaller effects on immigrants who

FIGURE 4.—IMMIGRANT-NATIVE EARNINGS AND SKILL GAPS BY ARRIVAL COHORT



Figures show the immigrant-native earnings and skills gaps. Point estimates are in table 5.

arrived during the 1960s, even among particularly low-skilled groups: the earnings of immigrants with fewer than ten years of schooling were reduced by 2 to 5 percentage points, while Mexican immigrants experienced a 5 to 8 percentage point decline.

It bears repeating, however, that these estimates should not be taken as evidence of changes in cohort quality because the Social Security data are only for immigrants who chose to remain in the United States until the early 1990s. Previous research by Borjas (1995) and Borjas and Friedberg (2006) provides evidence that the educational attainment of new immigrants, relative to natives, fell steadily between decennial censuses from 1960 and 1990, and perhaps began to rise in the 1990s. For example, Borjas (1995) notes that recent immigrants in the 1980 decennial census (who arrived between 1975 and 1979) had about 0.88 years of education fewer than natives; recent immigrants in the 1990 decennial census had about 1.32 fewer years of education. This decline in relative educational attainment translates into a decline in relative earnings across the cohorts on the order of 3.5%, assuming an 8% return to a year of schooling. These trends in educational attainment are a clear indicator of changes in the labor market skills across cohorts and are not affected by the changes in the wage structure studied in this paper.

VI. Conclusion

The 1980s is generally thought to be a time when immigration to the United States by refugees and particularly by low-skilled migrants was at an all-time high, prompting a resurgence in interest in immigration reform that has continued to today. This study used longitudinal earnings data from Social Security earnings records to study the effect that changes in the return to skills during the 1980s and 1990s had on the relative earnings of immigrants. Since new immigrants earn less on average than native-born workers, increases in the return to skills and widening wage inequality will increase the earnings gap between the groups, contributing to the perception that immigrants are either not as skilled or are not assimilating as rapidly as earlier groups did. The estimates I presented indicate that the return to labor market skills rose by 41% between 1980 and 1997. If, instead, the price of skills had remained at its 1980 level, the earnings of immigrants who arrived between 1980 and 1994 would have been between 6.4 and 17.4 percentage points higher at the end of the period, depending on their date of arrival. The rising returns also had the effect of reducing the rate of earnings assimilation experienced by the 1980–1984 arrivals in particular. This study therefore indicates that these migrants had, on average, better labor market skills than what their earnings disadvantage would suggest.

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