

## **The Impact of Immigrants on Host Country Wages, Employment and Growth**

Rachel M. Friedberg and Jennifer Hunt

**I**mmigration is a contentious issue in the industrialized nations of the world. This is true not merely in traditional receiving countries, such as the United States, Canada and Australia, but in recent decades also in Europe, which historically experienced net emigration. In Europe, for example, support has risen in recent years for virulently anti-immigrant political parties, such as the National Front in France, the National Alliance in Italy, and the Republikaner in Germany. The debate has a particularly interesting twist in those countries most of whose residents are themselves descendants of immigrants. The inscription on the Statue of Liberty exhorts the world to “give me your tired, your poor, your huddled masses yearning to breathe free . . . .” Yet there has always been a tension between this open-door philosophy and fear of the economic and social impact of the next wave of immigrants.

Many of the key issues in the debate on immigration policy are economic. Most attention has been paid to the potential adverse effect on the labor market outcomes of native-born workers: immigrants may compete with native-born workers in the labor market, displacing them in employment or bidding down wages. Less attention has been devoted to the possible benefits of immigration. Immigrants may complement some native factors in production, which would lead to these factors benefiting from immigration, and overall welfare may rise. Another question less commonly asked is how immigration influences growth in per capita income. Cases in which it would be interesting to understand this link include the role of immigration in creating the large internal American

■ *Rachel M. Friedberg is Assistant Professor of Economics, Brown University, Providence, Rhode Island. Jennifer Hunt is Assistant Professor of Economics, Yale University, New Haven, Connecticut. Both are Faculty Research Fellows at the National Bureau of Economic Research, Cambridge, Massachusetts.*

*Table 1*  
**Immigrants as a Percentage of the Population**

	1981	1991
Australia	20.6	22.7
Austria	3.9	6.6
Belgium	9.0	9.2
Canada	16.1	15.6
Denmark	2.0	3.3
Finland	.3	.7
France	6.8	6.3
West Germany	7.5	8.2
Italy	.6	1.5
Luxembourg	26.1	28.4
Netherlands	3.8	4.8
Norway	2.1	3.5
Spain	.5	.9
Sweden	5.0	5.7
Switzerland	14.3	17.1
United Kingdom	2.8	3.1
United States	6.2	7.9

*Note:* Later year is 1990 for France, West Germany, Luxembourg, and the U.S. Earlier year is 1986 for Canada, 1982 for France, 1984 for the UK and 1980 for the U.S. People are classified as immigrants on the basis of nativity or citizenship, depending on the country.

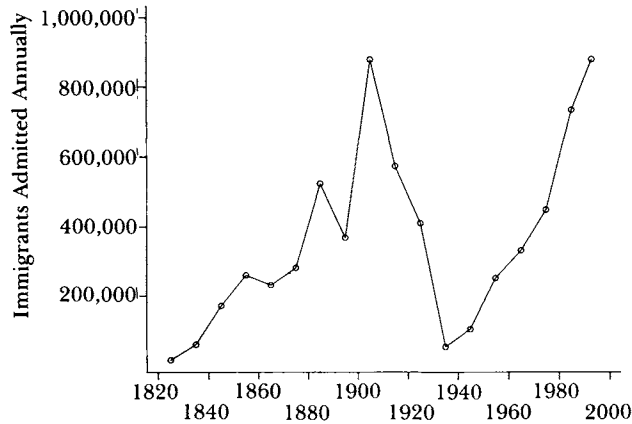
*Source:* OECD, *Trends in International Migration* (1994).

market in the late nineteenth and early twentieth century; the effect of immigration back to Germany after World War II; and the current mass migration to Israel. The connection between immigration and growth is likely to depend upon the circumstances of the receiving economy and the characteristics of the immigrant inflow.

Immigration policy varies considerably from country to country. The United States allows in large numbers, most of whom enter based on their family ties with earlier immigrants already in the country. In Canada and Australia, entry is based much more on skill qualifications. All people born in the United States, even those born to illegal immigrant parents, are automatically granted citizenship. In Germany and Switzerland, even the children of people who have lived in those countries for decades may not be considered citizens of the country.

Until recently, little detailed empirical work has been done on the impact of immigrants on the receiving economy. This paper discusses the recent theoretical and empirical research on immigration's impact on the income growth and labor market outcomes of natives.

*Figure 1*  
**Immigrant Flows to the United States**



*Note:* Excludes immigrants legalized under the Immigration Reform and Control Act of 1986.

*Source:* U.S. Immigration and Naturalization Service, *Statistical Yearbook* (1994) and the U.S. Bureau of the Census, *Statistical Abstract of the United States* (1994).

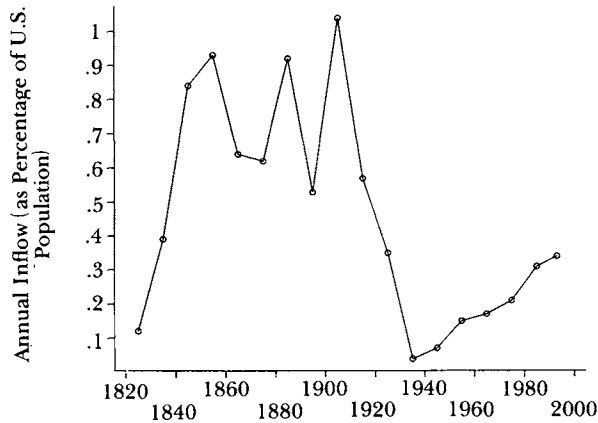
## Immigration Facts

Before focusing on particular questions, the size of international migration flows should be put in perspective. Approximately 100 million people in the world live in a country other than their own. Between 1975 and 1980, approximately 5 million people migrated from one country to another. Two-thirds of immigration in that period was to a handful of host countries: the United States, Canada and Australia.

Most of the research on the impact of immigration has been on the developed countries. Table 1 shows immigrants as a fraction of the population in selected OECD countries in 1981 and 1991. Luxembourg, Australia, Switzerland and Canada have notably high proportions of foreigners (over 15 percent). Other countries with significant immigrant shares are Belgium, West Germany and the United States (7–10 percent).

The United States has had one of the largest increases in the fraction foreign-born, rising from 4.7 percent in 1970 to 7.9 percent in 1990. Figure 1 shows inflows to the United States since the 1820s. Immigration peaked in the beginning of this century, with massive flows from southern and eastern Europe. In absolute numbers, immigration is once again returning to those historic levels. As shown in Figure 2, however, the immigration rate (defined as

*Figure 2*  
**Immigration Rates to the United States**



*Note:* Excludes immigrants legalized under the Immigration Reform and Control Act of 1986.  
*Source:* U.S. Immigration and Naturalization Service, *Statistical Yearbook* (1994) and U.S. Bureau of the Census, *Statistical Abstract of the United States* (1994).

inflows as a percent of the U.S. population) is relatively low in comparison. Still, immigration is an increasingly important component of population growth in the United States, rising from 13 percent of growth in the 1960s, to 19 percent in the 1970s, and to 25 percent in the 1980s.

The country composition of immigration to the United States has changed greatly over time, partly due to the dramatic change in entry policy brought about by the Immigration and Nationality Act amendments of 1965, which abolished the national origins quota system in place since the 1920s. As seen in Table 2, in the 1950s, over half of all immigrants came from Europe. Currently, fewer than one in five immigrants is European. Almost 40 percent of recent immigrants are from Asia (especially Southeast Asia), and a roughly equal number originate in Mexico, the Caribbean and Latin America.<sup>1</sup> Most immigrants, therefore, come from countries that are poorer and less educated than the United States. Table 2 also shows the share of 1980s immigrants from each region who have less than a high school education. The source country composition of immigration has shifted toward countries whose immigrants have less education. Forty-one percent of all new adult immigrants do not possess a high school diploma, in comparison to 23 percent of natives. It is interesting to note that the educational distribution of immigrants is relatively bimodal: although the average level of schooling possessed by immigrants is lower than natives', 24 percent of new immigrants to the United States are

<sup>1</sup>In the 1980s, the share of Mexicans alone was as high as 22.6 percent.

**Table 2**  
**Source Country and Educational Composition of U.S. Immigration**

	1951-60	1993	% less than high school
Europe	52.7	18.3	19.3
Asia	6.1	38.2	26.4
Canada	15.0	2.6	14.0
Mexico	11.9	14.0	76.1
South and Other America	12.7	23.3	48.4
Africa	.6	2.8	12.5
Other	1.0	.7	23.8

*Note:* “% less than high school” is the percentage of people who immigrated to the United States in 1980-90 who were aged 25 or older in 1990 and did not possess a high school degree.

*Source:* U.S. Immigration and Naturalization Service, *Statistical Yearbook of the INS 1993* (1994), U.S. Bureau of the Census, *The Foreign-Born Population of the United States, 1990 Census of Population* (1993a).

college graduates, compared to 20.3 percent of natives. The low level of education possessed by many immigrants has important implications for their potential impact on the U.S. economy.

A small percentage of immigrants to the United States entered or have remained in the country illegally (Warren and Passel, 1987; Chiswick, 1988; and Borjas, Freeman, and Lang, 1991). The flow of illegals has been estimated to be between 200,000 to 300,000 per year, compared to a legal flow of about 900,000 per year. The illegal immigrant population was estimated at around 3.4 million in 1992 (equal to 1.3 percent of the U.S. population), when the stock of foreign-born in the United States was about 21 million (equal to 8.2 percent of the U.S. population). About 40 percent of the illegals have come to the United States from Mexico.

Undocumented immigrants tend to concentrate in certain cities, industries and occupations. For example, it is estimated that 43 percent of all illegal aliens live in the state of California, a state in which 21.7 percent of the population is foreign-born, and illegal immigrants comprise 4.7 percent. California recently voted into law the controversial Proposition 187, which would make illegal aliens ineligible for public health and education services. Another third of the illegal immigrant population lives in New York, Texas and Florida. The greater concentration of undocumented workers will make their impact less diffuse than that of legal immigrants. The effect of illegal immigration may also be qualitatively different from that of legal immigration, since illegal workers are constrained in the types of jobs they can take. Empirical study of the effect of illegal immigration on the labor market is, of course, hampered by the difficulty

in obtaining data on their presence in the labor market, conditions of employment and so on.

A key factor determining the impact of immigration on the receiving economy is how many immigrants remain permanently in their host countries and how many eventually return to their countries of origin. It is very difficult to obtain data on remigration, but it has been estimated that roughly one in four immigrants to the United States eventually returns permanently to his or her country of origin.<sup>2</sup> In addition to the rate of remigration, the question of who returns is also important for understanding the long-term impact of immigration. Return migration may be dominated by people who fail to do well in the United States, give up and return home, or by those who are most successful. In this way, selective remigration may magnify or mitigate the initial impact of immigration.

### **Theoretical Impact of Immigrants on Native Factors of Production**

Theoretical predictions of the impact of immigration on the wages of natives depend upon the model used. The most important modelling decisions are whether the host economy is open or closed to international trade and the degree of substitutability between immigrants and natives.

In a closed economy model, immigrants will lower the price of factors with which they are perfect substitutes, have an ambiguous effect on the price of factors with which they are imperfect substitutes and raise the price of factors with which they are complements. For example, consider an economy where production takes place using capital and skilled labor, which are complementary, and unskilled labor, which is a substitute for the other two factors. If immigration of unskilled workers occurs, the wage of unskilled workers will fall, while the effect on the return to capital and the skilled wage will be ambiguous. The fall in the unskilled wage will induce employers to substitute away from capital and skilled labor to unskilled labor. However, since the greater supply of unskilled labor means that optimal output is now higher, this scale effect will induce employers to use more of all inputs. If the immigrants are skilled, they will lower the skilled wage, causing an ambiguous effect on the unskilled wage, due once again to competing substitution and scale effects. However, the fall in the skilled wage and the rise in skilled employment will lead to increased demand for the complementary factor, capital, and hence an increase in the return to capital.

<sup>2</sup>Warren and Kraly (1985) and the Immigration and Naturalization Service (1994) estimate a remigration rate of 31 percent for all immigrants during 1901–90 and 22 percent for those who arrived between 1981–90.

Immigration will lower the wage more if immigrants are prepared to work for less than natives, as seems plausible in the case of illegal immigrants, for example. An influx of such immigrants not only shifts labor supply, but makes it more elastic.

In the most commonly employed open economy model, the Heckscher-Ohlin model, the results are quite different. If technology is assumed to be the same across countries, trade will be driven by factor endowments, and factor price equalization occurs if countries' factor endowments are not too different. In this situation, immigration will cause production of the more labor-intensive good to increase, but factor prices will remain unchanged. In an open economy, the adjustment may be thought of as occurring through the labor embodied in traded goods: immigration will cause the country to compensate by exporting more (or importing less) labor as embodied in goods.

Notice that if factor price equalization obtains, there is no (economic) reason for migration to occur between countries. An explanation for migration from poor to rich countries in the context of this model could be that rich countries have tariffs on goods that make intensive use of unskilled labor, in an attempt to raise the domestic wage of unskilled labor above the world level. If labor is mobile, however, immigration of unskilled labor from abroad will occur until the wage of such labor returns to the world level (by which point the country will be specialized in the production of the good that makes intensive use of unskilled labor). Once the country is specialized, the impact of immigration will have effects similar to those of the closed economy case. If immigration is restricted—as it is in reality—the wage could remain above the world level for some time. Notice, however, that if capital is internationally mobile, factor price equalization should occur even if tariffs and restrictions on labor mobility are present.

A model of trade and factor flows that captures many realistic features is one in which countries have very different endowments of factors, and factor price equalization might not occur even with free trade; rather, countries will specialize in production, instead of each producing all goods. Thus, countries with a large labor endowment will produce a more labor-intensive mix of goods than countries with a large capital endowment. The resulting cross-country differences in wages could then generate migration. In this case, the impact of a labor influx will then depend upon its size: a large enough inflow will force the country to move to a more labor-intensive mix of products, which will lower the wage (and increase the return to capital). Enough migration (or capital movement) will once more eliminate wage differentials. On the other hand, a small inflow will not affect wages, as the country will increase production of its relatively labor-intensive goods and sell more of those goods on the world market, and thus factor price equalization will be achieved through trade.<sup>3</sup>

<sup>3</sup>If technologies are allowed to differ across countries, as in Markusen (1983), factors will flow toward the country that has an absolute advantage in their use.

If the country receiving immigrants is a large one, the increase in output of labor-intensive goods spurred by immigration will reduce the world prices of those goods. This may reduce the wage, even under conditions where factor price equalization would hold for a small country.

Any changes in wages of native groups will be accompanied by changes in native employment or hours worked. In the example of unskilled immigration to a closed economy, although total employment of unskilled workers (including immigrants) will increase, the fall in the unskilled wage will cause some natives to leave the labor force or reduce their hours, and the employment rate (or labor force participation rate) of natives may fall. Conversely, the employment rate of any group whose wage rises as a result of immigration is likely to increase.

These models do not directly predict that unemployment will result from immigration, yet they do predict movements of factors between production sectors of different factor intensity (even in models with factor price equalization), and to the extent that job matching and capital movement do not occur instantaneously, unemployment will result in the short run even for natives. The job search problem will of course be more acute for the immigrants themselves, all of whom must find new jobs. In the closed economy model, which predicts an adjustment of the wage, unemployment could result if the wage is made rigid by institutional arrangements. This is particularly likely in the European setting, in countries where union contracts apply to most workers. In such a case, the adjustment to immigration will come through unemployment rather than through reduced wages.

Models that do admit equilibrium unemployment include the efficiency wage model of Shapiro and Stiglitz (1984). In that model, firms cannot perfectly observe workers' level of effort, and so to elicit higher productivity, they need to build in an incentive for workers not to shirk. Equilibrium unemployment serves as that worker discipline device. Workers who are caught shirking are fired, so the fear of becoming unemployed induces workers to put forth effort, as long as the wage is sufficiently high. In equilibrium then, wages are negatively related to the unemployment rate.

In this model, an influx of immigrants increases the size of the labor force, which allows firms to lower the wage and raise employment. However, the lower wage must be accompanied by a rise in the unemployment rate to maintain workers' incentive not to shirk. How the rise in unemployment is distributed across natives and immigrants is an empirical question.

## **Empirical Approaches to Evaluating Labor Market Responses**

### **Cross-Section Differencing**

Most approaches to measuring the impact of immigration on the labor market outcomes of natives have used as a starting point the idea that one can look at a cross-section of cities or regions in a country and use variations in



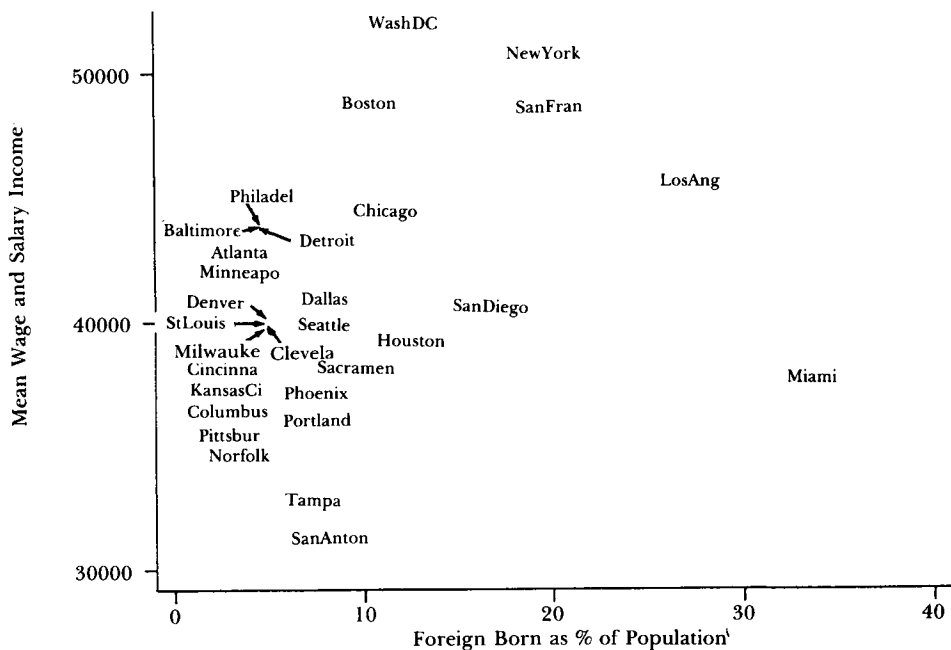
immigrant density to identify the effect of immigrants on the outcome of interest. For example, one might look at the proportion of immigrants in many cities and the level of wages in those cities. A possible difficulty with this approach follows from the discussion of open economies: in the presence of free trade within the recipient country, along with capital mobility or labor mobility, factor price equalization is likely to obtain. In this case, even if immigrants affect native wages at the national level, an uneven distribution of immigrants across the country may not result (in the long run) in cross-section wage differences, as wages may be equalized by flows in goods or factors. It appears likely, however, that regional wage differentials may appear in the short term as the result of supply or demand shocks.

Another important consideration is the fact that immigrants may choose where to settle in the receiving country. Immigrants, likely to be the most mobile of workers, will probably move to those regions whose demand shocks have led to higher wages. Because of this endogeneity, a naive econometrician might conclude that greater immigrant density leads to higher wages. In fact, if one plots the mean 1990 wage and salary income of the 30 largest Standard Metropolitan Statistical Areas (SMSAs) in the United States against the fraction of those cities' population that is foreign-born, as in Figure 3, one finds that cities with higher immigrant densities also have higher mean incomes. The correlation between these two variables is 0.37.

If immigrants choose their location based upon the level of the wage, but not on foreseen rises in it, the endogeneity problem may be circumvented by using data from two or more time periods. The change in immigrant density will not be affected by the change in the local wage, and any correlation between those two changes will be attributable to the effect of a change in immigrant density on the change in the wage. Differencing also eliminates location-specific effects that do not vary over time and offers the advantage of focusing more on the short term by looking at the effect of immigrant flows rather than stocks. However, if immigrants choose locations with growing wages, a spurious positive correlation between immigrants and wages will still be present in the differenced estimation.

In an example of differenced estimation, Goldin (1994) exploits U.S. cross-city variation using several sources of data from the period 1890–1923. She examines the effect of changes in the number of foreign-born as a fraction of city population on changes in wages in different occupations and industries, matching the city-level wage data with information on immigrant density taken from the nearest Censuses of Population. For some subperiods and groups, the effects are positive or zero, but the most common result is that a 1 percentage point increase in the fraction of the population that is foreign-born reduces wages from 1.0–1.6 percent. Some of Goldin's results may be affected by the "composition" problem, common to many papers in this literature: city-level wages are a composite of the wages of immigrants and natives in that location. Therefore, if immigrants earn less than natives, cities with higher proportions of immigrants will have lower average wages, even if immigrants have no

Figure 3

**Earnings and Immigrant Densities in the 30 Largest SMSAs**

Note: Income numbers are at the household level.

Source: U.S. Bureau of the Census (1993b).

negative impact on the native wage. Without being able to distinguish native from immigrant earnings, it is not possible to sort out between these two alternatives.

In a cross-section study of more recent data, LaLonde and Topel (1991) examine levels and changes in immigrant density across U.S. cities (SMSAs), but analyze individual-level census data on males from 1970 and 1980, and allow different waves of immigrants to have different effects. The use of individual-level data reduces the simultaneity problem, because it is possible to control for many of the characteristics that might cause people to move to growing areas. It also allows city-specific effects to be controlled for, even in an undifferentiated cross-section. However, the problem remains that flows of goods or people may diffuse the effects of immigration and render them imperceptible to cross-section analysis.

Lalonde and Topel (1991) focus upon the effect of different immigrant cohorts on each other, reasoning that since immigrants will affect each other more than they affect natives, any effect found can be viewed as an upper bound on the impact of immigrants on native groups. The largest effect found is the impact of male immigrants who have been in the United States for five or

fewer years on their own group: the preferred estimates suggest that increasing the fraction of such immigrants in the labor force by 10 percent reduces their wages by about 0.3 percent. If young blacks and Hispanics are included as groups in this analysis, their wages are found to be insignificantly affected by the number of immigrants (the point estimates are similar to the inter-immigrant group effects). The results are not sensitive to whether annual or weekly wages are used, which leads the authors to conclude that time without a job, measured either by unemployment or by exiting the labor force, is not an important factor. These findings suggest that the labor market impact of immigrants is not a cause for concern.

### **Instrumental Variables**

The next step in sophistication is to find “instruments” for the change in immigrant density. If a variable can be found that is sufficiently correlated with the change in immigrant density, but does not directly influence the outcome variables, one can use the instrumental variables technique to remove the bias due to immigrant choice of regions with improving outcomes. If the instrumental variable is also uncorrelated with omitted information on trade flows and the mobility of native labor and capital, the bias due to their omission will also be remedied.

The challenge is to find a suitable instrument. As one example, Altonji and Card (1991) use the stock of immigrants in 1970 as an instrument for the change in the fraction of foreign-born individuals in the population from 1970 to 1980. Their logic is that in this period, new immigrants tended to move to places where similar immigrants already resided (Bartel, 1989) and that this initial concentration of immigrants does not directly influence the outcome variables. They try to explain changes in wages and unemployment across SMSAs from 1970 to 1980, controlling for changes in average age and education in each metropolitan area. The analysis focuses on the less-skilled native groups one would expect to be most negatively affected by immigration: white male high school dropouts, and black and white females and black males with high school education or less. The results suggest that immigrants had an unexpected *negative* effect on unemployment in the census week. They also had a negative effect on the fraction of the population who worked in the previous year and on weekly earnings in the previous year. No significant impact was found on the labor force participation rate or the employment to population ratio in the census week or the number of weeks worked in the previous year. The magnitudes of the coefficients imply that a 1 percentage point increase in the percent of foreign-born in a city reduces the unemployment rate by 0.23 percentage points; reduces the number who worked in the previous year by 0.25 percentage points; and reduces wages of unskilled natives by 1.2 percent, at most.

Along with those of Goldin (1994), the Altonji and Card (1991) wage results are among the most negative found by studies with an important

cross-section dimension. The instrumental variables technique should eliminate positive bias caused by immigrants moving to areas with growing wages, as well as bias toward zero due to factor price equalization across the country. This may explain why Altonji and Card arrive at a more negative figure than most papers that do not use instrumental variables. To compare their results to those of other studies, it is necessary to convert the wage coefficient into an elasticity: for a city whose foreign population share increases from 7 to 8 percent (a 14 percent increase), the wage is predicted to fall by 1.2 percent. Hence, in their results, a 10 percent increase in foreign share implies a 0.86 percent fall in wages (weekly earnings).

It is interesting to put these instrumental variables results into perspective by comparing them with related results on the expansion of the U.S. workforce with the labor force entry of the post-World War II baby-boom generation. Welch (1979) studies the effect of generational crowding on wages. He finds that for white male high school dropouts, an age cohort which is 10 percent larger will have 0.8–1.8 percent lower weekly earnings, which is similar to the immigrant crowding effect. However, Welch also finds that the effect of a large age cohort on annual earnings is about 2.5 percent, which implies that an important part of the effect of crowding comes through less employment, together with the lower wages. By contrast, Altonji and Card (1991) find that immigration has either a small or positive effect on employment. Taken together, these results imply that the overall adverse impact of immigration is smaller than that of generational crowding. Welch calculates that the baby boom was responsible for a 12 percent drop in the wages of high school dropouts from 1967–1975. To induce the same wage reduction would require a 140 percent (or 10 percentage point) increase in the immigrant share, using Altonji and Card's estimate.

Another perspective on the size of these results is what they imply for changes in immigration policy. According to these estimates, had the United States increased by 10 percent the number of immigrants admitted in the 1980s, the immigrant density would have been 0.25 percentage points (or 4 percent) higher than it was at the end of the decade, and U.S. wages would have been 0.4 percent lower as a result. As another example, if there were no illegal immigrants in California, the wage level would be 2.0–5.5 percent higher.<sup>4</sup>

Comparative studies across countries shed light on whether these results from the United States hold in other labor market settings. In their study of the West German labor market, Pischke and Velling (1994) apply the technique

<sup>4</sup>Measuring immigration's impact in California is problematic because the density of immigrants is so much higher there than the U.S. average on which most estimates of the wage elasticity are based. The distinction between percent changes and percentage point changes becomes important here.

developed in Altonji and Card to German data for 1985 and 1989. It is interesting to note that they also find no significant detrimental effects of immigrants on employment, unemployment or wages. This accords with the evidence from the United States discussed so far.

### **Production Functions**

A less common use of cross-section data has been to estimate a production function to compute elasticities of substitution between immigrants and natives, which allows computation of the effect of immigrants on other factor prices. Jean Grossman (1982) carries out such a study, based on the estimation of a trans-log production function using 1970 data across SMSAs. Grossman finds significant effects of immigrants on natives, with magnitudes suggesting that a 10 percent increase in the number of employed immigrants would reduce native wages by 1 percent. In this model, it should be noted that natives are not distinguished by skill.

### **Factor Price Equalization Considerations**

The literature relying primarily on cross-section data thus finds modest effects of immigrants on natives' labor market outcomes. However, as already discussed, the results of these studies are likely to be biased toward zero if instrumenting has not successfully dealt with the immigrants' location decision. Also, such cross-section studies are likely to be biased toward zero if the effects of immigration are spread evenly across an economy by factor price equalization, which is the issue confronted in this section.

The question of whether factor price equalization holds within a country is difficult. Different regions do appear to have product mixes that vary in how intensively they use different factors, yet the resulting wage differentials should vanish in the presence of labor or capital mobility. If mobility costs are postulated, it is possible that wage differentials could exist in the steady state. Yet even under this scenario, relative wages across regions will be less sensitive to immigration than the national wage, assuming domestic regions are more open to each other than the national economy is to other countries.

Some empirical evidence is available to assess the extent and speed of factor price equalization. For the United States, Blanchard and Katz (1992) document that wage differentials caused by a demand shock of 1 percent to employment growth in a particular state appear to linger for up to 10 years, and unemployment and labor force participation differentials for about 6 years. In a parallel study of Europe, Decressin and Fatàs (1995) find that unemployment and labor force participation are perturbed for about 4 years by region-specific shocks (they do not analyze wages). These studies suggest that it is reasonable to seek the impact of immigration by using cross-section data on

regions, and that the bias toward zero due to factor price equalization may be small.

Some cautionary evidence is provided by Filer (1992) and White and Hunter (1993), whose studies of the 1970s show that internal migrants in the United States avoided those areas where immigrants were arriving from abroad. This can be seen as a mechanism through which factor price equalization could occur. Although the skill composition of internal migrants may be different from that of immigrants from abroad, internal migrants presumably have a qualitatively similar effect on wages. Failing to take into account the fact that net internal migration to a region falls in response to immigration from abroad will lead to underestimates of the effect of immigration on wages in cross-section studies. This is because a reduction in net migration to high-immigration areas will keep wages there higher than they would otherwise have been. The bias caused by the omission of internal migration may be remedied by suitable instrumental variables, and may therefore be less of an issue in the Altonji and Card (1991) estimation than in the LaLonde and Topel (1991) estimation. More recent work on internal migration has failed to confirm the offsetting effect found in the earlier analyses,<sup>5</sup> but it nevertheless underscores the importance of instrumenting for the immigrant density.

In summary, it is probably reasonable to assume that factor price equalization is not so rapid or complete as to render cross-section analysis of immigration useless. However, it remains important to use instrumental variables to capture the impact of immigration, both to take into account the choice of location by immigrants and also the possibility of compensating flows of factors and goods.

### **Natural Experiments**

A number of studies examining “natural experiments” in immigration are able to shed light on the importance of biases in cross-section analysis. These studies seek episodes where the timing and location of immigration may be politically rather than economically motivated, which reduces the problem of immigrants choosing locations based on their labor market conditions. For example, Card (1990) examines the impact of the Cubans who increased Miami’s population by about 7 percent in the May 1980 Mariel boatlift. The timing of this influx was politically determined, and the arrival location was to some extent exogenous, due to Miami’s proximity to Cuba (although not all the Mariels remained in Miami). It is thus reasonable to examine the evolution of variables of interest in the period immediately following the boatlift, comparing

<sup>5</sup>For examples, see Butcher and Card (1991) and White and Liang (1994), using U.S. data from the 1980s, and Pischke and Velling (1994) using data from Germany.

the outcomes with those in similar cities and ascribing differences in patterns to the arrival of the Mariels.<sup>6</sup>

Using yearly data from the Current Population Survey, Card (1990) considers wages, employment rates and unemployment rates for unskilled whites and blacks, for non-Cuban Hispanics and for Cubans. Only Cubans appear to have been negatively affected. The observed pattern for Cubans, however, seems consistent with the idea that their relative decline was a compositional effect, caused by the addition of the Mariels, who (as is known from a 1985 survey) earned less and had higher unemployment than other Cubans. Card finds that population growth in Miami slowed, however, and he speculates that other migration to Miami may have been reduced in response to the boatlift. Since Card examines yearly data, however, any type of factor price equalization adjustment must have happened very quickly.

In another natural experiment, Hunt (1992) examines the repatriation to France of Algerians of European origin prompted by Algerian independence in 1962. This influx of skilled labor increased the French labor force by 1.6 percent. Its timing was exogenous, and the location of the repatriates determined to a large extent by climate (and proximity to port of arrival). In a differenced cross-section analysis for the years 1962 and 1968, Hunt uses as instrumental variables the temperature of the region and the stock of pre-1962 repatriates. She finds that a 1 percentage point increase in the repatriate share of the labor force reduced the wage of a region by at most 0.8 percent (zero in some specifications) and raised the unemployment rate of natives by 0.2 percentage points. It also turned out that other immigrants from abroad were more likely to move to areas with more repatriates, and this effect offset the reduction in internal migration to these areas caused by lower wages and higher unemployment.

A final example along these lines is the return of Portuguese colonialists from Africa after a Marxist revolution in 1974, studied by Carrington and deLima (1994). They use a time-series specification, comparisons with Spain and a cross-section across the twelve provinces of Portugal. They find that their results are very sensitive to the approach taken. On the whole, the natural experiment literature adds to the evidence suggesting a limited impact of immigrants on natives.

### **Time Series**

The use of time-series data at a national level avoids any bias toward zero due to factor price equalization and endogenous regional choice of immigrants,

<sup>6</sup>This kind of analysis is not possible in general, because only the census provides information on birthplace, rather than simply ethnicity.

but introduces a different bias toward zero: immigrants will tend to come to a country at times when labor market outcomes are favorable. An additional difficulty is that of modelling the movement of wages over a long time period. In an example of pure time-series analysis, Pope and Withers (1993) find no negative effects of immigration on Australian natives over the period 1861–1981. In their study, they use the labor market characteristics of sending countries and transport costs to Australia as instrumental variables for the migration rates.

### **Wage Inequality Literature**

A series of recent papers motivated by rising inequality has estimated elasticities similar to or smaller than the Altonji and Card and Goldin estimates, but in a context that suggests immigration may have economically important effects. These papers use the yearly data from the Current Population Survey to estimate how the relative supplies of different educational groups affect their relative wages. Such studies have used both time-series and regional cross-section analysis. A calculation is then made as to the contribution of immigrants to the increase in the relative supply of the least-educated group in the 1980s and, hence, to the relative decline of the wage of the less skilled. To compare the results with those discussed so far, we must assume that the increase in inequality comes entirely from a fall in the wage of the less skilled. The elasticities calculated using this assumption will thus overstate the negative impact of immigration on the absolute wage of the unskilled.

Borjas, Freeman, and Katz (1992) use time-series data for the United States from 1967–1987. Their results suggest that immigration accounted for one-quarter of the 10 percent decline in the relative earnings of high school dropouts from 1980–1988, a period when immigrants as a proportion of the labor force rose from 6.9 percent to 9.3 percent. This means a 1 percentage point increase in the proportion of immigrants reduces the absolute wage of dropouts by at most 1.2 percent, the same magnitude calculated by Altonji and Card.

Borjas and Ramey (1993) look at relative wages in a panel of 44 SMSAs from 1977–1991, using data from the Current Population Survey. Their estimates suggest that a 1 percentage point increase in fraction foreign-born reduces the wage of high school dropouts relative to college graduates by 0.6 percent. This is half as large as the Altonji and Card estimate.

Greater reliance on time-series data avoids the biases present in the cross-section estimation toward finding no effect of immigration (like the problems involving immigrant choice of location and factor price equalization discussed earlier). It seems likely, however, that data constraints cause the estimates in the wage inequality literature to overstate immigration's impact on native wages. One reason is the composition problem: the results confound the



negative impact with the purely mechanical negative effect on the average unskilled wage of adding unskilled immigrants, whose earnings are below the unskilled native average. The method also constrains the effect on relative wages of increasing the supply of unskilled workers to be the same, whether the increase is due to natives or immigrants, but since unskilled natives are probably better substitutes for each other than are unskilled immigrants, the elasticity estimated will be larger than the true elasticity for unskilled immigrants.<sup>7</sup> Both of these problems arise due to data constraints, since the immigrant density can be calculated from the CPS only for certain years. Notice that if foreign-born high school dropouts earn 20 percent less than native dropouts, the increase in their number from 1980–1988 would be expected to reduce the average dropout wage by 1.5 percent just due to the composition effect, and this magnitude is large compared to the total impact of 2.5 percent ascribed to immigration in Borjas, Freeman, and Katz (1992).

The wage inequality literature thus points to an upper bound on the negative effect of immigration on wages similar to that of the cross-section literature, but suggests the true effect is considerably smaller. The upper bound would suggest that immigration had a significant role to play in the rise in inequality in the 1980s.

## **Immigration and Growth**

Labor economists interested in migration have focused empirically upon labor market outcomes such as wages and employment. They have typically assumed an economy with an aggregate production technology displaying constant returns to scale. Macroeconomists and international economists have paid some attention to the question of the influence of migration on (per capita) growth, which may be particularly interesting in the context of increasing returns to scale. Of course, growth would then feed back into the variables traditionally in the domain of labor economists. While recent theoretical work has made strides toward explaining the possible links between immigration and growth, only a few empirical studies have been conducted, and no clear picture has emerged from these.

A simple theoretical analysis can be based on a modified Solow (1956) growth model. Production is a function of labor and human capital, which are internationally mobile, and physical capital, which is not. Assume there is no

<sup>7</sup>Borjas and Ramey (1993) recognize this problem, and they include the percentage foreign-born explicitly on the right-hand side of their regression, which avoids constraining the impact of natives to be the same as that of immigrants. However, their foreign-born variable is constructed by interpolating between the 1970 and 1980 censuses and the 1989 CPS, and the time-series variation is thus to a large extent a trend.

trade between countries.<sup>8</sup> A country receives immigrants if it has a higher ratio of physical capital to labor, which implies a higher wage rate. Immigrants are assumed to bring no physical capital with them, but they do bring human capital and will bring more human capital if the ratio of physical capital to human capital is high. In such a model, the key to the impact of immigration is whether immigrants bring enough human capital to offset their dilution of physical capital in the receiving economy. If immigrants have little human capital, their impact is akin to that of faster population growth in slowing per capita growth. If immigrant human capital levels are higher than natives' by a sufficient amount, growth will be speeded up.<sup>9</sup>

Obviously, these models have their limitations. They view economies as closed except to immigrants and the human capital they carry. They also tend to imply that in the long run everyone lives in one country. Braun (1992) extends the models to allow for perfect physical capital mobility and introduces the concept of a natural resource that is subject to congestion. People and capital will move to places well endowed with this resource or with better technologies, but this migration will not continue forever, due to the increasing congestion of the natural resource.

When the assumption of constant returns to scale production is replaced with that of increasing returns to scale, the results are transformed. Brezis and Krugman (1993) formalize this in a free trade model where the country receiving immigrants can borrow and lend at the world interest rate. In this case, if (exogenous) immigration occurs, output will increase more than proportionately, which implies a rise in the rate of return to capital as well as an increase in the wage. Since the interest rate must equal the world rate, however, the capital-to-labor ratio will rise in response, further increasing the wage. Since a higher quantity of labor results in a higher wage in these models, the receiving country's aggregate labor demand curve becomes upward sloping.

The theoretical models generally predict that a migrant will move either to a country with a higher wage or a country where the expected stream of wages is higher. But if higher immigration can help create the higher wages that make that immigration attractive in the first place, then there is simultaneity between growth and migration that will be difficult to disentangle empirically. A paper that tackles this issue is that by Barro and Sala-i-Martin (1992). They include migration in an equation regressing growth in per capita income on the level of per capita income (and other variables) for Japanese and American regions in different time periods. In this context, the coefficient on the level of income indicates the rate of convergence between regions (which one could

<sup>8</sup>Some readers may recognize this as a human capital-augmented Solow-Swan model. The theoretical discussion of growth in this section draws heavily on Barro and Sala-i-Martin (1995).

<sup>9</sup>These results are little altered by moving to a Ramsey growth model, which allows the savings rate to be endogenous. For details, again see Barro and Sala-i-Martin (1995).

view as recovery from shocks or as short-term growth). The impact of migration on growth may be judged in two ways: by the way in which including a migration variable affects the estimated convergence coefficient and also by the actual coefficient on migration, which can be interpreted as the effect of migration on long-term growth. For both Japan and the United States, adding migration to the convergence regression raises the convergence coefficient slightly and yields a positive coefficient on migration. For the United States, this coefficient suggests that a 1 percentage point higher net migration rate is associated with a 0.1 percent higher growth rate.

If measures of temperature and population density of the region (the latter proxying for housing costs or, possibly, the congestable resource of Braun's model) are used as instrumental variables for migration, the coefficient becomes insignificant for both the United States and Japan (and the convergence coefficient is virtually unchanged). The point estimate suggests that a 1 percentage point rise in the net migration rate raises long-term growth by 0.01 percent for the United States, and by 0.04 percent for Japan. The authors conclude that migration has little effect on growth, but the results may be due to weak instruments.

A puzzle arises when the work of Barro and Sala-i-Martin (1992) is compared with that of Blanchard and Katz (1992), whose study of the U.S. states concludes that migration is the major labor market response to state-specific shocks to employment growth. The very different framework in which Blanchard and Katz study the question makes comparisons difficult, however. They estimate a system of equations for employment growth, participation rates and unemployment. Their results reveal that after a shock to employment growth in a state, participation and unemployment rates eventually return to their pre-shock levels. Employment returns to its old growth rate but no higher, which implies that employment is permanently lower than it would have been in the absence of the shock. Since participation and unemployment rates are back at their old levels, the lower employment must be due to emigration from the state. This picture suggests that migration is a very important equilibrating mechanism for recovery from shocks to a state, which is at odds with the Barro and Sala-i-Martin results.

There are few papers which can be appealed to for a resolution of this puzzle in the U.S. data. In a study of migration among the OECD countries, Dolado, Gorio, and Ichino (1993) contribute to our understanding of the question by performing structural estimation of the Solow-based model described above, using national panel data. Net migration is instrumented using lagged values of migration, savings rates, schooling rates and population density. The coefficient on the migration variable is not reported, but in their approach, adding migration reduces the convergence coefficient. Although they refer to migration in a different setting, these results are more in accordance with the Blanchard and Katz (1992) finding.

As outlined in the theoretical discussion, the expected results depend upon the human capital level of the migrants compared to the natives. Dolado, Goría, and Ichino document that immigrants to OECD countries have lower human capital than natives. Borjas, Bronars, and Trejo (1992) demonstrate that the Roy model captures self-selection among internal migrants in the United States: wage compression at home encourages the skilled to emigrate, while wage dispersion attracts the skilled. Immigrants move to where their skills are best rewarded, and thus relative immigrant quality will depend on the wage dispersion in the receiving region. Migrant quality has not been explicitly accounted for thus far in the internal migration and growth literature. It is conceivable that doing so might help resolve the puzzle of U.S. internal migration.

## Conclusion

Despite the popular belief that immigrants have a large adverse impact on the wages and employment opportunities of the native-born population, the literature on this question does not provide much support for this conclusion. Economic theory is equivocal, and empirical estimates in a variety of settings and using a variety of approaches have shown that the effect of immigration on the labor market outcomes of natives is small. There is no evidence of economically significant reductions in native employment. Most empirical analysis of the United States and other countries finds that a 10 percent increase in the fraction of immigrants in the population reduces native wages by at most 1 percent. Even those natives who should be the closest substitutes with immigrant labor have not been found to suffer significantly as a result of increased immigration. The upper bound on the wage impact is large enough to explain one-quarter of the rise in inequality in the United States in the 1980s, but the true effect is probably considerably smaller.

The theoretical literature on immigration and economic growth suggests that the impact of immigrants on natives' income growth depends crucially on the human capital levels of the immigrants. Empirical research on this question has yielded conflicting answers, and more work on this issue is needed.

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