Part 4

Other Effects of Immigration

9 Effects on Other Markets in the Destination

The previous two chapters discussed how immigration affects the labor market in the destination country, specifically, how immigration affects the wages and employment of natives in theory and in practice. This chapter considers other effects of immigration on domestic markets. Immigration increases the number of consumers in the destination, which leads to higher demand for goods and services. In addition, immigration adds to the local labor supply and increases the supply of certain products in an area. These effects translate into competing effects on prices: an increase in demand will lead to higher prices, while an increase in supply will cause prices to fall.

In the case of housing markets, the evidence indicates that the demand effect wins out, and immigration leads to higher housing prices. Immigration does appear to lead to lower prices for some other immigrant-intensive goods and services, however. Immigrants can add to product variety in a local area by creating goods and services that would not otherwise be offered. In addition, immigration may promote international trade and financial investment by improving information flows across countries. Finally, immigration may have macroeconomic effects by affecting physical capital, output and consumption in the destination country.

Housing

Economic theory tells us that as the number of consumers of a good increases, the price of that good increases. This holds for housing: an increase in the number of households in an area will raise the demand for housing. This will result in a rightward shift in the demand for housing and hence a price increase, as shown in Figure 9.1(a). Note that the figure assumes that the supply of housing is relatively inelastic, which is certainly true for areas where vacant land is scarce, such as parts of London. The rightward shift in demand causes prices to rise from P to P'. The equilibrium quantity of housing will increase as well (from Q to Q').

The elasticity of housing supply varies tremendously across regions and states. If housing supply is more elastic in an area, then an increase in housing demand will have less effect on housing prices, as shown in Figure 9.1(b). Either way, an increase in the number of home buyers or renters due to immigration will cause housing prices to increase. The extent of the effect depends on how many immigrants move into a region and how elastic (or inelastic) the supply of housing is in that region. Thus, the impact of immigrants to the local housing market really depends on the local situation. In areas with inelastic supply (such as San Francisco), an

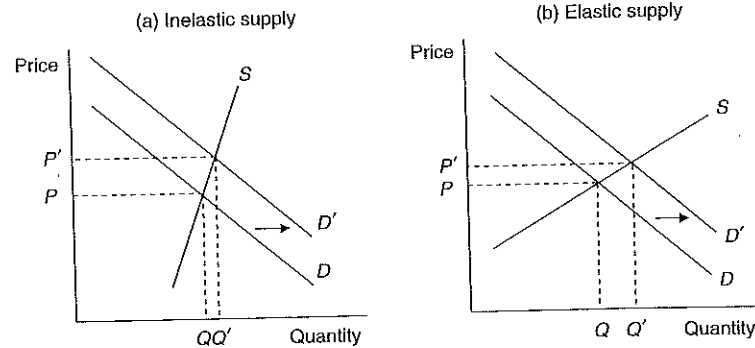### (a) Inelastic supply

(b) Elastic supply

Figure 9.1 Effects of immigration on the housing market.

In (a), the supply of housing is inelastic. An increase in the demand for housing causes the price of housing to increase sizably, from P to P'. In (b), the supply of housing is elastic. An increase in the demand for housing causes a smaller increase in prices.

influx of immigrants will lead to significantly higher housing prices. In areas with more elastic supply (such as Phoenix or Atlanta), an influx of immigrants will have a smaller positive effect on housing prices.

Higher housing prices have good and bad effects. On the positive side, they raise the value of people's homes. For many households that are homeowners, their house is a large portion of their overall wealth. Thus, higher housing prices can have positive effects on household wealth. However, higher housing prices make it more expensive for households to purchase a house or rent, and immigrants may crowd out some natives from the housing market. That is, by making houses more expensive, fewer households can afford to buy or rent housing, particularly low- and middle-income households. The majority of the adverse effects of higher housing prices are felt by households with lower incomes. Once again, there are winners and losers with migration, but now the benefits and costs are in terms of housing prices.

Immigrants could potentially affect housing prices through another mechanism. An increase in immigration to a region could lead to out-migration by natives. Natives may prefer not to live near ethnic enclaves, or they move away from areas where there is increased competition for jobs. Housing demand would still increase due to immigration (as long as emigration does not completely offset immigration), but the net effect would be smaller since some natives not leave the area, as shown in Figure 9.2. The resulting effect on housing prices would be dampened. Again, how much prices rise depends on how elastic the supply of housing is in that region.

If immigration and out-migration by natives are of similar magnitudes, immigration may have no effect on housing prices. This discussion shows how difficult it can be to tease out the effect of immigration since it may be offset by other effects. Economists therefore have to carefully analyze the various mechanisms that may be at play.

Economists have examined whether housing prices increase in response to immigrant inflows. Albert Saiz (2007) tests this hypothesis with U.S. data and finds that an immigrant
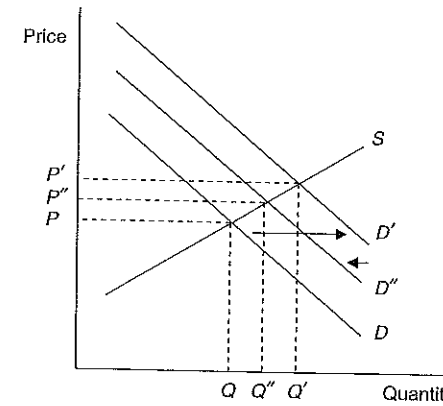
Figure 9.2 Housing market in the destination when natives respond to immigration by moving out of the area.

Immigration increases the demand for housing from D to D'. However, if some natives leave the area, the demand for housing may shift back part of the way (to D''). The resulting house prices (P'') are higher than without migration (P), but lower if there was no out-migration of natives (P').

inflow equal to 1 percent of the population of a large "gateway" U.S. city leads to a 1 percent increase in rental and house prices in that city. Gateway cities are cities that historically attracted a relatively large share of new immigrants, such as Los Angeles and New York City. This effect is sizeable compared with the labor market effects discussed in Chapter 8. In fact, Saiz points out that the positive effect of housing prices appears to be an order of magnitude bigger than the negative effect on wages. In addition, Saiz's analysis indicates that immigrants do not displace natives one-for-one: although some natives may migrate out of an area in response to the immigrant inflow, the overall positive effect on housing prices suggests that immigration increases housing demand and prices.

Research on Spain also finds that immigration affects housing prices. Libertad Gonzalez and Francesc Ortega (2013) investigate whether the housing market boom in Spain between 1998 and 2008 was due in part to the large inflow of immigrants the country experienced during that period. The foreign-born population in Spain rose from 0.5 million to 5 million in ten years! At the same time, house prices increased 175 percent. Gonzalez and Ortega find that immigrant flows are at least part of the story behind the housing market bubble in Spain. Their analysis concludes that the immigrant inflows, which increased the working-age population by about 1.5 percent annually, led to an annual increase in housing prices of 2 percent. This effect is even bigger than Saiz's estimate for the United States. In fact, Gonzalez and Ortega claim that immigrant inflows explain why the housing boom was larger in Spain than in other parts of the European Union and in the United States.

Other economists have studied how immigrants affect the cultural diversity of a city. Gianmarco Ottaviano and Giovanni Peri (2006) measure the economic value that immigrants bring to U.S. cities. They find that immigration raised the average rental prices that U.S.

natives paid in major cities during 1970 to 1990; immigration also raised the average wage of natives, according to their study. Unlike Saiz, who argues that immigrants raise house prices by increasing housing demand, Ottaviano and Peri suggest that immigrants raise housing values because they bring cultural diversity, which some natives value, and higher wages.

Prices of goods and services

Immigrant workers contribute to the supply of goods and services. As discussed in Chapters 7 and 8, immigration may put downward pressure on wages. Lower labor costs may translate into lower prices for goods and services, particularly in sectors of the economy in which immigrant workers are concentrated.

For example, consider the landscaping industry in the United States. Approximately 30 percent of workers in this industry are low-skilled immigrants (Cortes, 2008). Immigration may have reduced labor costs in this sector, leading to an increase in the supply of landscaping services. Figure 9.3 shows the effect of immigration on the market for landscaping services. The price of landscaping services falls in response to the rightward shift in the supply curve.

This is also true for other industries in which immigrants represent a significant share of the labor force, such as housekeeping, babysitting and dry cleaning. All of these sectors are nontradeable services. Nontradeable services are services that are not traded in international markets. The country cannot import the service from abroad and therefore has to produce it using the local labor force. Nontradeable goods and services face less competition, and less competition can cause prices to be higher. However, if the labor force includes lots of immigrants who are working locally in these industries, that can help to keep prices down.

This is exactly what Patricia Cortes (2008) finds when examining U.S. price data during 1980 to 2000. Service industries, such as landscaping, in which low-skilled immigrants comprise a sizable share of the labor force, are classified as immigrant-intensive services. Cortes finds that a 10 percent increase in the share of low-skilled immigrants in the labor force causes a 2 percent decrease in the prices of immigrant-intensive services. Her estimates suggest that
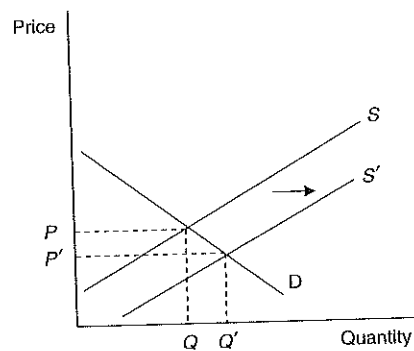

Figure 9.3 Market for landscaping services with immigration.

Immigration leads to a rightward shift in the supply curve for landscaping services. The price of landscaping services falls from P to P'.

U.S. immigrant inflows during 1980 to 2000 reduced the price of immigrant-intensive services by at least 9 to 11 percent in the average U.S. city.

Lower prices are a good thing for consumers. Undoubtedly, lots of families have benefited from lower prices for landscaping and babysitting. In fact, studies suggest that lower daycare costs due to immigration have encouraged more high-skilled female natives to work (Furtado and Hock, 2008; Cortes and Tessada, 2011). Cortes finds that high-skilled U.S. natives have benefited the most from the price decreases because they spend more on these types of services. Low-skilled natives benefit less since they consume less of these services. Meanwhile, low-skilled natives are more likely than high-skilled natives to compete with low-skilled immigrants in the labor market. Low-skilled natives are therefore more likely hurt by immigration through lower wages. Notice that in Figure 9.3, the demand for landscaping services does not increase as a result of more immigration. It is not likely that many low-skilled immigrants would use landscaping services given their relatively low incomes. Therefore, more immigration of low-skilled workers would not lead to an increase in the demand for landscaping workers that could offset the negative wage effect of the increase in labor supply.

Immigrants do increase the demand for certain goods and services, which can put upward pressure on prices. In addition to housing, immigrants increase the demand for many different types of necessities (such as food) and wants (such as cell phones), which can make those goods and services more expensive. Overall, immigration can have important distributional consequences on natives' purchasing power: An increase in immigration of low-skilled workers would favor high-skilled natives by reducing the prices of services they purchase but hurt low-skilled natives by reducing their purchasing power via higher prices on some goods and services and lower wages.

Product diversity

Have you ever walked through an immigrant community, like Chinatown in London or San Francisco, or Little Italy in New York City or Buenos Aires? If so, you would notice that consumers can obtain goods and services there that are difficult to find elsewhere in the country. Immigrant communities add to the variety and diversity of products in a country. Think about the wonderful mix of ethnic food that consumers can find in New York City and London. The majority of the ethnic food produced in those cities is produced by immigrants. Not only do immigrants add to the variety of food, but they add to the quality. In fact, as the size of the immigrant population increases in an area, both the quantity and the quality of ethnic food increase. Many would argue that large immigrant cities have some of the best restaurants in the world, and it is due to the diversity of food that immigrants bring with them to their destination.

Immigrants have a comparative advantage in the production of ethnic goods. A comparative advantage is when an individual or group can perform an economic activity at a lower opportunity cost than other individuals or groups. In this case, immigrants can make food from their home country at a lower cost and higher quality because they have the skills and knowledge to do so. Ethnic restaurants are another good example of nontradeable goods and services since they are locally produced. While the public has long viewed this type of diversity as an important effect of immigration, economists have only recently started to quantify these effects.

Immigrants can affect product diversity (or product variety) in the destination in two ways. First, they form part of the consumer base and increase the demand for ethnic goods. For example, they may want to buy certain types of rice or seasonings in the destination. The increase in the demand for these goods and services is shown in Figure 9.4. This increased demand for ethnic goods will encourage producers to supply these goods, and they then become available to native consumers. Second, immigrants are often suppliers of ethnic goods, as in the case of ethnic restaurants. Figure 9.4 also shows an increase in the supply of ethnic food. By consuming and producing ethnic food, immigrants increase both the quantity and quality of the food. This leads to more options, or "consumption variety," for natives.

The overall impact of immigration on the prices of ethnic goods and services depends on which effect dominates, demand or supply. As shown in Figure 9.4, if the increases in the demand and supply of ethnic food due to immigration are of the same magnitude (leading to equivalent rightward shifts), then the net effect on prices is zero. However, if the supply shift is larger, then the net effect on prices would be negative (it would be positive if the demand shift is larger). No matter what, an increase in immigration will lead to more ethnic food in equilibrium, as shown in Figure 9.4.

Ottaviano and Peri (2006) study the increase in consumption variety due to immigration and show that immigrants create more ethnic diversity in some local goods and services. As they state, "Who can deny that Italian restaurants, French beauty shops, German breweries, Belgian chocolate stores, Russian ballets, Chinese markets, and Indian tea houses all constitute valuable consumption amenities that would be inaccessible to Americans were it not for their foreign-born residents?" (p. 10). If natives prefer more variety and diversity in their consumption, then immigration improves the overall welfare of natives.

Francesca Mazzolari and David Neumark (2012) examine these effects in California, focusing on restaurants and retail industries. In terms of ethnic restaurants (which are nontradeable and immigrant-intensive, as discussed above), Mazzolari and Neumark find that an increase in the immigrant share in an area leads to an increase in share of ethnic restaurants in that area.
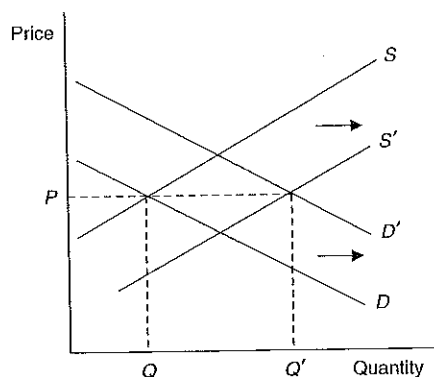

Figure 9.4　Market for ethnic food with immigration.

Immigration increases the supply and demand for ethnic food. If the increases in demand and supply are the same magnitude, then the price remains at P.

Their analysis suggests that the supply effect is larger than the demand effect, although both channels appear to be important in the market for ethnic restaurants.

However, the results are not the same for the retail sector. Mazzolari and Neumark find that there is less diversity in the retail sector as a result of immigration. Retail industries are much less immigrant-intensive than restaurants in that immigrants represent a smaller share of the workforce. In addition, immigrants tend to have lower incomes and to be more sensitive to prices than natives. Immigration therefore increases demand for big-box retailers, such as Walmart and Home Depot, which tend to have lower prices than smaller, stand-alone retailers. As a result, areas in California with relatively large immigrant populations have fewer small establishments, more big-box retailers and less overall diversity in retail stores.

In sum, immigration affects both the supply and demand for nontradeable goods and services. Which effect dominates determines how immigration affects the prices of goods and services. The evidence suggests that immigration decreases prices and increases product variety in some immigrant-intensive sectors, including the restaurant industry, day care, housekeeping and landscaping. However, immigration can have negative effects on product diversity for retail stores, which rely less on immigrant labor.

International trade

The last two sections suggested that the tradability of a good or service is impacted by immigration. This section builds on this idea and considers how immigration affects international trade and the implications for consumers in the destination country.

Exports are goods and services produced domestically and sold abroad to foreigners. Imports are goods and services produced abroad and sold domestically. Net exports are the difference between exports and imports. A country that is a net exporter has a higher value of exports than imports in a given period and runs a trade surplus. A country that is a net importer imports more than it exports and runs a trade deficit. The United States currently has a trade deficit of about $45 billion, while China has a trade surplus close to $20 billion.[1] If exports are constant, an increase in imports leads to a reduction in net exports.

Immigrants can be both consumers and producers of internationally-traded goods and services and thereby affect a country's exports and imports. As consumers, immigrants are likely to want goods and services from their origin country. Immigration therefore may lead to an increase in imports. In a comprehensive study analyzing immigration in OECD countries in the year 2000, Peter Egger, Doug Nelson and Maximilian von Ehrlich (2012) examine the effect of immigration on imports. Their hypothesis is that immigration enhances migrant networks, which reduce transactions costs of trade. Thus, having more immigrants from a specific country should increase imports from that country. They find that imports are positively affected by the number of immigrants until there are about 4,000 immigrants from a specific country of origin. After that point, there is no relationship between imports and immigration.

Other economists have studied how immigration affects exports. Immigrants can be producers of goods and services in the destination country, and many of those goods and services may be exported back to the origin country, where the immigrants have connections. As such, immigration could boost exports. In Spain, an increase in the number of immigrants living

in a province leads to an increase in trade with those immigrants' country of origin (Peri and Requena-Silvente, 2010). A similar effect holds for U.S. states: an increase in the immigrant population in a U.S. state leads to an increase in that state's exports to the country of origin (Herander and Saavedra, 2005). In both cases, the effects are quantitatively important.

If immigration positively affects both exports and imports, as suggested above, the effect on net exports depends on which effect is bigger. If exports respond more to immigration than imports, then the net effect on the trade balance is positive. But if the reverse occurs and imports respond more to immigration than exports, then net exports fall. Using data on Canada, Keith Head and John Ries (1998) find that immigration has a larger effect on imports. Thus, increases in the number of immigrants in a country may actually reduce net exports and worsen the trade balance.

Besides affecting the volume of trade across borders, immigration affects product variety, as discussed earlier. Today, consumers around the world can purchase a much greater variety of products than they used to, and much of the increased variety is due to international trade between countries. The variety of imported products in the United States increased by a factor of three between 1971 and 2001 (Broda and Weinstein, 2006). Bo Chen and David Jacks (2012) have found that approximately one-quarter of the growth in product variety in Canada during 1988 to 2006 was due to immigration during that period. They argue that immigrants are in a unique position since they have better knowledge of the variety of goods available, better access to global markets, better ability to predict market conditions and a better understanding of the regulatory environment back home. Chen and Jacks find that the increase in product variety due to immigration led to welfare gains for Canadian natives.

The link between immigration and international trade is important but complicated since immigration potentially affects both exports and imports. The net effect depends on the magnitudes of these effects, which likely vary over time and across countries. That is, the trade position of a country may be more or less responsive to its immigrants. That responsiveness may depend on the number of immigrants in that country and the composition of those immigrants in terms of their age, years of residence in the duration, skill levels and so on. Either way, immigrants may be both consumers and producers of goods and services. In addition, immigration likely lowers the transactions costs of buying and selling goods abroad and hence facilitates more international trade.

Financial markets

As with international trade of goods and services, immigration may facilitate financial flows across countries. Imagine high-skilled Chinese immigrants working in Australia. These Chinese immigrants have knowledge of financial institutions in both China and Australia. They may consider investing in Australia through financial markets. In addition, the presence of high-skilled Chinese workers in Australia may attract other Chinese financial investors who learn about opportunities in Australia from their compatriots who work there. The flow of workers from China to Australia may increase financial flows from China to Australia.

It is well known in the financial world that financial investors exhibit "home bias." Home bias in financial markets means that investors prefer to invest in their home country because of information problems abroad, even if returns are potentially higher abroad. For example,

investors may not understand or trust regulations and laws in other countries, and this may result in a preference towards home-country investments. If the information problems are severe, which is the case when countries are quite different from one another in terms of financial institutions, regulations and political situations, then financial capital may not flow efficiently between countries. Studies show that information problems reduce the flow of financial capital across countries. However, these information problems have diminished over time as a result of innovations in information technology (IT) and decreases in the cost of international telecommunications. Still, given the sizable difference in asset returns across countries, there should be even more international mobility of financial capital than is observed in the data.

The existence of information problems across countries may create a role for immigration to boost international financial flows. More immigration between countries should reduce these information problems, promoting more international financial investment. Maurice Kugler, Oren Levintal and Hillel Rapoport (2013) study the effect of immigration on financial flows between a large set of countries during 1990 to 2000. They find that immigration has important positive effects on bilateral financial flows between countries, and the largest effects occur in countries in which information problems are the most acute. Their results indicate that high-skilled immigrants and long-term bonds drive the effects of immigration on international financial flows.

Immigrant networks may also affect foreign direct investment by lowering the risk associated with investing abroad. Hisham Foad (2012) finds that immigration is positively correlated with foreign direct investment in U.S. states. A state with a larger immigrant network has more foreign-owned affiliates open each year. In addition, high-skilled immigrant communities attract more foreign direct investment.

This area of research is still preliminary, but it suggests that immigration can help promote the flow of financial capital across countries, much like it promotes the flow of goods and services across countries.

Physical capital investment

As discussed in Chapter 7, including physical capital in the production function has implications for the wage effects of immigration. Physical capital is typically assumed to be constant in the short run, so immigration is assumed to not affect physical capital in the short run. In the long run, physical capital can be adjusted, so firms may respond over time to an influx of immigrants by changing their stock of physical capital.

Immigration may affect the demand or supply of physical capital. If immigrants bring capital with them, then the supply of physical capital may increase with immigration. Alternatively, the demand for physical capital may change in response to an immigrant-induced increase in labor supply. The direction of the effect on the demand for capital depends on the relationship between labor and capital in the production process. If labor and capital are complements in production, an increase in labor supply will encourage firms to acquire more capital. However, if firms can substitute physical capital for labor, then an increase in workers (via immigration) may reduce the demand for physical capital. The firm will adjust labor and capital until the marginal rate of technical substitution equals the ratio of wages to rental rates on capital, as discussed in Chapter 7.

The specification of the production function has important implications for how immigration affects capital investment. In the case of a Cobb-Douglas production function with physical capital and labor (as in equation A7.11 in the appendix to Chapter 7), an increase in the number of workers causes the marginal productivity of capital to increase. When immigration increases the number of workers, firms will have an incentive to invest in more capital. This effect is larger when immigration consists of high-skilled workers who bring skills and expertise with them and when there are capital–skill complementarities in the production process. However, other specifications of the production function may yield different results. For example, if firms can substitute between physical capital and labor, then an increase in the number of workers will reduce the demand for physical capital.

Peri (2012) studies the effects of immigration on physical capital using U.S. data for 1960 to 2006. He finds that in the long run (defined as ten years), immigration did not have a significant effect on capital intensity—the ratio of physical capital to output—in U.S. states. This result is consistent with employment, capital and output all growing at approximately the same rate. If capital and output were growing at similar rates, then the ratio of capital to output (e.g., capital intensity) remained constant over time.

Technology and innovation

An important channel through which immigration increases aggregate output is total factor productivity (TFP). In a typical production function, TFP measures the overall effectiveness of the other inputs to production. In a simple production function with capital and labor as inputs, TFP could include technological innovation in IT services and the intensity of research and development (R&D) since these factors are not directly captured by labor and physical capital. That is, TFP is the residual output that is not explained by the other inputs to production. TFP cannot be measured directly. It must be imputed by specifying a production function and then attributing to it the amount of output that is not attributable to other inputs.

Peri (2012) finds that immigration had a significant, positive effect on TFP growth in U.S. states between 1960 and 2006. His results indicate that states with larger-than-average inflows of immigrants experienced faster output growth per worker, and this was entirely due to higher TFP growth. Much of the TFP growth occurred because immigrants and natives specialized in different types of tasks in the labor force (as discussed in Chapters 7 and 8).

Immigration can also affect the level of innovation within a firm or industry.[2] For example, if the number of high-skilled immigrant workers who possess certain knowledge not readily available within the domestic workforce increases, firms or industries could experience innovation that would have beneficial effects on productivity and output. These effects are often described as "knowledge spillovers," in which natives learn and benefit from immigrants who have more or different knowledge or innovative ideas. A common way to measure innovation is to track the number of patents over time. Patents grant inventors intellectual property rights over their invention or idea; patent holders have monopoly rights for a certain amount of time. Jennifer Hunt and Marjolaine Gauthier-Loiselle (2010) indicate that a 1 percentage point increase in the population share of immigrant college graduates in the United States results in a 15 percent increase in patents per capita. Using different U.S. data, William Kerr and William Lincoln (2010) show that increases in the number of immigrant scientists and

engineers admitted to the United States on H-1B visas lead to more patents among workers with Indian and Chinese last names. (For more details about the H-1B visa program, see Chapter 13.) In fact, about 12 percent of all patents in the United States are issued to people with Indian or Chinese last names! Importantly, both studies do not find evidence that immigrants crowd out U.S. natives in terms of patents. In fact, both studies suggest positive spillovers onto U.S. natives' patent activity.

Another study by Hunt (2011) focuses on innovation by immigrant college graduates who enter the United States on different types of visas. She finds that immigrants who enter on temporary worker visas or student/trainee visas outperform U.S.-born college graduates in terms of wages, patents and publishing. As Hunt explains, part of the reason for this pattern is that these immigrants are more likely to have majored in a scientific or technical field and to have a graduate degree. Meanwhile, immigrants who enter as legal permanent residents tend to perform similarly to U.S. natives. Thus, immigrants who come to the United States to work or train are more innovative than those who come for other reasons (such as family reunification).

In addition, immigrants tend to be entrepreneurial. Hunt (2011) finds that "immigrants are more likely than natives to start a company with more than 10 workers, suggesting that immigrants have a niche in start-ups based on technical knowledge from master's and doctoral degrees" (p. 422). Entrepreneurial spirit encourages the development of new goods and services and can boost employment among natives. As Hunt (2011) states, "U.S. total factor productivity benefits from the presence of creative, inventive, and entrepreneurial immigrants in the United States" (p. 419).

Income

The basic immigration model first laid out in Chapter 1 shows that immigration leads to an increase in national income that economists term the immigration surplus. As discussed in Chapter 7, that model assumes that there are no migration costs and immigrants and natives are perfect substitutes in production. The immigration surplus arises from the fact that immigration reduces wages, which encourages firms to hire more workers and increase output. Although that model is a good starting point, it does not include other ways that immigration affects the destination, many of them discussed in this chapter. Figure 9.5 displays the mechanisms discussed so far: housing, prices of products, product variety, international trade, financial markets, capital, and innovation and productivity.

Some of these mechanisms are difficult to quantify. One approach to quantifying the effect of immigration on national income is to bypass the various mechanisms and directly measure how immigration affects national income. Ortega and Peri (2014) find that the share of immigrants in the population has a large positive effect on long-run income per capita among a large sample of rich and poor countries in 2000. That is, a country with more immigrants has higher income per capita. They find, using instrumental variables to control for endogeneity, that a 10 percentage-point difference in the share of foreign born is associated with differences in income per person by a factor near two (equivalent to a 100 percent increase in per capita income). Their estimates imply that if Japan, which has an immigrant share of about 1 percent, increased its immigrant share to 11 percent, its income per capita would double in the long run.
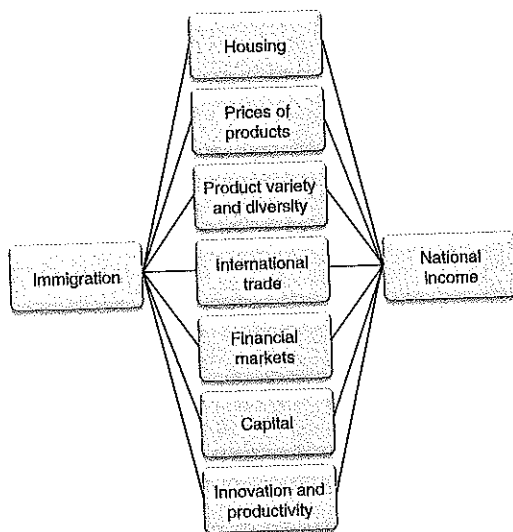
Figure 9.5 Various channels of how immigration affects national income.

Income inequality

Immigration can affect the distribution of income, or income inequality. As Chapter 4 discussed, there are several ways to measure income inequality, including the Gini index, income shares and relative earnings of workers in different skill groups. As Chapter 7 discussed, low-skilled immigration will tend to increase the relative wages of high-skilled workers and increase the skill premium, while high-skilled immigration will tend to decrease the relative wages of high-skilled workers and decrease the skill premium.

Income inequality has risen in many developed countries since the late 1970s, most notably in the United States and United Kingdom. A number of factors are often given as reasons for rising income inequality. Potential institutional factors include falling union membership, declining minimum wages and adoption of less progressive tax structures. Another potential factor is an increase in the demand for high-skilled labor combined with a decrease in the demand for low-skilled labor as a result of skill-biased technical change (SBTC), or changes in the production function that favor high-skilled workers. Greater international trade may also have contributed to rising income inequality by reducing the demand for low-skilled labor in developed countries. Many low-skilled labor-intensive goods can be produced more cheaply abroad, leading to lower low-skilled wages in developed countries.

Immigration may contribute to income inequality. An inflow of low-skilled immigrants that reduces low-skilled wages would increase income inequality. An inflow of high-skilled immigrants that drives down high-skilled wages would reduce income inequality. (Which one occurs depends on the relative return to skill, as discussed in Chapter 4.) Martin Kahanec and Klaus Zimmermann (2011) find that immigration tends to decrease income

inequality in western European countries. Specifically, they show that the college-educated population share in OECD countries is positively related to the immigrant population share, and the college-educated population share, in turn, is negatively related to the Gini index. In other words, by increasing the relative size of the college-educated population, immigration has put downwards pressure on inequality in much of Western Europe. Research specific to the United States shows that immigration has had very little effect on wage inequality there (Card, 2009).

Growth accounting

Immigration can also have a long-run effect on output growth. Economists often do growth accounting exercises to determine the primary sources of growth in an economy. The production function tells us how inputs combine to produce output. It is expressed as

$$Y = Af(L, K) \tag{9.1}$$

where A is total factor productivity, L is the number of workers, K is the stock of physical capital and f is the production function that relates labor and capital to output. For output to grow, an input to production (labor or capital) or TFP has to grow. We can rewrite equation 9.1 in terms of growth rates (or percent changes) as

$$\%\Delta Y = \%\Delta A + a_L \%\Delta L + a_K \%\Delta K \tag{9.2}$$

where a_L and a_K represent the elasticity of output with respect to labor and capital, respectively. (Notice that the elasticity of output with respect to TFP equals one. The appendix to this chapter gives an example using a Cobb-Douglas production function.) The elasticities for labor and capital (a_L, a_K) are assumed to be between zero and one and must be estimated using data. For example, if $a_L = 0.7$, then a 1 percent increase in labor will cause a 0.7 percent increase in output. It is important to note that when talking about growth rates of countries, a 1 percent increase in output (GDP) is relatively large. Consider the U.S. economy, with GDP close to $17 trillion; a 1 percent increase in U.S. GDP for one year is $170 billion! Countries that are less wealthy tend to grow at higher rates.

Equation 9.2 is called the growth accounting equation. TFP growth has a one-to-one effect on output growth. For example, a 2 percent increase in TFP will lead to a 2 percent increase in output (holding capital and labor fixed). This is not true for capital and labor: Labor's contribution to output growth consists of multiplying the elasticity of output with respect to labor by the growth rate in labor. Since this elasticity is less than one, a 1 percent increase in labor will lead to output increasing by less than 1 percent. The same is true for capital.

For developed countries such as the United States, the elasticity of output with respect to labor is approximately 0.7. If immigration creates growth in the labor supply (which is usually the case), then immigration will positively affect output growth (holding TFP and capital constant). For example, if labor supply increases by 1 percent in the United States due to immigration (which is 1.55 million workers given a labor force of 155 million), then U.S. GDP would increase by 0.7 percent, or $119 billion (again, assuming no growth in TFP and capital).

Researchers have found little to no effect of immigration on capital, but there is evidence of positive effects on TFP (Peri, 2012), suggesting that immigration could actually increase GDP through both the labor supply and TFP channels.

The Solow model

The canonical model for considering the growth effects in an economy is the Solow growth model. The Solow growth model is an example of an exogenous growth model where the source of growth is exogenous to, or outside, the model. Growth models are able to tell us how countries grow over the long term (think decades instead of years). In the Solow model, output is measured in per capita terms and depends on the capital–labor ratio. Recall from Chapter 7 that capital evolves over time. Over very long periods of time, the capital stock will reach a steady state such that there is no further adjustment of capital. The model below examines the effect of immigration on this steady-state equilibrium.

The aggregate production function in the Solow model is expressed in per-worker notation. Total output is again expressed as

$$Y = Af(L, K) \tag{9.3}$$

where A is TFP and $f(L, K)$ is the production function. If there are constant returns to scale, we can divide both sides of the equation by the number of workers, L. In per-worker notation, this yields

$$y = Af(k) \tag{9.4}$$

where $y = Y/L$ and $k = K/L$. If the production function has the usual properties (such as diminishing marginal returns to capital), then graphically it looks like Figure 9.6. As shown in the figure, y is increasing in k but at a decreasing rate.
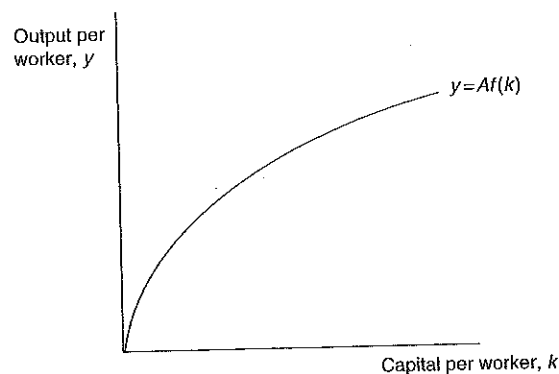

Figure 9.6 Solow growth model.

The mathematical derivation of the Solow growth model is complicated (and can be found in most intermediate macroeconomics textbooks), so we provide only its graphical representation here. Central to the model is that the demand for physical capital, investment per worker (expressed as i), equals the supply of physical capital, or savings per worker (expressed as s). Per-worker savings is the fraction of total income that is saved, or

$$s = \lambda y = \lambda Af(k) \tag{9.5}$$

where λ is the savings rate, or the marginal propensity to save. Notice in Figure 9.7 that per-capita savings takes the same general shape as the production function but is lower since the savings rate λ is a value between zero and one. For example, $\lambda = 0.3$ indicates that the savings rate is 30 percent.

Meanwhile, investment per worker (i) consists of two components: the population growth rate (n), and the depreciation rate of physical capital (d). Specifically,

$$i = (n + d)k \tag{9.6}$$

which increases linearly with k. Thus, Figure 9.7 plots the investment line as a straight line with a slope equal to $n + d$. As with the savings rate, the population growth and depreciation rates are values between zero and one.

The model is in equilibrium when savings equals investment, or $s = i$. In Figure 9.7 the intersection of i and s occurs at k^*, which is the steady-state capital–labor ratio. Countries are moving towards this steady state. The steady-state capital–labor ratio is called the Golden Rule level of capital if it maximizes consumption per worker.

In the Solow growth model, higher population growth will affect investment. Specifically, a higher population growth rate (n) will make the investment line steeper (but it still originates
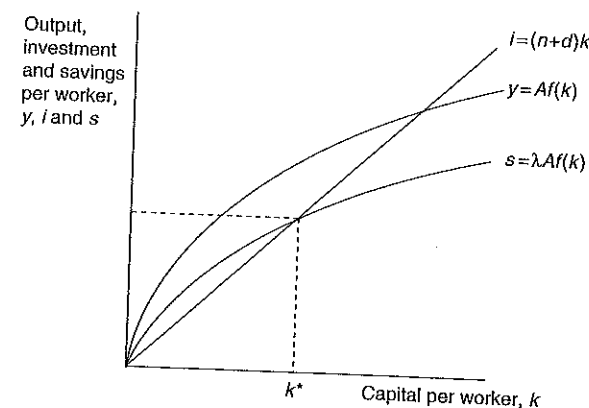

Figure 9.7 Solow growth model steady state.

The steady-state level of capital per worker, k^*, occurs where investment per worker equals savings per worker.
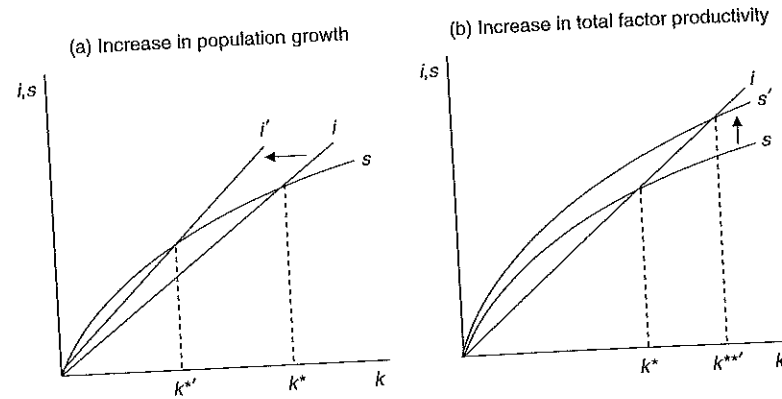
(a) Increase in population growth

(b) Increase in total factor productivity

Figure 9.8 Solow growth model with population growth and TFP increase.
In (a), the investment line, *i*, pivots to the left as population growth increases, so that $k*$ decreases to $k*'$.
In (b), the savings line, *s*, shifts up as total factor productivity increases, so $k*$ increases to $k**'$.

at the origin). This is shown in Figure 9.8(a) as the movement from *i* to *i'*. A steeper investment line will lower the steady-state value of $k*$ to $k*'$. The intuition is as follows: With higher population growth, the same capital stock has to be shared among more workers. Thus, the capital–labor ratio (*k*) falls. As the capital–labor ratio falls, output per worker (*y*) falls. Thus, faster population growth will lower output per worker. If immigration causes faster population growth in a country (which is most often the case), then immigration will reduce output and steady-state consumption per capita in that country.

Our discussion above suggests that immigration positively affects TFP through innovation and entrepreneurship. If this is the case, the Solow growth model delivers the following result: an increase in TFP will shift the production function upward by increasing the parameter *A*. An increase in *A* raises output per worker (*y*) and hence savings per worker (*s*). This is shown in Figure 9.8(b) as the shift from *s* to *s'*. An upward shift in *s* raises the steady state from $k*$ to $k**'$. Therefore, the Solow growth model suggests that if immigration increases TFP, then immigration can increase the capital–labor ratio, output growth and consumption per capita in the long run.

Final thoughts

Immigration has important but complicated effects on an economy. This chapter highlighted some of the markets in the destination that are directly affected by immigrants, including housing, financial markets, international trade and physical capital. In many cases, immigrants can have competing effects: they may increase the demand for a good or service, but they may also increase the supply. The net effect on prices depends on the relative magnitudes of these competing effects. In most cases, immigration leads to more production of goods and services in an economy and a greater variety of products offered. At the macroeconomic level, immigration can increase the amount of physical and financial capital in an economy and boost

innovation and productivity. If the productivity effects are big enough, the net effect of immigration on the long-run growth rate should be positive. The next chapter considers the fiscal effects of immigration on the destination.

Problems and discussion questions

1   Using Google Maps, figure out the location of Chinatown in San Francisco. Count the number of Chinese restaurants in that area and print out the map. Discuss the reasons why Chinese restaurants are geographically distributed in this way. What are the costs and benefits of large concentrations of ethnic restaurants in major U.S. cities?

2   Saiz (2007) finds that an influx of immigrants in a gateway U.S. city increases rental and house prices in that city. Choose what you believe to be a gateway city (why might it be a gateway city?) and find the median house price and immigrant share of the population. Then calculate the effect of an immigrant inflow equal to 1 percent of the population on house prices according to Saiz's results.

3   Egger, Nelson and von Ehrlich (2012) find that immigration from a source country positively affects imports from that country until the immigrant stock from that source country reaches 4,000. After that point, additional immigrants from that source country do not appear to affect imports. Explain why this might be the case using the information about migrant networks provided in this chapter.

4   Give an example of immigration increasing exports to the source country and an example of immigration increasing imports from the source country. In each case, what is the effect on GDP in the destination country?

5   Economists have found that immigration can increase productivity and stimulate innovation. How might a firm benefit from the ideas of immigrant workers? Find an example of a patent or business created by immigrants that has contributed to the destination country's economy.

6   Pick a destination country. Using United Nations data (links below), find the foreign-born stock as a percentage of the total population in that country in 2013. Ortega and Peri (2014) find that a 10 percentage-point difference in the immigrant share leads to a 100 percent increase in income per person (on average). Using this estimate, how much would per capita GDP increase if that country increased their immigrant share by 0.1 percentage points? 1 percentage point? 10 percentage points?

Notes

1 Federal Reserve Economic Data, Federal Reserve Bank of St. Louis. Available at: http://research.stlouisfed.org/fred2/ [3 September 2014].
2 For a good discussion of how innovation and entrepreneurship due to immigration affects productivity, see Lewis (2013).

Internet resources

UN data on the migrants stock by sex and age are available at http://esa.un.org/unmigration/TIMSA2013/migrantstocks2013.htm.
UN data on GDP are available at http://unstats.un.org/unsd/snaama/selcountry.asp.

References

Broda, C. and Weinstein, D.E. (2006) "Globalization and the gains from variety." *Quarterly Journal of Economics* 121(2), pp. 541–585.

Card, D. (2009) "Immigration and inequality." *American Economic Review Papers & Proceedings* 99(2), pp. 1–21.

Chen, B. and Jacks, D. (2012) "Trade, variety, and immigration." *Economics Letters* 117(1), pp. 243–246.

Cortes, P. (2008) "The effect of low-skilled immigration on US prices: Evidence from CPI data." *Journal of Political Economy* 116(3), pp. 381–422.

Cortes, P. and Tessada, J. (2011) "Low-skilled immigration and the labor supply of highly skilled women." *American Economic Journal: Applied Economics* 3(3), pp. 88–123.

Egger, P., Nelson, D. and von Ehrlich, M. (2012) "Migration and trade." *World Economy* 35(2), pp. 216–241.

Foad, H. (2012) "FDI and immigration: A regional analysis." *Annals of Regional Science* 49(1), pp. 237–259.

Furtado, D. and Hock, H. (2008) "Immigrant labor, child care services, and the work fertility trade-off in the United States." *IZA Discussion Paper* No. 3506. Bonn: Institute for the Study of Labor.

Gonzalez, L. and Ortega, F. (2013) "Immigration and housing booms: Evidence from Spain." *Journal of Regional Science* 53(1), pp. 37–59.

Head, K. and Ries, J. (1998) "Immigration and trade creation: Econometric evidence from Canada." *Canadian Journal of Economics* 31(1), pp. 47–62.

Herander, M. and Saavedra, L.A (2005) "Exports and the structure of immigrant-based networks: The role of geographic proximity." *Review of Economics and Statistics* 87(2), pp. 323–335.

Hunt, J. (2011) "Which immigrants are most innovative and entrepreneurial? Distinctions by entry visa." *Journal of Labor Economics* 29(3), pp. 417–457.

Hunt, J. and Gauthier-Loiselle, M. (2010) "How much does immigration boost innovation?" *American Economic Journal: Macroeconomics* 2(2), pp. 31–56.

Kahanec, M. and Zimmermann, K.F. (2011) "International migration, ethnicity and economic inequality." In: Salverda, W., Nolan, B. and Smeeding, T.M. (eds.) *The Oxford Handbook of Economic Inequality.* Oxford: Oxford University Press, pp. 455–490.

Kerr, W.R. and Lincoln, W.F. (2010) "The supply side of innovation: H-1B visa reforms and U.S. ethnic invention." *Journal of Labor Economics* 28(3), pp. 427–508.

Kugler, M., Levintal, O. and Rapoport, H. (2013) "Migration and cross-border financial flows." *IZA Discussion Paper* No. 7548. Bonn: Institute for the Study of Labor.

Lewis, E. (2013) "Immigration and production technology." *Annual Review of Economics* 5:1, pp. 165–191.

Mazzolari, F. and Neumark, D. (2012) "Immigration and product diversity." *Journal of Population Economics* 25(3), pp. 1107–1137.

Ortega, F. and Peri, G. (2014) "Openness and income: The roles of trade and migration." *Journal of International Economics* 92(2), pp. 231–251.

Ottaviano, G.P. and Peri, G. (2006) "The economic value of cultural diversity: Evidence from US cities." *Journal of Economic Geography* 6(1), pp. 9–44.

Peri, G. (2012) "The effect of immigration on productivity: Evidence from US states." *Review of Economics and Statistics* 94(1), pp. 348–358.

Peri, G. and Requena-Silvente, F. (2010) "The trade creation effect of immigrants: Evidence from the remarkable case of Spain." *Canadian Journal of Economics* 43(4), pp. 1433–1459.

Saiz, A. (2007) "Immigration and housing rents in American cities." *Journal of Urban Economics*, 61(2), pp. 345–371.

Appendix

We can use the Cobb-Douglas production function from the appendix to Chapter 7 in our growth accounting. If natives and immigrants are perfect substitutes, the production function is

$$Y = A(L_N + M)^\alpha K^\gamma \tag{A9.1}$$

where A is total factor productivity, L_N is the number of native-born workers, M is the number of immigrant workers, K is the stock of physical capital in the destination country and α, $\gamma \geq 0$. If the production function exhibits constant returns to scale, then $\alpha + \gamma = 1$.

Under constant returns to scale, we can manipulate equation A9.1 to rewrite it in terms of percentage changes:

$$\%\Delta Y = \%\Delta A + \alpha\%\Delta L_N + \alpha\%\Delta M + \gamma\%\Delta K \tag{A9.2}$$

Notice that in the Cobb-Douglas specification, the elasticities—the percentage change in output for a 1 percent change in an input—are the exponents for labor and capital. For example, if the number of immigrant workers (M) increases by 1 percent, output (Y) increases by α percent. If natives and immigrants are perfect substitutes (as shown here), these elasticities are the same for natives and immigrants. (This would not be the case if they were imperfect substitutes or complements.) Thus, as more immigrants enter a country ($\%\Delta M > 0$), output increases ($\%\Delta Y > 0$).

10 Fiscal Effects

One major concern regarding immigration worldwide is the impact on federal, state and local governments. The net fiscal impact of immigration—the difference between tax revenues from immigrants and the cost of publicly funded services received by immigrants—on receiving countries is the subject of considerable debate. Estimates vary within and across countries and over time. Concerns mainly center on the impacts of less-skilled and undocumented immigrants. The most-cited concerns are that these immigrants "do not contribute their fair share" or that "they are getting something for nothing." Highly skilled immigrants, who generally pay more in taxes than they receive in government-funded services, are less controversial from a fiscal standpoint.

Estimating the fiscal impact of immigrants is important for a number of reasons. Policymakers need estimates of short- and long-run fiscal effects of immigration in order to determine under which scenarios immigrants will be net fiscal contributors and under which scenarios they will be a net fiscal drain. Understanding the mechanics behind the fiscal impact of immigration can help policymakers target and alleviate other fiscal imbalances. For example, immigration can help policymakers target and alleviate other fiscal imbalances. For example, policymakers in countries with aging populations may aim to increase immigration in order to offset future labor and pension shortages. Understanding immigrants' usage of public services and publicizing these figures may affect public perceptions, which in turn have the potential to shape immigration policy. Surveys show that opinions about immigrants are tied closely to perceptions about their fiscal impact (OECD, 2013).

Many factors contribute to the fiscal impact of immigration, such as immigrants' age at arrival, their reasons for migrating (economic vs. humanitarian and family reunification migrants), their skill levels, the generosity of publicly funded services and the structure of the tax system. These factors all tie to the most important determinant: immigrants' employment outcomes. Although there is a wide range of fiscal effects by demographic characteristics and regions, most estimates of the net fiscal impact of immigration are relatively small, especially in comparison to most developed countries' fiscal imbalances. Studies of 27 OECD countries report minor fiscal effects of immigration, with the net fiscal impact rarely exceeding 0.5 percent of GDP (OECD, 2013).

This chapter discusses several important aspects of the fiscal effect, sometimes referred to as the taxpayer effect, of immigration. Methodological and measurement issues are presented first, followed by current estimates of the fiscal effect for the United States and other OECD countries under various assumptions and measurement methods. The chapter concludes with an in-depth discussion of immigrants' participation in four government-funded programs in the United States: welfare, education, health care and Social Security.

Measuring the fiscal impact

Measuring the fiscal impact of immigration accurately can be quite complicated. Two main methods are used. The first is the static accounting method. This method calculates tax revenues from the immigrant population minus expenses during a particular time period (usually a fiscal year). The second method is dynamic modeling. This method can be further separated into net transfer profile-based projections and the generational accounting method. Dynamic modeling takes into account long-run considerations, such as the fiscal impact of immigrants' descendants. It may also include the impact of immigration on economic growth, which in turn affects tax revenues.

Fiscal costs and benefits

When computing the fiscal effect of immigration, economists must decide which revenues and expenses to include and how to estimate them. Government transfers and publicly funded services received by immigrants are clearly costs, but some other services, such as public goods, are more difficult to quantify. (Public goods are goods that are both non-excludable and non-rivalrous, or people cannot be effectively excluded from using them and use by one person does not reduce other people's ability to use them.)

On the cost side for the government, the most straightforward transfers are cash welfare and government-funded retirement benefit programs (like Social Security in the United States), while the most direct public services are public education and health care. In the United States, public schools are required to provide K-12 education and medical providers to provide emergency medical care regardless of people's legal status. The cost of these services can be substantial, particularly for states and cities near the U.S.–Mexico border. In some countries, the government pays for language training for school-aged children and adult migrants. The cost of this integration-related service can be sizable for the first few years after immigrants arrive. In addition, analyses of the fiscal impact of immigration may count expenses incurred for active labor market policies, such as job training programs, for immigrants. The number of categories of publicly funded programs can be quite extensive, and they are a key component of any estimate of the fiscal impact of immigration.[1]

Studies make various assumptions regarding how immigration affects the provision and cost of public goods. For pure public goods, such as national defense, immigration may actually decrease the cost per capita since these fixed costs are now spread over a larger population.[2] This is not the case for congestible public goods, however. Congestible public goods need to be provided in greater numbers as the size of the population increases—these goods become congested as more people use them, so the government must provide more of them as immigration occurs. Such goods include roads and other infrastructure, law enforcement and labor market programs.

On the revenue side, many immigrants pay taxes tied to employment, such as income and payroll taxes. Various levels of government also impose numerous taxes tied to daily living. These include sales taxes, property taxes, value-added taxes, fuel, liquor, tobacco and excise taxes.

When using any of the methodologies described in this chapter, there are a number of assumptions and decisions that must be made. First, the unit of analysis must be determined. This entails deciding whether the focus is on the household, individual, cohort or generation and whether it is at the national or regional level. In addition, economists must decide whether and whether it is at the national or regional level. In addition, economists must decide whether children born in the destination country to immigrant parents should be included in the analysis and whether education is a cost or an investment. Second, assumptions must be made regarding unauthorized immigrants' contribution to fiscal coffers and use of government-funded services. Researchers must estimate the number of unauthorized immigrants and decide whether they have different usage or take-up rates than legal immigrants. Third, economists must posit the impact of immigration on public goods, as mentioned above. Fourth, economists must make assumptions regarding various cohorts of immigrants and their benefits usage and contribution rates since cohorts may differ in terms of educational attainment, age, language ability and reason for migrating. Fifth, for dynamic methodologies in particular, projections are needed for the future population sizes of native-born individuals and immigrants. Dynamic methodologies also need to make assumptions about the future of government spending, tax policies and other economic indicators.

Static accounting method

In the static accounting method, economists calculate the difference between taxes and other contributions made by immigrants (credits) and fiscal transfers made to immigrants (debits). This calculation is typically done for a fiscal year and is the most straightforward and direct way to measure the fiscal impact of immigration. Usually, the credits are immigrants' tax payments, and the debits are government expenditures on immigrants. The advantages of this method are that it is relatively simple and relies on only a few assumptions. The main weakness of the static accounting method is that it does not account for longer-run considerations, such as immigrant lifecycle effects, the impact of their descendants or indirect effects on natives' wages and employment.

The most widely referenced study for the United States that uses this method (and also a dynamic method discussed later) is part of a 1997 study by the National Research Council (NRC). The NRC study makes a number of assumptions, most notably constraining all changes to be budget neutral (Smith and Edmonston, 1997). Any increase in expenditures must be balanced out by an increase in taxes. The annual fiscal effect of immigrants on a typical native is then approximated by

$$NAFI_N = -\Delta T_N \tag{10.1}$$

where $NAFI_N$ is the net annual fiscal impact of immigration on natives and ΔT_N is the change in taxes paid by native-born residents because of new immigration. If $NAFI_N$ is positive, the average native's taxes fall. If $NAFI_N$ is negative, the average native's taxes rise.

In this method, revenues are based mainly on taxes paid by current natives, current immigrants and businesses. The number of natives is represented by N, and the number of immigrants by M. T_N and T_M are the average tax rates for native-born and migrant households, respectively. A is a measure of other revenues on a per-native basis, such as taxes paid by

businesses. The expense side includes the cost of government services provided to natives and migrants. The per-person cost of government services is represented by E_N for natives and E_M for migrants. Additional expenses are represented by X_N, which captures the cost of all other government spending on a per-native basis. The following equality must hold in any given year:

$$T_N N + T_M M + A_N N \equiv E_N N + E_M M + X_N N \tag{10.2}$$

Equation 10.2 represents the government's budget constraint. To address possible changes in immigration or government policy, the budget constraint can be shown in terms of flows of new migrants (ΔM) and changes in taxes and spending for immigrants and natives on a per-native basis:

$$-\Delta T_N = (T_M - E_M)(\Delta M / N) + (\Delta T_M - \Delta E_M)(M / N) + (\Delta A_N - \Delta X_N) \tag{10.3}$$

The left-hand side of equation 10.3 shows the effect on the average native's taxes for all changes that may have occurred as a result of immigration. Again, if the left-hand side is negative ($-\Delta T_N < 0$), this means that new immigrants are a fiscal burden on current residents. Conversely, if the left-hand side is positive, then new immigrants provide fiscal benefits. If $\Delta T_N = 0$, new immigrants are fiscally neutral, or have no net fiscal effect.

Immigration's impact is separated into three components on the right-hand side of equation 10.3. The first term, $(T_M - E_M)(\Delta M / N)$, shows the impact on native residents (N) if new immigrants (ΔM) are similar to previous immigrants. If government spending on immigrants is more than immigrants pay in taxes ($T_M - E_M < 0$), immigrants will increase the tax burden on natives, and the first term will be negative. The opposite is true if previous immigrants provide a net fiscal benefit and new immigrants continue to do so. In other words, the first term assumes that new immigrants pay and use services at the same rate as previous immigrants. However, this may not be the case. The second term, $(\Delta T_M - \Delta E_M)(M / N)$, allows for this possibility.

The second term shows the effect of changes due to differences in the demographic characteristics of new immigrants. If new immigrants are less skilled and require more services or pay less in taxes than previous immigrants, $\Delta T_M - \Delta E_M$ is likely to be negative, which increases the tax burden on natives. More specifically, ΔT_M would be negative if new immigrants pay less in taxes, and ΔE_M would be positive if new immigrants receive more in publicly funded services. If new immigrants are more skilled, the opposite would occur.

The last term, $\Delta A_N - \Delta X_N$, addresses other revenues and spending obligations that immigration may affect. For example, if the fiscal impact is estimated at the state level, a state may receive federal aid to assist its new immigrant population. This additional revenue would be captured in ΔA_N. At the federal level, new immigrants may start businesses that contribute tax revenues (ΔA_N) or create additional government expenses (ΔX_N).

Dynamic modeling

Dynamic modeling takes the age profiles of immigrants and the impact of their descendants into consideration. There are two main dynamic models: net transfer profile-based projections, and the generational accounting method.

The method behind net transfer profile projections is to augment the static models with projections of tax revenues and government benefits usage in the future. The end result of such studies is to compute the net present value (NPV) of contributions by each additional immigrant, taking into account various demographic characteristics and age profiles. For example, an immigrant's net fiscal contribution can be calculated by education, sex, age of arrival, legal status and country of origin, and the calculation can include descendants. The 1997 NRC report uses this method, and its results for the United States are discussed later in this chapter. Economists have also used this method to assess the fiscal impact of immigration in several OECD countries, including Germany, the Netherlands and Sweden.

To arrive at overall NPV estimates, researchers first produce age profiles of the annual fiscal impact of immigrants at a point in time (cross-sectional age profiles). These age profiles are typically presented graphically and can be split into three age groups: childhood, working age and retirement. Assessments of the costs, benefits and net impact of each age group of immigrants are the building blocks for NPV calculations. As shown in the top panel of Figure 10.1,
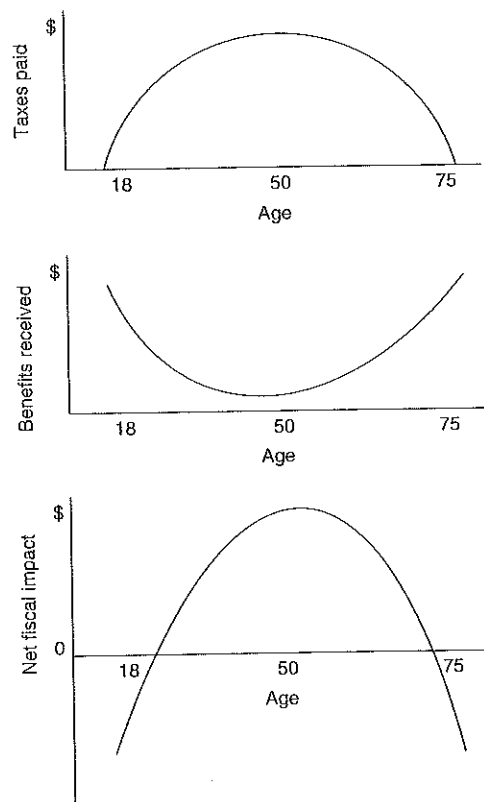

Figure 10.1 Age profiles of taxes paid, benefits received and net fiscal impact.

taxes paid by immigrants (and natives) tend to form an inverted U-shaped pattern. Taxes paid tend to start at zero for the young who are in school, rise with age as people move through working age and peak in the mid-fifties. After that, income and taxes tend to fall as people transition into retirement. For benefits received, shown in the middle panel, the opposite pattern occurs. Receipt of government benefits tends to be higher among the young who are in school and the elderly who are in retirement. Putting these costs and benefits together requires subtracting the middle panel from the top panel. The resulting net fiscal impact is also an inverted-U shape, as shown in the bottom panel. In this case, however, there are negative values as the benefits received by the young and the old outstrip their tax contributions. In other words, the net fiscal effect (taxes minus benefits) is negative during the childhood and retirement phases of the lifecycle.

The next step for NPV calculations is to construct longitudinal age profiles that show the fiscal impact as a person (often called a "representative agent") moves through the lifecycle. Longitudinal age profiles are more complicated to compute than cross-sectional age profiles because tax policies, the generosity of benefits, productivity and other economic factors may change as immigrant cohorts age. Specifically, researchers need to make assumptions about fiscal policy, debt/GDP ratios, the real interest rate, the generosity of benefits to immigrants, the taxes paid by immigrants, the costs of education and the likelihood of return migration by immigrants and descendants over their lifetimes. Regarding fiscal deficits (when government spending exceeds tax revenues and the government's debt increases), researchers typically assume that the debt-to-GDP ratio will ultimately stabilize at some point in the future. As countries hit their debt limits, they may need to increase taxes and cut spending, and researchers need to make assumptions about these changes. Another complicating factor in computing the fiscal impact of immigration is that GDP will likely grow as a result of immigration. This occurs because of the immigration surplus, complementarities between immigrants and natives and higher productivity and innovation in the receiving country as a result of immigration. (Chapters 7 and 8 discuss the theory and evidence regarding these effects.) Holding all else constant, if this gain is large enough, policymakers could reduce the tax rate while still hitting debt targets.

The last step in net transfer profile projections produces the NPV estimates by summing up all the discounted impacts of an immigrant estimated in the longitudinal age profiles. This discounting requires assuming an interest rate. Researchers often use the government's borrowing rate. Discounting gives more weight, or importance, to fiscal effects closer to the present and less weight to the future. Using the assumptions above plus other demographic assumptions regarding family structure and assimilation of immigrants and their descendants, the researcher arrives at the estimated NPV of an immigrant's fiscal impact.

The second dynamic model is the generational accounting (GA) method, introduced by Alan Auerbach, Jagadeesh Gokhale and Laurence Kotlikoff (1991). Policymakers can use this method to assess whether a government's current path of taxes and transfers is sustainable. The GA method involves an intertemporal budget constraint. The intertemporal budget constraint puts the typical budget constraint, where spending is limited by income, into a multi-period and dynamic context. The intertemporal budget constraint requires that the tax payments made by immigrants and natives over their lifetimes and those of

all future generations cover current and future government spending, including any past government indebtedness. Either current or future generations ultimately must pay for fiscal deficits.

GA models can be used to assess the impact of changes in the size of the immigrant population on the current generation or future generations. The end result of this method is to quantify a generational account, or a fiscal balance, for a particular generation under various assumptions. To make these calculations, economists must estimate or project the size of the current and future population, economic growth, taxes and transfers corresponding to the attributes of the population, government debt, interest rates and any likely policy changes (Auerbach and Oreopoulos, 1999). The Congressional Budget Office (CBO) makes many projections like this for the United States.[3]

The government's inter-temporal budget constraint with immigration is

$$\sum_{s=0}^{D}\left(N_{t,t-s}+M_{t,t-s}\right)+\sum_{s=1}^{\infty}(1+r)^{-(s-t)}\left(N_{t,t+s}+M_{t,t+s}\right)=\sum_{s=t}^{\infty}G_{s}(1+r)^{-(s-t)}-W_{t} \qquad (10.4)$$

The left-hand side of equation 10.4 represents the present value of all taxes paid by current and future generations. The right-hand side is the present value of government expenditures and current indebtedness. Specifically, N represents the NPV of taxes paid by natives, and M represents the NPV of taxes paid by immigrants. The first term on the left-hand side shows taxes paid by the current generation, which is born at time $t-s$ and has a lifespan of D years. The second term sums all future generations, where s is the number of years after t that an individual is born. On the right-hand side, the first term is the present value of government spending, where r represents the real interest rate and G represents government spending. The last term, W, is government net worth or wealth, which is the difference between the government's assets and debt.

Researchers can use this framework to determine whether immigration contributes to fiscal stress or alleviates it on a generational basis. Using an intertemporal model avoids the pitfalls of examining a certain cohort of immigrants at a point in time. Different populations will have different impacts on taxpayers at different points in their lifetime. For example, if immigrants in a country are mostly working age, the deficit may fall in the short run because of their tax contributions. However, when those immigrants eventually retire and receive benefits, such as publicly funded pensions, they will boost government spending and the deficit. If another country receives a large share of school-age immigrants, it will need to fund their education in the short run. However, in the longer run those immigrants are likely to pay more in taxes than they cost in government spending.

Estimates of the fiscal impact of immigration

Numerous studies have estimated the fiscal effects of immigration using the static and dynamic methods explained above. The main findings of major studies are summarized below. The methodology and assumptions used can result in large variations in estimates.

United States

The most comprehensive analysis of the fiscal impact of immigration in the United States was conducted by the National Research Council (NRC) in 1997. This study includes estimates using both the static accounting method and a dynamic model.

The NRC study does not include national estimates using the static accounting method, but it does present estimates of the annual fiscal effect of immigration for California and New Jersey, two states with large immigrant populations. The study finds a negative fiscal impact at the state and local levels in both states. The negative state-level fiscal impact is three times larger in California than in New Jersey. This difference is attributed to the large differences in immigrants' skills and educational attainment across the two states. Table 10.1 presents the main findings of the study. Expenditures are broken down into K-12 education, government transfers and all other expenditures. Revenues are broken down into property tax, income tax, sales tax and all other revenues. Since the fiscal budgets must balance at the local and state levels (because of

Table 10.1 Local and state expenditures, revenues and average fiscal balance per household (1996 dollars): New Jersey and California

	New Jersey			California		
	All	Natives	Immigrants	All	Natives	Immigrants
Expenditures						
Local:						
K-12 education	2273	2162	2985	974	768	1581
All other	868	807	1251	4549	4522	4627
Total	3141	2969	4326	5523	5290	6208
State:						
K-12 education	1625	1585	1878	1537	1212	2496
Transfers to households	502	496	530	817	594	1474
All other	588	566	738	780	704	1003
Total	2715	2647	3146	3134	2510	4973
Revenues						
Local:						
Property tax	2949	2921	3126	1059	1092	965
All other	192	192	188	4464	4481	4412
Total	3141	3113	3314	5523	5573	5377
State:						
Income tax	1515	1526	1446	1738	1964	1070
Sales tax	582	586	562	688	727	570
All other	618	623	576	708	714	701
Total	2715	2735	2584	3134	3405	2341
Average fiscal balance						
Local	≡0	144	−922	≡0	283	−831
State	≡0	88	−562	≡0	895	−2632
Total	≡0	232	−1484	≡0	1178	−3463

Source: Smith and Edmonston (1997).

balanced budget requirements there), total revenues must equal total expenses at those levels. For New Jersey, the average household receives and pays $3,141 for services at the local level and $2,715 at the state level, both of which are predominantly for K-12 education (all figures are in 1996 dollars). In California, these figures are $5,523 and $3,134, respectively.

The bottom line of the NRC study is that there is a fiscal redistribution from native-born households to immigrants. In New Jersey, immigrant-headed households imposed an average fiscal cost of $922 at the local level and $562 at the state level. This translates into an additional $144 tax bill at the local level and $88 at the state level, or $232 in total, for each household headed by a U.S. native. In California, the redistribution is estimated to be even larger, with a fiscal cost of $831 at the local level and $2,632 at the state level per immigrant household. This translates into a total fiscal burden of $1,178 per native-born household in California. Larger family sizes and relatively low incomes among immigrant households in California resulted in greater use of educational services, greater receipt of government transfers and smaller state tax payments there than in New Jersey.

Table 10.2 reports fiscal estimates at the federal level for native- and immigrant-headed households in California. The average native-born household pays $2,722 more in federal taxes than it receives in federally funded services and transfers. The average immigrant-headed household, in contrast, pays $2,682 less in taxes than it receives in federally funded services and transfers. These estimates include expenditures on national defense. If defense is treated as a pure public good and not included, the average immigrant-headed household in California makes a net contribution of $127 at the federal level.

The 1997 NRC report has other key findings. First, fiscal burdens stem from low tax revenues received from low-wage earners rather than from high rates of receipt of social services. Second, state and local governments bear the costs while the federal government reaps benefits, at least while immigrants are young and healthy. Immigrants lower the per capita costs of public goods such as national defense and interest on government debt but increase congestion costs on public goods such as roads, sewers, law enforcement, libraries, and airports. Pure public goods tend to be provided by the federal government, while congestible public goods tend to be provided by state and local governments. Third, the children of immigrants tend to be upwardly mobile. This last point has important implications for dynamic estimates, which are discussed later in this chapter.

A more recent study by the OECD (2013) uses the static accounting method to compute an updated aggregate measure for the United States. That analysis concludes that both native- and foreign-born households are net fiscal contributors. However, households

Table 10.2 Federal state expenditures, revenues and average fiscal balance per household (1996 dollars): California

	All	*Natives*	*Immigrants*
Expenditures	13,549	13,625	13,326
Revenues	14,896	16,347	10,644
Average fiscal balance	1,347	2,722	−2,682

Source: Smith and Edmonston (1997).

headed by a U.S. native make a larger net fiscal contribution than households headed by an immigrant. These results diverge from the results in the NRC study. Much of the divergence appears to be due to differences in the categories of taxes and benefits included in the two studies. The NRC study focuses on the state and local level, where immigrants typically impose the largest costs, while the OECD study focuses on the federal level, where immigrants tend to be net contributors when not including defense spending. Policymakers relying on such studies need to use caution and understand all of the assumptions underlying the estimates.

Several studies focus on the impact of undocumented immigrants on government budgets. Although undocumented immigrants are not eligible for most public assistance programs, state and local governments incur costs related to education, health care and law enforcement.

Media reports often suggest that undocumented immigrants create severe hardships to local areas by filling up emergency rooms and schools. Most studies confirm that unauthorized immigrants receive more in services than they pay in taxes at the state and local level. However, this fiscal burden tends to be localized in major immigrant-receiving states and cities, and estimates suggest that its magnitude is actually relatively small. The CBO (2007) surveyed 29 studies of the impact of unauthorized immigrants on state and local budgets. Overall, the studies confirm that states incur net fiscal costs from unauthorized immigrants, but these costs are typically less than 5 percent of total government expenditures. Net expenditures ranged from millions of dollars for small states to billions of dollars for California, the state with the largest number of unauthorized immigrants. Even in jurisdictions with large fiscal burdens in California, spending on unauthorized immigrants was less than 10 percent of total spending on government services.

Estimates of the net economic impact—as opposed to the net fiscal impact—of immigration should incorporate any economic gains (and losses) as well as net fiscal costs. In Texas, a report prepared by the state comptroller estimates that unauthorized immigrants paid $424 million more in revenue than was spent at the state level to provide education, health care and law enforcement to unauthorized immigrants in fiscal year 2005 (Strayhorn, 2006). The report also concludes that local governments incurred net costs of $1.4 billion in 2005 to provide health care and law enforcement. Education was the largest expense at the state level, and health care was the largest expense at the local level. Without the 1.4 to 1.6 million undocumented workers, however, the state's GDP would have been $17.7 billion, or 2.1 percent, smaller.

Legalizing undocumented immigrants affects their net fiscal position. A legalization program, or amnesty, for unauthorized immigrants can lead to higher tax revenues, but it also may lead to greater eligibility for government benefits. The net impact is thus theoretically uncertain. The CBO (2013) estimated that a legalization program included in a bill passed by the U.S. Senate in 2013 would have led to larger increases in federal spending than in tax revenues, suggesting that legalization programs increase the fiscal burden of immigrants in the United States. Most of the increase in federal spending was due to health care.

As discussed above, static estimates are only a snapshot and cannot be used to predict the future since they do not include changes in demographics, fiscal policy or immigration policy.

Dynamic models can be used to evaluate various assumptions and scenarios. The NRC study includes a dynamic analysis, which concludes:

> The average fiscal impact of immigrants under the baseline assumptions is positive in part because they tend to arrive at young working ages, in part because their descendants are expected to have higher skills and incomes, in part because they pay taxes for some items, such as national defense and interest on the federal debt, for which they do not impose costs, and in part because they will help to pay the public costs of the aging baby-boom generations.
>
> (Smith and Edmonston, 1997: 353)

The main results of the dynamic analysis are NPV calculations of the fiscal impact of an additional immigrant and his descendants over 300 years.[4] Table 10.3 summarizes the results. The main finding is that the average immigrant makes a positive fiscal contribution. This is due to the immigrants' descendants, who are assumed to assimilate quickly. The average net fiscal impact of an immigrant is $80,000 per immigrant (all figures are in 1996 dollars). Not surprisingly, the largest positive impact is $198,000 for an immigrant with more than a high school degree, including descendants. For those just with a high school degree, the estimate is a $51,000 fiscal gain. For immigrants without a high school degree, the average impact is a $13,000 fiscal loss.

The second and third rows of Table 10.3 decompose the overall impact into the separate impacts of an immigrant and his descendants. Not including descendants, the average immigrant creates a fiscal cost of $3,000. The cost rises to $89,000 for an immigrant without a high school degree. Although there is large variation in the NPV impacts of immigrants themselves by educational attainment, the fiscal impact of their descendants is positive, large and relatively similar across parental education groups. These estimates reflect assimilation by immigrants' children and later descendants.

The study also looks at NPVs by age at arrival and finds that immigrants who arrive at a younger age make larger net contributions. The NPV of the fiscal impact peaks for immigrants who arrive between ages 10 and 25 and then reaches a trough for those who arrive in their late sixties, when the impact is a large negative number. Meanwhile, the NPV for immigrants' descendants is positive regardless of immigrants' age at arrival.

In addition to a number of robustness checks, the study estimates the impact of an additional 100,000 immigrants entering the United States per year on the average citizen. It concludes there would be only a minimal fiscal effect. The overall effect would be a fiscal benefit of $30 per U.S. resident, which includes an increase of $40 at the federal level and a decrease of $10 at the state level. Thus, the NRC report concludes that, despite concerns over the fiscal

Table 10.3 Average net fiscal impact of an immigrant (1996 dollars)

	Overall	Less than high school graduate	High school graduate	College and higher
Immigrants and their descendants	80,000	−13,000	51,000	198,000
Immigrants	−3,000	−89,000	−31,000	105,000
Descendants	83000	76,000	82,000	93,000

Source: Smith and Edmonston (1997).

burden imposed by immigrants, "Our calculations suggest that immigrants may instead, on average, and in the long run, have a positive fiscal impact" (p. 352).

OECD countries

Across OECD countries, estimates suggest that the fiscal impact of immigration is small in terms of GDP (OECD, 2013). Further, the average fiscal impact is around zero. The OECD report notes, "Immigrants tend to have a less favourable net fiscal position than the native-born, but this is almost exclusively driven by the fact that immigrant households contribute on average less in terms of taxes and social security contributions than the native-born and not by a higher dependence on benefits" (p. 2).

Table 10.4 reports results for OECD countries using the static accounting method. Recall that this method is not forward-looking, relies on a number of assumptions and reflects past migration flows rather than current or future flows. In the OECD study, the unit of analysis is the household. Households are categorized as native born, mixed or migrant households based

Table 10.4 Net fiscal contribution by migration status, 2007–2009 average (in euros, PPP adjusted)

Country	Native	Mixed	Migrant
Switzerland	14,968	21,437	14,549
Iceland	12,272	17,558	9,292
Luxembourg	−1,228	7,232	9,178
Italy	3,980	12,126	9,148
United States	8,534	17,158	8,274
Greece	5,008	10,511	7,728
Spain	3,107	9,830	7,496
Belgium	9,159	16,830	5,560
Canada	7,552	15,494	5,167
Norway	5,055	20,366	4,505
Portugal	950	9,799	4,479
United Kingdom	2,604	11,954	3,029
Slovenia	4,450	2,368	3,006
Netherlands	9,940	21,303	2,544
Denmark	7,362	17,713	2,368
Austria	3,375	6,443	2,353
Australia	3,776	8,353	2,303
Hungary	1,081	1,915	1,864
Finland	5,706	12,265	1,314
Sweden	6,815	−13,473	896
Estonia	4,514	5,877	−2
Czech Republic	3,474	1,116	−184
Ireland	2,487	6,511	−1,274
France	2,407	9,131	−1,451
Slovak Republic	2,148	752	−2,171
Germany	5,875	−4,453	−5,622
Poland	291	−4,630	−5,691

Source: Organization for Economic Cooperation and Development (2013).

on the nativity of up to two household heads. The household heads are native born in native-born households; one is native born and the other foreign born in mixed households; and the heads are foreign born in migrant households. The estimates are based on data for the period 2007 to 2009 and are expressed in a common currency (the euro) and adjusted for purchasing power parity (PPP). Also, estimates typically exclude migrants with less than one year of residency. This may understate the positive impact of immigration since recent or temporary immigrants often come to work and are therefore net fiscal contributors.

As shown the last column of Table 10.4, estimates of the net fiscal contribution of the average migrant household vary considerably across countries. The estimates for migrant households are positive in 20 of the 27 countries. The largest net fiscal contribution is about 15,000 euros per migrant household in Switzerland, while the most negative estimate is −5,691 euros in Poland. Most of the countries with negative numbers for migrants have older immigrant populations who receive pensions, while Ireland was suffering from a deep financial crisis during the period under study (2007–2009). Notice that the net fiscal contribution is negative for native-born and mixed households in a few countries as well.

Net fiscal contributions tend to be smaller for immigrants than for natives. According to the OECD study, this gap is not explained by differences in age or educational attainment. Instead, the main factor underlying the gap between immigrants' and natives' fiscal effects is employment, which can explain about one-half of the gap. Immigrants are less likely than natives to be employed in most of the countries where natives make a larger fiscal contribution than immigrants. There are some places where immigrants contribute more than natives, such as Greece, Italy, Portugal and Spain, largely due to high employment rates among recent immigrants. Mixed households tend to have positive net contributions and often out-contribute native-born households. One reason for this pattern is that mixed households, by definition, are comprised of two adults, whereas native-born and migrant households can be comprised of single adults.

In most of the 27 countries in the OECD study, immigrants pay less than natives in taxes and receive less in transfers. Table 10.5 shows average contributions paid and benefits received by households' migrant status in each of the countries. The least generous countries, not surprisingly, in terms of benefits are those facing the worst fiscal crises—Greece, Iceland, Italy, Portugal and Spain. At the other extreme, migrant households receive more than native-born households in benefits in France and Germany. Native-born and migrant households alike make large fiscal contributions in Luxembourg and Switzerland, but migrant households' contributions exceed natives' there.

In addition to the comprehensive OECD (2013) report, numerous country-level studies give static estimates of the fiscal impact of immigration. Immigrants have a positive fiscal effect in Australia and New Zealand, both countries with point-based admissions systems (Slack et al., 2007). Meanwhile, immigrants have a negative fiscal effect in Canada, which also has a point-based system (Grubel, 2005; Grubel and Grady, 2011; Javdani and Pendakur, 2011). Immigrants are a net fiscal drain in Denmark and Sweden, which tend to have generous welfare programs (Ekberg, 1999; Wadensjö, 2000; Gerdes and Wadensjö, 2006; Wadensjö, 2007). In the United Kingdom, immigrants tend to be net fiscal contributors during periods of economic growth, whereas they impose fiscal costs during economic downturns (Gott and Johnston, 2002; Sriskandarajah, Cooley and Reed, 2005).

Results based on dynamic models are mixed across European countries. For Sweden, estimates of the projected fiscal impact of immigration between 2006 and 2050 range from

Table 10.5 Fiscal contributions paid and benefits received by household migration status, 2007–2009 average (in euros, PPP adjusted)

Contributions paid				Benefits received			
Country	Native	Mixed	Migrant	Country	Native	Mixed	Migrant
Luxembourg	20,043	23,732	20,463	Germany	9,498	18,629	13,727
Switzerland	19,858	26,353	20,149	France	10,952	12,193	11,412
Belgium	18,856	25,611	13,707	Luxembourg	21,270	16,500	11,285
US	15,527	22,844	13,145	Sweden	10,226	10,999	10,109
Netherlands	21,175	32,576	12,415	Austria	13,330	15,022	9,980
Iceland	18,972	23,117	12,380	Netherlands	11,236	11,273	9,871
Norway	17,382	31,613	12,368	Denmark	10,211	8,715	8,673
Austria	16,705	21,465	12,334	Ireland	12,014	10,063	8,583
Italy	15,346	19,552	12,310	Belgium	9,697	8,781	8,147
Canada	12,959	21,160	11,518	Poland	5,178	10,483	8,009
Denmark	17,574	26,428	11,041	Norway	12,327	11,246	7,863
Sweden	17,041	24,472	11,005	UK	8,899	9,036	7,774
UK	11,503	20,990	10,803	Finland	9,482	7,706	7,628
Slovenia	13,316	14,096	10,491	Slovenia	8,866	11,728	7,485
Spain	10,518	14,820	10,057	Canada	5,407	5,666	6,351
France	13,359	21,324	9,961	Switzerland	4,889	4,917	5,601
Greece	13,246	16,068	9,476	Australia	4,700	3,961	5,144
Finland	15,188	19,970	8,942	Czech Rep	4,990	6,965	5,100
Portugal	8,024	13,854	8,320	US	6,993	5,687	4,871
Germany	15,373	14,176	8,094	Hungary	5,450	6,551	4,779
Australia	8,476	12,314	7,447	Slovak Rep	4,003	6,123	4,610
Ireland	9,527	16,574	7,309	Estonia	3,014	3,501	3,992
Hungary	6,531	8,466	6,643	Portugal	7,074	4,055	3,841
Czech Rep	8,465	8,095	4,914	Italy	11,366	7,426	3,162
Estonia	7,528	9,378	3,990	Iceland	6,701	5,559	3,087
Slovak Rep	6,151	6,876	2,439	Spain	7,412	4,990	2,561
Poland	5,470	5,853	2,319	Greece	8,238	5,557	1,748

Source: Organization for Economic Cooperation and Development (2013).

−1.6 percent of GDP to +1.3 percent of GDP, depending on the assumptions made about new immigrants' employment rates and the level of public spending (Ekberg, 2011). In The Netherlands, the NPV of fiscal effects is considerably more positive (or less negative) for an immigrant who arrives at age 25 instead of as a child; the most negative estimate is −96,000 euros, and the most positive estimate is 45,000 euros (Roodenburg, Euwals and ter Rele, 2003). Two studies of Germany find positive fiscal impacts over the typical migrant's lifetime (Bonin, Raffelhüschen and Walliser, 2000; Kirdar, 2010).

U.S. immigrants' participation in government-funded programs

In the United States, individual states have considerable leeway to set eligibility rules and benefit levels for many publicly funded programs. This is particularly true with respect to

immigrants in the post-1996 welfare reform era. Furthermore, states have implemented a variety of policies regarding immigrants' access to education, the labor market, businesses licenses and driver's licenses, among others. Most of these policies focus on unauthorized immigrants. This section discusses immigrants' fiscal effect through the lens of their participation in four major government-funded programs and services in the United States: welfare, education, health care and Social Security.

Welfare

Welfare in the United States typically refers to means-tested benefits, either cash or in-kind, made to eligible low-income individuals. Prior to 1996, the main cash welfare program was Aid to Families with Dependent Children (AFDC). In 1996, that program was transformed and renamed Temporary Assistance for Needy Families (TANF). AFDC and TANF are only available to families with minor children. Other cash transfer programs include: the Earned Income Tax Credit (EITC), which acts as a negative income tax for the working poor; Supplemental Security Income (SSI) for the disabled and elderly; and, in some states, General Assistance (GA) programs for poor people who do not qualify for other programs. Major in-kind welfare programs include food stamps (called the Supplemental Nutrition Assistance Program, or SNAP); public housing or housing subsidies (called Section-8 vouchers); and free or subsidized health insurance (Medicaid and the State Children's Health Insurance Program, or SCHIP). Social Security and Medicare are programs for the elderly and are not considered welfare since eligibility is based on age, not income.

Rapid growth in the low-skilled immigrant population during the 1970s and 1980s in the United States raised concerns that the country was becoming a welfare magnet (e.g., Bartel, 1989; Borjas, 1999). Some studies of the pre-1996 era conclude that immigrants are more likely than U.S. natives to participate in welfare programs (e.g., Blau, 1984; Borjas and Hilton, 1996). Although undocumented migrants are not eligible for public assistance programs other than emergency medical care, the growing size of this population created concerns among policymakers about the future fiscal costs of this group of immigrants and their U.S.-born children.

As a result, parts of the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA)—commonly referred to as welfare reform—aimed to reduce immigrants' use of government-provided services. Specifically, the law states that "aliens within the Nation's borders [should] not depend on public resources to meet their needs" (U.S. Congress 1996, Section 1601, Chapter 14). Although states were given flexibility in defining eligibility rules and allowed to offset some of the restrictions, the law contained the following provisions regarding immigrants' use of social services: most non-citizens who arrived before August 22, 1996, lost eligibility for Supplemental Security Income (SSI), food stamps and Medicaid; non-citizens arriving after August 22, 1996, are ineligible for most types of public assistance during the first five years after arrival; and non-citizens arriving after August 22, 1996, are subject to stricter eligibility requirements because their sponsors' income and assets are counted along with their own income and assets if they apply for public assistance during their first ten years in the United States.
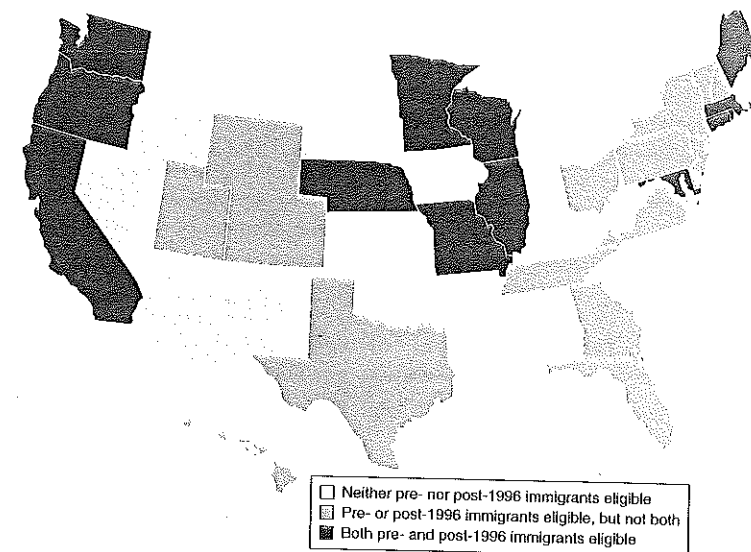
□ Neither pre- nor post-1996 immigrants eligible
▨ Pre- or post-1996 immigrants eligible, but not both
▰ Both pre- and post-1996 immigrants eligible

Figure 10.2 Immigrants' eligibility for welfare programs after 1996.
Source: Based on Borjas (2002).

Figure 10.2 shows states' response to the immigrant provisions in PRWORA. Some states continued to allow most immigrants to participate in programs on the same eligibility basis as U.S. natives. Specifically, some offered food stamps and SSI to immigrants who arrived before 1996 and TANF, Medicaid or SSI to immigrants who arrived after 1996. Those states are shown in the darkest color in the map. The lightest-colored states in the map offered neither, while states in the middle color extended eligibility to one or the other group but not both. In general, states with larger immigrant populations were more likely to extend eligibility to immigrants.

After 1996, welfare participation among immigrant households fell more precipitously than among native-born households. George Borjas (2002) attributes the decline to trends in welfare participation rates in California. Other research indicates that conditional on being eligible, immigrants are less likely to participate in public assistance programs, or less likely to "take up" benefits, than U.S. natives after 1996 (Fix, Capps and Kaushal, 2009; Bitler and Hoynes, 2013). These studies suggest "chilling effects" due to immigrants' confusion regarding their eligibility for welfare programs. Further, tougher immigration enforcement, as measured by apprehensions of unauthorized immigrants for removal from the country, reduces immigrants' participation in Medicaid (Watson, 2014).

The 1997 NRC study did not include the effects of welfare reform since those effects were not yet fully known. It estimated that PRWORA would cause the NPV of the average immigrant's fiscal impact to rise by about $8,000.

Education

In the United States, education is primarily funded by state and local governments, not by the federal government. Education is the largest expense for U.S. state and local budgets. It therefore is not surprising that the cost of educating foreign-born children and the children of foreign-born parents is a significant fiscal cost to state and local governments. About one-fifth of school-aged children in the United States are immigrants or the children of an immigrant (Capps et al., 2005). Only a small minority of these children are unauthorized immigrants. Many of the children of both legal and illegal immigrants are U.S. citizens since they were born in the United States. Since 1982, all children residing in the United States are entitled to receive free publicly funded K-12 education, regardless of immigration status.

Educational expenditures on children and young adults are not only a cost but also a significant investment. Children eventually join the workforce and pay taxes. The more education they receive, the higher their eventual earnings typically are and therefore the more they eventually pay in taxes. The education-related fiscal impact of immigration is therefore quite different in the short run than in the long run. Another issue is that the states and cities that disproportionately experience the front-loaded costs of educating immigrants may not be the same locations that eventually receive the benefits if immigrants move as they age.

One particular concern regarding immigrant children and the children of immigrants is the cost of providing bilingual or English as a second language education. The cost of educating students who do not speak English fluently is 20 to 40 percent more than it is for native-born students (CBO, 2007). However, spending on bilingual education represents only 2 percent of total spending at the K-12 level and has been stable over time despite the rise in the immigrant population in the United States (Griswold, 2012).

Whether immigrant children and the children of immigrants continue on to higher education and who pays for their education is the subject of debate, especially for illegal immigrant children. (Chapter 13 discusses the debate about whether to allow unauthorized immigrant youth to pay in-state tuition at public colleges and universities in the United States.) The private and public benefits of higher education are clearly documented. Higher education not only results in higher earnings and lower unemployment but can improve quality of life in other ways as well. For example, people with higher levels of education tend to live healthier lives, have better access to health care and have higher rates of employer-provided health insurance coverage. As earnings rise, so do taxes paid to state, local and federal governments.

Health care

The cost of health care for immigrants is another topic of considerable debate in the fiscal realm. Immigrants tend to be healthier and use less health care than U.S. natives. However, immigrants are less likely to have health insurance, and much of the cost of the health care they receive is funded by taxpayers. Despite this, estimates suggest that increases in the costs of health care in the United States are not due to immigration and that immigrant-related health care costs are not a large share of overall government spending.

Immigrants tend to use less health care than U.S. natives since they tend to be younger and healthier. One way to look at the age distribution of immigrants and natives is the dependency ratio, which is the ratio of working-age people to retirement-age people. When working age is defined as ages 18 to 64, the dependency ratio is estimated at 6.5 to 1 for immigrants, compared with 4.7 to 1 for U.S. natives (Zallman et al., 2013). For undocumented immigrants, the ratio is estimated to be even higher at 12.4 to 1. In other words, there are more working-age people relative to retirement-age people among the foreign-born population than among the native-born population.

Immigrants tend to be much healthier when they arrive because many of them migrate to work, are in their prime working years and have healthier lifestyles. Studies that compare health-related behavior and outcomes show that immigrants have healthier habits in terms of smoking, drinking, consuming unhealthy foods and being obese (Wallace et al., 2012). Not surprisingly, immigrants are therefore less likely than their native-born counterparts to experience serious health problems, such as diabetes, hypertension, heart disease and asthma (Pylypchuk and Hudson, 2009).

Immigrants also tend to use less health care, especially undocumented immigrants, in part because they are more likely to be uninsured. While only about 14 percent of U.S. natives were uninsured in 2010, 34 percent of all immigrants and 59 percent of undocumented immigrants were (DeNavas-Walt, Proctor and Smith, 2011; Batalova and Lee, 2012). Not having health insurance results in greater reliance on emergency rooms or publicly funded clinics for health care, a lower rate of preventative care and less access to regular health care providers (Rodriguez, Bustamante and Ang, 2009).

The federal government requires health care facilities to provide health care in life-threatening circumstances to everyone regardless of immigration or legal status and ability to pay. This results in uncompensated care for providers. It falls on state and local governments to cover much of these expenses. Certain jurisdictions, especially along the U.S.–Mexico border, face sizable costs. Nonetheless, these costs tend to be a small share of total spending.

At the national level, studies suggest that immigrants impose fewer costs on the health care system than native-born residents and pay more into the system through payroll taxes than they receive in services. Immigrants accounted for 8.5 percent of nationwide health care spending in 2000 but were 13 percent of the total population (RAND, 2006). Undocumented immigrants accounted for 1.5 percent of health care spending but were 3.2 percent of the population. During the period 2002 to 2009, undocumented immigrants contributed about $115.2 billion more to Medicare than they received in services (Zallman et al., 2013). Similarly, immigrants paid in $33.1 billion into the Hospital Insurance fund in 2009 but were only responsible for $19.3 billion in expenses (Zallman et al., 2013). Immigrants generated a total surplus in that fund of $115.2 billion during 2002 to 2009. Meanwhile, U.S. natives accumulated a deficit of $28.1 billion during that period.

Social Security

Social Security is the government-funded retirement program for the elderly in the United States. All legal workers and some undocumented immigrants working under stolen or made-up Social Security numbers contribute to Social Security through employer- and

employee-paid payroll taxes. This deduction appears on paychecks as the Federal Insurance Contributions Act (FICA) tax. The FICA tax actually includes two separate taxes with different tax rates: Social Security and Medicare. As of 2014, the tax rate for Social Security is 6.2 percent of earnings paid by both the employer and the employee, or 12.4 percent total. There is a maximum taxable amount of earnings, which was $117,000 in 2014. For Medicare, the tax rate is 1.45 percent of earnings paid by both the employer and the employee, or 2.9 percent total. There is no earnings limit on the Medicare tax.

Many undocumented workers use false or fraudulently obtained Social Security numbers (SSNs) to satisfy employment eligibility verification requirements during the hiring process. Employers then use these numbers to withhold federal, state and local income and payroll taxes for employees. Some undocumented workers instead use Individual Tax Identification Numbers issued by the IRS to file tax returns, make payments and apply for refunds. The Social Security Administration estimates that about one-half of undocumented workers pay Social Security taxes (Feinleib and Warner, 2005). Other studies estimate that between 50 and 75 percent of unauthorized immigrants pay federal, state and local taxes (CBO, 2007).

Given that many immigrants, authorized and unauthorized, will not receive Social Security benefits, immigrants contribute to the solvency of the Social Security system. The Social Security Administration (SSA) estimated in 2011 that an increase of 300,000 immigrants per year would extend the solvency of the system by about one year (Griswold, 2012). In fiscal year 2010, the SSA also calculated that unauthorized immigrants contributed about $13 billion in payroll taxes but received only $1 billion in benefits (Goss et al., 2013). Most unauthorized immigrants will never receive benefits based on the contributions they make. Contributions that cannot be matched with a worker because an invalid SSN was used go into the Earnings Suspense File, which totals in the hundreds of billions of dollars.

Final thoughts on fiscal effects

Assessing the impact of immigrants on government accounts is complicated. There are many ways to calculate fiscal impacts, and all methods require that researchers make considerable assumptions. Although estimates vary widely, some patterns do emerge. First, in most countries the fiscal impact of immigration appears to be rather small as a share of overall economic output. Studies that look at the impact in a given year—the static accounting method—typically find an impact between −1 to +1 percent of GDP. Second, immigrants' labor market success affects their fiscal impact. In countries with relatively skilled immigrants admitted on the basis of employment qualifications, such as Australia and New Zealand (although not Canada), immigrants add to government coffers. Countries with sizable humanitarian immigrant populations experience smaller fiscal gains or even losses from immigration. Third, immigrants' age at arrival matters. Countries experience the biggest gains when immigrants, not surprisingly, work more years and therefore contribute more in taxes. Fourth, assimilation by immigrants' children can help alleviate fiscal imbalances, particularly for government-funded retirement benefit programs, in destination countries.

The next chapter shifts the focus from destination countries to source countries, where immigration also has fiscal, labor market and other effects.

Problems and discussion questions

1   What are the fiscal costs and benefits of immigration? At what level of government (federal, state or local) do they occur?
2   Why might unauthorized immigration be a net plus to the U.S. Social Security system?
3   Do immigrants strain the welfare system in the United States? In Europe? Why or why not?
4   What policies have countries implemented to reduce the fiscal costs associated with low-skilled immigrants? What other policies could they implement?
5   Explain the difference between the static and dynamic methods. Which one is more likely to indicate that immigrants are a fiscal cost if immigrants arrive at age 5? At age 25? At age 65? Why the differences?

Notes

1   For example, the National Research Council's study of the fiscal impact of immigrants in New Jersey includes nearly 30 categories of expenses (Smith and Edmonston, 1997). The services provided by the local government include: government administration, courts, police and fire protection services, public works, welfare and public health, recreation and conservation, libraries, vocational education, community colleges and K-12 education. At the state level, expenditures include: government administration, public safety and criminal justice, health, community development, transportation, environmental management, employment training, educational administration and state aid for K-12, higher education, state spending on Medicaid, AFDC and SSI, general state welfare assistance, pharmaceutical assistance for the elderly and disabled, municipal aid to local governments and property tax reimbursements.
2   Other pure public goods may include expenditures on veterans, research and development and the repayment of preexisting public debt.
3   The CBO's budget projections can be found at https://www.cbo.gov/topics/budget/budget-projections.
4   The extensive assumptions include: (1) starting in 2016, the debt/GDP ratio is held constant; (2) budgetary adjustments are done through a combination of higher taxes and lower spending; (3) the real interest rate is 3 percent; (4) immigrants continue to receive benefits as they did in 1994–1995; (5) taxes for immigrants follow the cross-sectional pattern for the first ten years and then become fixed to the age-specific tax payments of natives; (6) immigrants who arrive after age 55 get OASDHI benefits; (7) 30 percent of immigrants return home and bring their young children with them, and 16 percent of second-generation immigrants emigrate with their parents; (8) bilingual education costs raise total educational costs for immigrant and second-generation children by 22 percent.

Internet resources

The OECD's International Migration Statistics includes data on immigrants by citizenship, age, occupation, duration of stay, occupation, field of study and labor status, available at http://www.oecd-ilibrary.org/social-issues-migration-health/data/oecd-international-migration-statistics_mig-data-en.

Suggestions for further reading

Smith, J.P. and Edmonston, B. (eds.) (1997) *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*. Washington, DC: National Academies Press.
Storesletten, K. (2000) "Sustaining fiscal policy through immigration." *Journal of Political Economy* 108(2), pp. 300–323.

References

Auerbach, A.J., Gokhale, J. and Kotlikoff, L.J. (1991) "Generational accounts: A meaningful alternative to deficit accounting." In: Bradford, D. (ed.) *Tax Policy and the Economy* vol 5. Cambridge, MA: MIT Press.

Auerbach, A.J. and Oreopoulos, P. (1999) "Analyzing the fiscal impact of US immigration." *American Economic Review* 89(2), 176–180.

Bartel, A.P. (1989) "Where do the new U.S. immigrants live?" *Journal of Labor Economics* 7(4), pp. 371–91.

Batalova, J. and Lee, A. (2012) "Frequently requested statistics on immigrants and immigration in the United States." Washington, DC: Migration Policy Institute. Available at: http://www.migrationpolicy.org/article/frequently-requested-statistics-immigrants-and-immigration-united-states-0/ [20 September 2014].

Bitler, M.P. and Hoynes, H.W. (2013) "Immigrants, welfare reform, and the U.S. safety net." In: Card, D. and Raphael, S. (eds.) *Immigration, Poverty, and Socioeconomic Inequality*. New York: Russell Sage Foundation, pp. 315–380.

Blau, F.D. (1984) "The use of transfer payments by immigrants." *Industrial and Labor Relations Review* 37(2), pp. 222–239.

Bonin, H., Raffelhüschen, B. and Walliser, J. (2000) "Can immigration alleviate the demographic burden?" *FinanzArchiv* 57(1), pp. 1–21.

Borjas, G.J. (1999) "Immigration and welfare magnets." *Journal of Labor Economics* 17(4), pp. 607–637.

Borjas, G.J. (2002) "Welfare reform and immigrant participation in welfare programs." *International Migration Review* 36(4), pp. 1093–1123.

Borjas, G.J. and Hilton, L. (1996) "Immigration and the welfare state: Immigrant participation in means-tested entitlement programs." *Quarterly Journal of Economics* 111(2), pp. 575–604.

Capps, R., Fix, M., Murray, J., Ost, J., Passel, J.S. and Herwantoro, S. (2005) "The new demography of America's schools: Immigration and the No Child Left Behind Act." Washington, DC: Urban Institute. Available at: http://www.urban.org/UploadedPDF/311230_new_demography.pdf [20 September 2014].

Congressional Budget Office (CBO) (2007) "The impact of unauthorized immigrants on the budgets of state and local governments." Washington, DC: Congressional Budget Office. Available at http://www.cbo.gov/publication/41645 [20 September 2014].

Congressional Budget Office (CBO) (2013) "Cost estimate: S. 744, Border Security, Economic Opportunity, and Immigration Modernization Act." Washington, DC: Congressional Budget Office. Available at: http://www.cbo.gov/publication/44225 [10 September 2014].

DeNavas-Walt, C., Proctor, B.D. and Smith, J.C. (2011) "Income, poverty, and health insurance coverage in the United States: 2010." U.S. Bureau of the Census Report P60-239. Washington, DC: U.S. Bureau of the Census. Available at: http://www.census.gov/prod/2011pubs/p60-239.pdf [20 September 2014].

Ekberg, J. (1999) "Immigration and the public sector: Income effects for the native population in Sweden." *Journal of Population Economics* 12(3), pp. 411–430.

Ekberg, J. (2011) "Will future immigration to Sweden make it easier to finance the welfare system?" *Journal of Population Economics* 27(1), pp. 103–124.

Feinleib, J. and Warner, D. (2005) "The impact of immigration on Social Security and the national economy." Washington, DC: Social Security Advisory Board. Available at: http://www.ssab.gov/documents/immig_issue_brief_final_version_000.pdf [20 September 2014].

Fix, M., Capps, R. and Kaushal, N. (2009) "Immigrants and welfare: Overview." In: Fix, M.J. (ed.) *Immigrants and Welfare: The Impact of Welfare Reform on America's Newcomers*. New York: Russell Sage Foundation, pp. 1–36.

Gerdes, C. and Wadensjö, E. (2006) "Immigration and the welfare state: Some Danish experiences." *Academy for Migration Studies in Denmark (AMID) Working Paper* No. 60/2006. Copenhagen: Academy for Migration Studies in Denmark.

Goss, S., Wade, A., Skirvin, J.P., Morris, M., Bye, K.M. and Huston, D. (2013) "Effects of unauthorized immigration on the actuarial status of the Social Security Trust Funds." *Actuarial Note* No. 151. Baltimore, MD: Social Security Administration.

Gott, C. and Johnston, K. (2002) "The migrant population in the UK: Fiscal effects." *Research, Development and Statistics Directorate (RDS) Occasional Paper* No. 77. London: Research, Development and Statistics Directorate.

Griswold, D. (2012) "Immigration and the welfare state." *Cato Journal* 32(1), pp. 159–74.

Grubel, H. (2005) "Immigration and the welfare state in Canada: Growing conflicts, constructive solutions." *Fraser Institute Public Policy Sources* No. 84. Vancouver: Fraser Institute.

Grubel, H. and Grady, P. (2011) "Immigration and the Canadian welfare state 2011." Studies in Immigration and Refugee Policy, Fraser Institute. Vancouver: Fraser Institute.

Javdani, M. and Pendakur, K. (2011) "Fiscal transfers to immigrants in Canada." *Metropolis British Colombia Working Paper Series* No. 11-08. Vancouver: Metropolis British Colombia.

Kirdar, M. (2010) "Estimating the impact of immigrants on the host country social security system when return migration is an endogenous choice." *IZA Discussion Paper* No. 4894. Bonn: Institute for the Study of Labor.

Organization for Economic Cooperation and Development (OECD) (2013) *International Migration Outlook 2013*. Paris: OECD Publishing.

Pylypchuk, Y. and Hudson, J. (2009) "Immigrants and the use of preventative care in the United States." *Health Economics* 18(7), pp. 783–806.

Rand Corporation (RAND) (2006) "Rand study shows relatively little public money spent providing health care to undocumented immigrants." Santa Monica, CA: Rand Corporation. Available at: http://www.rand.org/news/press/2006/11/14.html [20 April 2014].

Rodríguez, M.A., Bustamante, A.V. and Ang, A. (2009) "Perceived quality of care, receipt of preventive care, and usual source of health care among undocumented and other Latinos." *Society of General Internal Medicine* 24(3), pp. 508–513.

Roodenburg, H., Euwals, R. and ter Rele, H. (2003) "Immigration and the Dutch economy." The Hague, Netherlands: CPB Netherlands Bureau for Economic Policy Analysis. Available at: http://www.cpb.nl/node/10221 [20 September 2014].

Slack, A., Wu, J. and Nana, G. (2007) "Fiscal impacts of immigration 2005/06." Economic Impacts of Immigration Working Paper Series. Wellington, New Zealand: Department of Labour.

Smith, J.P. and Edmonston, B. (eds.) (1997) *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*. Washington, DC: National Academies Press.

Sriskandarajah, D., Cooley, L. and Reed, H. (2005) "Paying their way: The fiscal contribution of immigrants in the UK." London: Institute for Public Policy Research. Available at: http://www.ippr.org/assets/media/images/media/files/publication/2011/05/Paying%20Their%20Way_1352.pdf [20 September 2014].

Strayhorn, C.K. (2006) "Undocumented immigrants in Texas: A financial analysis of the impact to the state budget and economy." Special Report (December). Austin, TX: Office of the Comptroller.

Wadensjö, E. (2000) "Immigration, the labour market, and public finances in Denmark." *Swedish Economic Policy Review* 7, pp. 59–83.

Wadensjö, E. (2007) "Immigration and net transfers within the public sector in Denmark." *European Journal of Political Economy* 23(2), pp. 472–485.

Wallace, S.P., Torres, J., Sadegh-Nobari, T., Pourat, N. and Brown, E.R. (2012) "Undocumented immigrants and health care reform." Mimeo, UCLA Center for Health Policy Research.

Available at: http://healthpolicy.ucla.edu/publications/Documents/PDF/undocumentedreport-aug2013.pdf [20 September 2014].

Watson, T. (2014) "Inside the refrigerator: Immigration enforcement and chilling effects in Medicaid participation." *American Economic Journal: Economic Policy* 6(3), pp. 313–338.

Zallman, L., Woolhandler, S., Himmelstein, D., Bor, D. and McCormick, D. (2013) "Immigrants contributed an estimated $115.2 billion more to the Medicare trust fund than they took out in 2002–09." *Health Affairs* 32(6), pp. 1153–60.

11   Effects on Source Countries

Although the number of international migrants continues to rise in absolute terms, the share of the world population who are migrants has remained steady at around 3 percent over the past 50 years. Nonetheless, there have been considerable shifts in migrants' demographic characteristics and their source and destination countries. Most notably, a greater share of migrants move from middle-income countries to high-income countries, and how far migrants move has increased. In addition, the education levels of immigrants have risen.

Researchers point to increased ability to finance migration costs and a significant drop in those costs as the main causes of these shifts. Rising wages in populous former low-income countries have increased migration from middle- to high-income countries. In particular, China and India gained middle-income status, and more of their citizens became able to bear migration costs.[1] In addition, in the late 1970s China became more willing to allow its citizens to leave. Meanwhile, migration costs have fallen, in part due to bigger migrant networks in receiving countries and greater interconnectedness through advances in information technology. The increased prevalence of ethnic enclaves and diasporas has lowered the information costs of migration and thereby increased their force as a "pull" factor. Migrant networks enable potential emigrants to more accurately evaluate economic opportunities in distant countries. Near-universal mobile phones have increased the flow of information and money to source countries, which in turn has the potential to boost emigration and economic development there.

Migrants are increasingly likely to be highly educated, in part because of rising education levels in most source countries, and to choose high-income destination countries. According to Cecily Defoort (2008), the share of migrants in the six largest OECD countries—Australia, Canada, France, Germany, the United Kingdom and the United States—with a tertiary, or college, education rose four-fold between 1975 and 2000. The number of tertiary-educated immigrants in OECD countries then increased by another 70 percent between 2000 and 2013 (United Nations and OECD, 2013).

Higher incomes in destination countries remain the main draw for economic migrants. Workers in high-income countries earn wages that are a multiple of those in middle-income countries (International Labour Organization, 2013). The possibility of earning more attracts high- and low-skilled immigrants alike. High-skilled migrants are also lured by non-pecuniary benefits available in high-income countries, such as better work environments, opportunities to conduct research with colleagues who are leaders in their field and more potential for career advancement.

The effects of emigration on the sending country are the focus of this chapter. To begin, emigration affects the labor market in the source country, with implications for workers and owners of other factors of production who remain there. If migrants are disproportionately high-skilled workers, emigration may adversely affect the living standards of those left behind. However, an outflow of high-skilled workers may actually increase human capital in the source country via increased transfer of knowledge from abroad and return migration. Relatedly, migrants often send funds, or remittances, to family members. As this chapter discusses, these remittances can have important economic effects. Lastly, the chapter explores how migration can affect political, economic and social institutions in the source country.

Labor market consequences of emigration for the source country

Migration has labor market implications in both sending and receiving countries. For the sending country, migration by workers decreases labor supply there. As shown in Figure 11.1, this shifts the labor supply curve to the left. (To simplify the analysis, the figure shows the supply curve as vertical, or perfectly inelastic, and assumes that all workers are identical, or there is only one skill level.)

For example, suppose workers in Poland are considering moving to the United Kingdom. This would occur if wages are higher in the United Kingdom, which is true for most workers. (Higher wages in the United Kingdom could be due to a number of factors, including higher
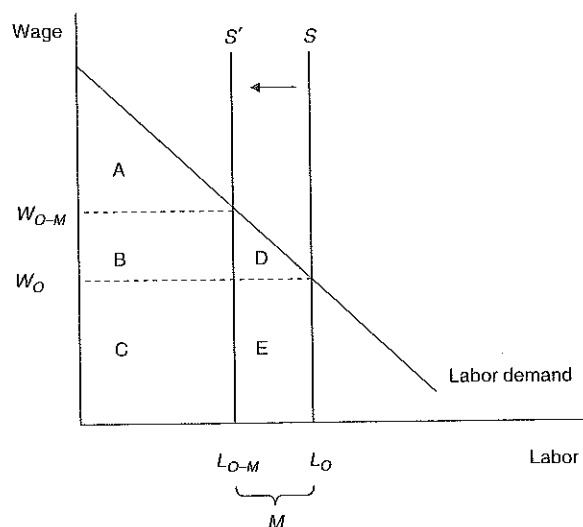

Figure 11.1 Labor market effects of migration in the source country.

Before immigration L_0 workers are employed in the origin at wage W_0. After migration, L_{0-M} workers are employed there at wage W_{0-M}.

product demand due to higher incomes there or higher productivity of workers due to differences in the capital stock or technology.) As workers migrate from Poland to the United Kingdom, labor supply decreases in Poland. Wages rise among workers who remain there. In Figure 11.1, wages rise from W_0 to W_{0-M}.

Although immigration creates a net welfare gain globally and in the destination, as discussed in Chapter 7, the model indicates that there are welfare losses in the source country. Before migration, workers earn the areas represented by C + E in Figure 11.1. The owners of other factors of production earn the areas represented by A + B + D. After M workers leave, the remaining workers, L_{0-M}, earn B + C. It appears that workers lose area E while gaining area B, but keep in mind that area E was earned by workers who leave. Area E is therefore not a loss to workers who remain in the source country. Owners of the other factors of production receive only area A after migration. Migration thus leads to a transfer of area B to workers from owners of other factors of production. It also leads to a social welfare loss equal to area D. (Again, area E does not count since it represents income lost by workers who move and then earn even higher incomes.) Thus, the sending country suffers on net in this model, while the world as a whole gains.

Studies indicate that migration does indeed lead to higher wages for those left behind. Using the simple theoretical framework presented above, Prachi Mishra (2007) examines the labor market impact of out-migration from Mexico. She finds that out-migration leads to higher wages there. Specifically, a 10 percent decrease in the number of Mexican workers in a schooling and experience skill group increases the average wage in that skill group by about 4 percent.

Emigration and human capital: brain drain or brain gain?

Beyond its impact on the labor market, emigration may have implications for the source country if it is disproportionately comprised of high-skilled workers. As noted above, this is a real concern for some countries since globally a disproportionate share of migrants is highly educated. When the consequences are perceived as negative, the emigration of highly-skilled workers is often called "brain drain." Originally, the term brain drain was used by the British Royal Society to describe the exodus of scientists and technology workers from the United Kingdom to the United States and Canada in the 1950s and 1960s (Gibson and McKenzie, 2011). Nowadays, the term is often used more broadly to encompass not only high-skilled migration from one developed country to another but also from developing to developed countries and from rural to urban areas within countries. In the past, policymakers typically aimed to stem the outflow or recover the perceived costs of high-skilled emigration. However, recent evidence links high-skilled emigration to positive outcomes in the source country. These benefits have been called "brain gain." Specifically, brain gain results when the remaining members of the sending country benefit from high-skilled emigration.

Studying high-skilled emigration is important because it is part of a broader discussion of the costs and benefits of immigration in global economies. International mobility of workers can create sizable global benefits. Estimates of the net gains from more open borders for all workers are in the trillions of dollars (Clemens, 2011). The gains from removing barriers to migration appear to be more than twice as large as the gains from removing barriers to trade

and capital flows. Increased migration of high-skilled workers in particular can increase economic growth and innovation in destination countries, as discussed in Chapter 9.

The implications of high-skilled migration for sending countries are less clear. On the one hand, migration of high-skilled workers may create negative externalities, shortages in certain occupations, problematic shifts in complementarities and fiscal shortfalls for those left behind. Governments in particular worry about squandering scarce resources on educating and training workers who then leave. Governments of developing countries also worry that emigration may exacerbate a shortage of health care workers. On the other hand, strong networks of migrants abroad and return migration may benefit source countries through better access to capital, technology and ideas. Whether high-skilled migration is a boon or a curse for sending countries is thus both a theoretical and an empirical question.

The extent of high-skilled emigration

Economists and demographers have developed several measures to gauge the extent of high-skilled emigration.[2] The most common indicator is the emigration rate of highly educated individuals, such as the fraction of the population with a tertiary education who leave. Another measure is the emigration rate among PhD holders. This measure focuses on workers who are typically involved in research and development (R&D), innovation, patents and other key sources of productivity growth. A third measure is the number or fraction of physicians abroad. Early concerns about brain drain in developing countries focused on the possibility that emigration led to shortages of medical professionals in source countries, particularly in Africa, motivating use of this measure.

Using the first measure, Herbert Brücker, Stella Capuano and Abdeslam Marfouk created emigration rates by country of origin, gender and educational level using data on 20 OECD destination countries.[3] Table 11.1 presents some their estimates for 2010. Specifically, the table presents emigration rates overall and by education attainment for the ten richest countries and the ten poorest countries with populations over one million.[4] Emigration rates are defined as the total number of migrants from the source country divided by the number of migrants plus the number of residents in the source country.

There are several notable patterns in Table 11.1. First, emigration occurs from both rich and poor countries. Indeed, emigration is higher from some rich countries than from some poor countries. Second, emigration rates tend to increase as education increases. Third, emigration of the highly educated tends to be much greater for poor countries than for rich countries. For example, more than one-third of high-skilled people have left Eritrea, Malawi, Mozambique and the Republic of Congo, while Zimbabwe has the highest emigration rate of high-skilled workers, 56 percent, in the table.

Other studies confirm these patterns across countries. The average emigration rate of people with a tertiary education is 7.3 percent in developing countries, with a range from 5.4 percent in larger countries to 13 percent in sub-Saharan African countries to 45 percent in small developing island nations (Docquier, Lohest and Marfouk, 2007). These rates are actually underestimates because they only include a subset of relatively developed destination countries; the same is true for the estimates presented in Table 11.1. As of 2000, Cape Verde, Grenada, Guyana, Haiti, Jamaica, Palau, Saint Kitts and Nevis, Saint Vincent and the

Table 11.1 Emigration rates (per 100 population) by education for richest and poorest countries, 2010

Country	Overall	Education level		
		Low	Middle	High
World	1.91	1.40	1.29	5.31
Richest:				
Qatar	0.18	0.07	0.08	0.68
Singapore	3.28	1.82	1.20	10.30
Norway	3.81	3.34	2.97	5.33
United States	0.46	1.94	0.27	0.53
Hong Kong	9.56	5.78	3.23	30.02
Switzerland	4.51	2.77	3.19	10.59
Canada	3.62	5.86	1.74	5.85
Australia	2.12	7.98	0.81	3.75
Austria	5.65	4.92	3.67	14.35
Netherlands	5.16	8.09	2.66	9.62
Poorest:				
Mali	1.40	0.94	6.63	12.57
Mozambique	1.47	0.53	14.83	46.37
Malawi	0.34	0.17	0.20	35.97
Niger	0.08	0.03	0.33	3.32
Zimbabwe	2.10	0.93	0.61	55.83
Eritrea	2.63	0.98	4.19	42.64
Liberia	3.65	0.71	5.19	20.24
Republic of the Congo	3.41	2.32	2.10	36.33
Burundi	0.35	0.10	1.28	16.51
Central African Republic	0.55	0.26	0.76	10.12

Source: Based on data from http://www.iab.de/en/daten/iab-brain-drain-data.aspx [3 June 2014]. Calculations are based on immigrants in twenty OECD destination countries.

Grenadines, Seychelles, Trinidad and Tobago and Tonga all had high-skilled emigration rates above 75 percent. Frédéric Docquier and Hillel Rapoport (2012b) attribute these high rates to the countries' small size, high poverty rates and (for some) proximity to the United States.

Over time, the absolute number of high-skilled migrants has increased. However, skill levels are increasing in sending countries as well, leaving the high-skilled emigration rate fairly steady. Sub-Saharan Africa appears to be an exception, however. Growth in educational attainment in source countries there has not kept up with increases in out-migration by the highly skilled (Defoort, 2008).

Although it is commonly believed that high-skilled emigration is concentrated among doctors and nurses, there is actually significant diversity in the occupations and industries of educated emigrants. In the United States and Canada, the share of high-skilled immigrants who are medical professionals is actually relatively low at 13 percent and 6 percent, respectively (Gibson and McKenzie, 2011). Nonetheless, some countries suffer severe health professional shortages as a result of emigration (Docquier and Rapoport, 2012b). In Grenada, Dominica,

Fiji, Ireland, Jamaica, Liberia and Saint Lucia, for example, more than 40 percent of physicians have emigrated (Bhargava and Docquier, 2008). Nonetheless, the number of health care professionals who have left some countries, particularly in sub-Saharan Africa, is so small relative to needs there that it effectively does not matter (Clemens, 2007).[5]

Researchers have documented several determinants of high-skilled emigration. Political instability, low average human capital, small populations and religious fractionalization in source countries are push factors for educated migrants (Docquier, Lohest and Marfouk, 2007). The number of high-skilled emigrants is similar for men and women, but this translates into a higher emigration rate among high-skilled women given global gender disparities in education (Docquier and Rapoport, 2012a). The "feminization" of migration gives rise to concerns about future economic growth in developing source countries since a higher level of education among women tends to be linked to lower fertility, higher labor productivity and faster economic growth in those countries (Docquier and Rapoport, 2012b).

Two other patterns have been observed among high-skilled emigrants. The first is that highly educated workers tend to agglomerate in urban areas (Clemens, 2009). The second is that high-skilled migration is correlated with low-skilled migration since high-skilled migrants may bring low-skilled family members with them (Gibson and McKenzie, 2011). In addition, networks in the receiving country may reduce migration costs for both high- and low-skilled migrants alike, while better opportunities may attract both groups.

Theories of brain drain and brain gain

Traditional models of high-skilled emigration predict negative consequences for economic growth in sending countries. In these models, high-skilled immigration results in increased global inequality, with rich countries getting richer and poor countries getting poorer. The models treat education as exogenous, or coming from outside the model, and do not allow education levels in source countries to change in response to emigration. This research was pioneered by Jagdish Bhagwati and Koichi Hamada (1974).[6]

Later models, first developed in the 1990s, are more optimistic. These models recognize that emigration may lead people left behind in the source country to increase their own human capital in an effort to themselves migrate. In addition, source countries may benefit from emigrants returning to follow entrepreneurial pursuits, boosting productivity through information diffusion or increasing investment through remittances. There are four main channels through which brain gain may occur: the human capital channel, the productivity channel, the transfer channel and the institutional channel.

The human capital channel allows the level of educational attainment to depend in part on migration prospects. The prospect of migrating to a country with a higher return to education can motivate people in the sending country to acquire more education. If only a fraction of these people actually migrate, education levels rise in the sending country over time. However, if potential migrants would move to a country with a lower return to education, such as Mexicans migrating to the United States, increased prospects of migrating may reduce the incentive to acquire education. Models that allow human capital to be endogenized, or depend on migration prospects, give ambiguous predictions for the impact of emigration on education levels in the source country (Docquier and Rapoport, 2012b).

Several case studies suggest that the human capital channel leads to an increase in education in source countries. In Fiji, Indo-Fijians invested in education in order to migrate to Australia, New Zealand or Canada after a 1987 military coup created an unstable environment for the Indian minority group. Given that those destinations have skills-based point systems, Indo-Fijians needed to acquire high levels of schooling to be able to migrate there. The rate of emigration among tertiary-educated Indo-Fijians rose, but education levels among the remaining population and returning migrants rose as well (Chand and Clemens, 2008). In Nepal, soldiers are recruited into the British Army as part of the special Gurkha brigade. In order to qualify, Nepalese soldiers must complete a certain level of schooling. An increase in the education cutoff led to a higher likelihood that Nepalese completed primary and secondary education (Shrestha, 2011). Surveys of teachers and students in Ghana, Micronesia, New Zealand, Papua New Guinea and Tonga indicate that students change what they study and teachers change what courses they offer in response to increased emigration (Gibson and McKenzie, 2012). In particular, teachers add foreign languages, teach tolerance of different perspectives and add global botany into their curriculum.

At the country level, studies also find evidence of a positive impact of emigration on human capital attainment in the sending country. Michel Beine, Docquier and Rapoport (2008) examine the impact of high-skilled emigration on educational attainment in 127 developing countries. They find that a doubling of emigration among the highly educated is associated with a 5 percent increase in the proportion of the population with a tertiary education in the source country in the short run, and a 22.5 percent increase in the long run. These numbers suggest a substantial increase in educational attainment in response to high-skilled emigration, particularly in the long run. Using these estimated elasticities, Docquier and Rapoport (2012b) identify winners (those experiencing brain gain) and losers (those experiencing brain drain). Losers include small and medium-sized countries with emigration rates above 50 percent, such as islands in the Caribbean and Pacific. The winners are large countries, such as Brazil, China and India.

In the productivity channel, high-skilled emigrants abroad can return flows of income, investment and expertise or move back to the source country themselves. These flows have a positive impact on total factor productivity (TFP). Enclaves in the receiving country diffuse technology to the sending country and increase TFP there. For most developing countries, adoption of technologies developed abroad, not home-grown innovation, is the main driver of technological progress. Network externalities between migrants abroad and the remaining residents in a sending country can enhance the sending country's adoption of new technologies. In pursuit of such gains, some countries encourage high-skilled emigration and have programs to facilitate training for migration. These countries include China, Cuba, India, the Philippines, Sri Lanka and Vietnam (World Bank, 2006). Countries with large diasporas, such as China, India and the Philippines, have experienced considerable growth in information technology, trade, investment, technology transfers and knowledge circulation as a result of high-skilled emigration (Saxenian, 1999, 2002; Opiniano and Castro, 2006).

The transfer channel links emigration to remittances. Remittances relax households' budget constraints and allow households to increase consumption, investment or savings or to pay off loans. If the funds are used for education, remittances may increase human capital formation and thereby ultimately boost economic growth in the home country. (Remittances are discussed more later in this chapter.)

Lastly, the institutional channel allows for feedback onto political, economic and social institutions in the home country. Better institutions may result in higher TFP. Furthermore, links between diasporas and the home country may boost the economy in the home country via increased trade and foreign direct investment. (Theory and empirical evidence on this channel are discussed later in this chapter.)

Growth accounting

The growth accounting technique from Chapter 9 can be used to analyze the effects of emigration on the source country. Recall that the growth accounting equation is

$$\%\Delta Y = \%\Delta A + a_L\%\Delta L + a_K\%\Delta K \tag{11.1}$$

where Y is output, A is TFP, L is number of workers, K is the stock of physical capital and a_L and a_K represent the elasticity of output with respect to labor and capital, respectively. For output to grow, an input to production (labor or capital) or TFP must grow.

In the simplest case, the reduction in the labor force in the source country means $\%\Delta L < 0$ and hence reduces output growth. However, if emigrants send remittances back to their source country, as posited by the transfer channel, then the capital stock may grow, or $\%\Delta K > 0$. This would contribute to faster growth in output. In addition, transmission of technologies or knowledge may occur when highly educated migrants move abroad and share newly acquired knowledge with their home country, as posited by the productivity channel. If so, TFP grows in the source country, or $\%\Delta A > 0$. The net effect would depend on the relative sizes of the elasticities of output with respect to capital and labor and the relative magnitude of the changes. If a_L is relatively small and a_K relatively big, the net effect of emigration could be positive for the source country. However, if the reverse holds, then emigration may act as a drag on output growth in the source country.

Policy issues and responses to high-skilled emigration

High-skilled emigration receives considerable attention in part because of its relevance for policymakers. When a highly skilled worker leaves, there may be fiscal implications if the source country's government has incurred the majority of the costs for training and educating the worker. The success of policies that tax or limit emigration rests on numerous assumptions and requires information on a wide range of effects in both sending and receiving countries. One well-known proposal, introduced by Bhagwati and Hamada (1974), is a Pigovian tax on high-skilled emigration, or a "tax on brains," to compensate origin countries. Quantifying the magnitude of these costs in order to set the tax is difficult. Further, policymakers have had limited success in imposing taxes or other fees on emigrants. For example, some governments offer student loans to citizens studying abroad and forgive the loan if a citizen returns. Less than 10 percent of these loans were repaid in Brazil, Venezuela and Kenya in the 1980s, and there have been sizable defaults among New Zealand emigrants (Albrecht and Ziderman, 1991).

Some countries aim to make return migration attractive to high-skilled emigrants. For example, India has invested in infrastructure to lure information technology workers to return

home. China has attempted to stem its outflow and encourage return migration by creating world-class educational institutions. France and the United Kingdom have tried to increase salaries and employment opportunities at home. The openness of the economies of Ireland, South Korea and Taiwan is another way to attract return migrants as well as investment from abroad (Cervantes and Guellec, 2002).

Remittances

Remittances are income received by households from family members abroad, sent as cash or in-kind transfers. Remittances may flow through formal or informal channels. Formal channels include money wiring services, such as Western Union and Money Gram, and financial institutions, such as banks and credit unions. Informal channels include family or friends returning home who bring money or goods back with them and networks of individuals who operate as money brokers in both the destination and source countries. These brokers are sometimes called *hawala* or *hundi* in South Asia and *padala* in the Philippines (Yang, 2011). Informal channels work on the honor system and are largely reliant on family connections.

Remittances are substantial. For many countries, remittances greatly dwarf foreign aid, and for some countries remittances equal or even exceed the level of foreign direct investment. The most widely used data on remittances are compiled by the World Bank. Figure 11.2 presents the World Bank's estimates of annual global remittances since 1970.[7] Total remittances have grown (in real terms) from slightly under $2 billion in 1970 to over $500 billion in 2013. Remittances fell slightly in 2009 as a result of the global financial crisis but otherwise have
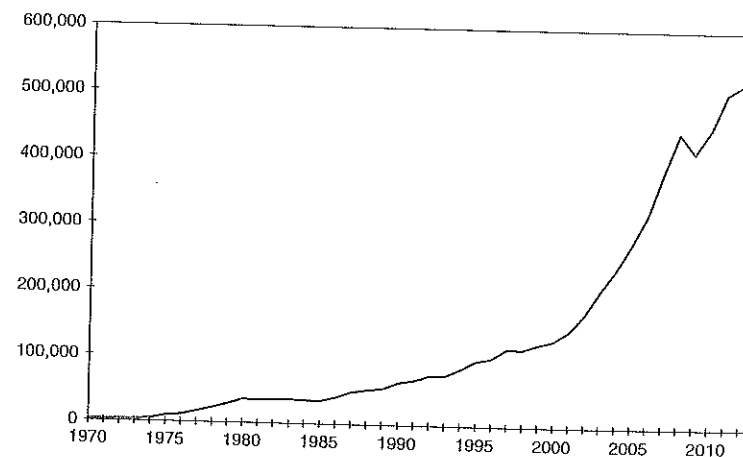

Figure 11.2 Total worldwide remittances, 1970–2013 (in millions, 2013 U.S. dollars).

Source: Based on http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1288990760745/RemittanceData_Inflows_Apr2014.xls [10 August 2014].

increased steadily over time. One should be cautious, however, when examining the time trend as some of the growth may be due to better accounting and increased use of formal channels.

The United States is the number one source country for international remittances, accounting for nearly one-fourth of remittances sent worldwide. Table 11.2 lists the top 25 recipient countries in 2013. India is at the top, with about $70 billion in remittances. China ranks second, receiving about $60 billion. Interestingly, several industrialized countries are on the list, including the United States. How can the United States be both the world's largest source of remittances and one of the world's largest recipients of remittances? It has the world's greatest number of immigrants, but it also has enough citizens working overseas and sending funds back to the United States to be on the list. The last column in Table 11.2 gives remittances as a share of GDP. For most of the countries, remittances are a small share of GDP. For the United States, remittances are less than one-tenth of 1 percent of GDP.

The list is strikingly different when looking at the top remittance-receiving countries by share of GDP. Table 11.3 lists those countries. Tajikistan comes out on top, with remittances accounting for more than one-half of GDP. Nine countries receive over 20 percent of their GDP in remittances.

Table 11.2 Top 25 remittance-receiving countries by level of remittances, 2013

Country	In US$ million	As a share of GDP (%)
India	69,969	3.7
China	60,000	0.7
Philippines	25,351	9.8
France	22,863	0.8
Mexico	22,282	2.0
Nigeria	21,000	7.9
Egypt	17,469	7.5
Pakistan	14,626	6.1
Germany	14,496	0.4
Bangladesh	13,776	12.2
Vietnam	11,000	7.1
Belgium	10,566	2.1
Spain	10,133	0.7
Ukraine	9,633	4.8
South Korea	8,765	0.8
Indonesia	7,614	0.8
Italy	7,536	0.4
Lebanon	7,200	16.1
Poland	7,157	1.4
Russia	6,862	0.3
United States	6,703	0.0
Sri Lanka	6,690	10.1
Morocco	6,619	6.8
Thailand	5,555	1.3
Guatemala	5,399	10.0

Source: Based on http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1288990760745/RemittanceData_Inflows_Apr2014.xls [10 August 2014].

Table 11.3 Top 25 remittance-receiving countries by share of GDP, 2013

Country	In US$ million	As a share of GDP (%)
Tajikistan	3,960	51.9
Kyrgyz Republic	2,290	31.4
Nepal	5,210	24.7
Moldova	1,981	24.6
Samoa	155	23.5
Lesotho	520	22.6
Armenia	2,436	21.4
Haiti	1,696	20.6
Liberia	383	20.4
Kosovo	1,125	17.0
Guyana	493	16.5
El Salvador	4,210	16.5
Lebanon	7,200	16.1
Honduras	3,124	15.8
Gambia	181	15.4
Jamaica	2,277	14.5
Tonga	61	12.6
Bangladesh	13,776	12.2
Jordan	3,680	11.4
Senegal	1,652	11.4
Georgia	2,056	11.2
Bosnia and Herzegovina	1,896	10.8
Sri Lanka	6,690	10.1
Guatemala	5,399	10.0
Philippines	25,351	9.8

Source: Based on http://siteresources.worldbank.org/INTPROSPECTS/Resources/334934-1288990760745/RemittanceData_Inflows_Apr2014.xls [10 August 2014].

Remittances make up a large share of the income of migrant workers, according to Dean Yang (2011). For example, Mexican migrants surveyed primarily in Mexico report that they send home 31 percent of their U.S. earnings. Salvadorans working in Washington, DC, report that remittances are 38 percent of their income. Senegalese working in Spain send one-half of their earnings back to Senegal, while Senegalese working in France send back 11 percent of their income.

Remittances are typically small amounts sent frequently. In a sample of Salvadoran immigrants in Washington, DC, for example, the average amount per transaction is $200 to $300, with about one-fourth at $100 or less (Yang, 2011). Migrants remit small amounts frequently for several reasons. Sending small amounts frequently may help the sender save and act as a means of self-control over the temptation to spend the money. It may be a way for migrants and recipients to reduce their losses if they are robbed. It may also help the sender maintain more control over how the recipient allocates the funds—a migrant who is unhappy with how remittances are being used can threaten to stop sending funds more effectively if he is sending them frequently. In addition, migrants may spread their remittances across recipients by sending smaller amounts to multiple people instead of one larger amount to one person.

Remittances are sent typically electronically and incur a fee. Fees can be fixed, a percentage of the transaction amount or a fixed fee plus a percentage. Globally, remittance fees average

almost 9 percent of the amount sent (World Bank, 2010). Among Tongan immigrants in New Zealand, the estimated elasticity of remittance transfers with respect to the fixed portion of the fee is –.22, or a 1 percent decrease in the fee is associated with a 0.22 percent increase in the amount sent (Gibson, McKenzie and Rohorua, 2006). Among Salvadoran immigrants in Washington, DC, reductions in fees lead to more frequent remittances, which ultimately increases the amount sent per month (Aycinena, Martinez and Yang, 2010). A $1 decrease in fees leads to migrants sending $25 more a month there, a strikingly large effect.

Reforms such as increasing competition in money transmission markets or providing migrants with more information on the relative cost of different money transmission services can have a large impact on remittances. Technological innovations, such as mobile banking, can change how migrant families send, receive and use remittances. Mobile banking—using cell phones to conduct financial transactions—can lower transactions costs and help alleviate the shortage of financial institutions that remittance-receiving families in rural areas often face. Mobile banking has already changed the way financial transactions are conducted in developing countries. One of the most widely used forms of mobile banking for remittances is the M-PESA system, as discussed in the box "M-PESA and remittances." Migrants themselves may also face difficulties accessing financial markets. This problem is particularly acute for unauthorized immigrants, who may lack the necessary documents to open a bank account. Mexican migrants in the United States with access to banks are more likely to save and bring back larger amounts of money to Mexico (Amuedo-Dorantes and Bansak, 2006).

Box 11.1 M-PESA and remittances

M-PESA is a mobile banking system run by Kenyan telecom provider Safaricom that allows users to make payments and transfers using their mobile phones. It was introduced in 2007 to reduce the costs of transferring funds from one individual to another. It has attracted worldwide attention for fostering dramatic growth of cell phone-facilitated payments and remittances within Kenya and has spread to other developing countries, including Afghanistan, Romania and Tanzania. In countries where money transfers from urban to rural regions occur frequently, M-PESA provides a service that is secure, convenient and low cost. As of 2013, M-PESA had 17 million active users, including 40 percent of the Kenyan population, and averaged $320 million in flows every month.

Economists have found that M-PESA has affected remittances. By lowering transactions costs and making transfers easily accessible and safe, mobile banking tends to increase the frequency that migrants send remittances (Morawczynski and Pickens, 2009; Mbiti and Weil, 2011). The amount sent per transaction decreases, but total remittances per month or year increase. Indeed, the income of rural recipients in Kenya rose up to 30 percent after they began using M-PESA (Morawczynski and Pickens, 2009). The rise of mobile banking has also decreased use of informal channels and increased demand for other banking products. However, the availability of M-PESA also seems to reduce migrants' need to return home and may lead to weaker ties to family members in the source country. In the long run, this may ultimately lead to fewer remittances.

Reasons for remitting

Understanding the motivations for remittances is critical to understanding how remittances affect economic outcomes. Economists have identified a number of reasons why migrants send remittances. Altruism models posit that migrants' desire to help family left behind is a strong and common motivation for remittances. The consumption smoothing model posits that migration takes place to diversify household earnings and ensure a steady source of income. In the target saving model, migration occurs in order to accumulate financial assets or fund a specific investment or purchase. Migrants may also plan to return and then open a small business, buy a plot of land for farming or build a house. Migrating to an area with higher-paying jobs helps migrants accumulate the required savings to undertake these relatively large expenses. Target savers are likely to be temporary immigrants. They are also less apt to make investments in the destination, more frugal in their consumption there and likely to remit and carry large sums home.

Migrants may also remit for insurance purposes. The decision to migrate may involve uncertainty, such as how quickly a migrant can find a job and, for an unauthorized immigrant, whether she will be deported. Sending money back can mean having some savings and a warmer welcome if a migrant returns. Another financial motivation for remittances is to repay migration costs. Migration entails an upfront cost, which may be financed through borrowing. Remittances may be necessary to repay the loan. These motivations are not mutually exclusive—any combination of them may apply to a particular migrant, and different motivations are likely to be more common among different groups of migrants.

Evidence on the impact of remittances

Research on the effects of remittances has looked at both macroeconomic effects and microeconomic effects. Macroeconomic effects include the effects on economic growth, exchange rates and capital accumulation. Microeconomic effects include the effects on households' spending and investment patterns and their poverty rate.

Remittances and economic growth

As the growth accounting framework indicates, economic growth can occur via increases in labor, capital or TFP. When migrants send money home, remittances that are saved may lead to an increase in capital. If remittances are used to fund human capital accumulation, then labor (which encompasses both quantity and "quality" of workers) or TFP may increase. However, if remittances enable family left behind to stop working, remittances may reduce labor and thereby act as a drag on output growth. The net effect of remittances on economic growth is thus not necessarily positive.

Further, remittances may reduce GDP through an increase in the exchange rate. If remittances are large enough, they may cause the country's currency to appreciate in value, which in turn may reduce exports. A massive inflow of foreign currency that leads to real exchange rate appreciation and a loss of international competitiveness, which then lead to a decline in the production of manufactured and other tradable goods, is called "Dutch disease." The possibility of Dutch disease is a substantial concern for developing countries whose economies

rely heavily on exports. Research suggests this has occurred in El Salvador (Acosta, Lartey and Mandelman, 2009).

Growth may be enhanced, however, through increased tax revenues on goods and services that are purchased with remittances. This assumes, of course, that governments put those tax revenues toward productive uses. Governments may also try to tax remittances directly, although few do so in practice. The Philippines abandoned its tax on remittances in 2010. However, some countries, such as Ethiopia, Pakistan and Venezuela, implicitly tax remittances by forcing the funds to be converted into the local currency at uncompetitive exchange rates.

The causal linkage between economic growth and remittances can run in either direction. Remittances may affect economic growth, and economic growth may affect remittances. Family members may be more likely to migrate and send money home during periods of weak economic growth. This would make remittances counter-cyclical and reduce estimates of the effect of remittances on economic growth that do not account for the effect of economic growth on remittances.

Studies have not reached a consensus on how remittances affect economic growth. Not only are there many channels through which remittances can affect growth, but the effect may be country- and time-specific (Chami et al., 2008). The impact may depend on the state of monetary and fiscal policy in the country receiving the remittances. In addition, studies use different methodologies, making it hard to compare their results.

Remittances and poverty

The majority of studies find that remittances are a key driver in moving people out of poverty and subsistence production in developing countries. In a study of 71 developing countries, Richard Adams and John Page (2005) find that a 10 percent increase in remittances per capita results in a 3.5 percent decline in the share of people living in poverty, defined as living on less than $1 per day. They conclude that "both international migration and remittances significantly reduce the level, depth, and severity of poverty in the developing world" (p. 1645).

Remittances spent on consumption tend to be spent on necessities, not on luxury or status items. In Mexico, for example, 80 percent of remittances are spent on food, clothing, health care, transportation, education and housing expenses (Coronado, 2004). A study finds that households in Albania that receive international remittances spend more at the margin on durable goods and utilities but less on food compared with households that do not receive any remittances (Costaldo and Reilly, 2007).

Remittances and development

At the microeconomic level, remittances can foster economic development if households spend them on investment activities such as acquiring more education, starting a small business or investing in agricultural technology. Evidence on whether remittances boost education is mixed, and the impact can vary within a population (Acosta, Fajnzylber and Lopez, 2007). For example, in El Salvador young girls and boys are more likely to be in school in households receiving remittances (Acosta, 2006). In Nepal, remittances increase the probability that children are in school, but girls benefit less than boys (Bansak and Chezum, 2009).

Evidence is clearer that remittances lead to increased investments in small businesses. Remittances are positively linked to the value of invested capital in small enterprises in Mexico and Pakistan, for example (Woodruff, 2007; Nenova, Niang and Ahmad, 2009). In Bangladesh, agricultural households that engage in international migration are more likely to invest in high-yield seed technology (Mendola, 2008). High-yield seed has a higher output, on average, but also has a greater variance in output. International migration serves as an insurance mechanism for these households, unlike households that are not insured via migration and remittances and therefore fall back on relatively low-yield, lower-variance seed.

Impacts on political, economic and social institutions

Emigration can be a powerful force for change in the origin country. It can affect economic growth and development there, both directly and via remittances. It can also lead to changes in political, economic and social institutions that have broad and potentially long-lasting effects. Xiaoyang Li and John McHale (2009) identify four channels through which emigration can affect institutions. The absence channel is how the loss of people, particularly those who are relatively well educated, affects institutions. The prospect channel is how the possibility of emigrating leads to changes in institutions. The diaspora channel is how emigrants affect institutions in the origin country. The return channel is how return migrants affect political, economic and social institutions.

While emigration may lead to institutional change, it is important to remember that institutions may push people to leave in the first place. People living in countries with corrupt political institutions, ineffective economic institutions or repressive social institutions may be more likely to leave. Researchers therefore need to think carefully about endogeneity and the timing of changes in institutions when examining possible causal linkages between emigration and institutions.

Impact on political institutions

Under the absence channel, the loss of people can reduce pressure for political change, particularly if would-be leaders or people who are discontented leave. Under the prospect channel, the possibility of leaving can empower potential emigrants to advocate for changes in political institutions. In addition, people may want the government to provide more education so that they can leave. Diasporas and return migrants may advocate for political changes. Through exposure to a new environment abroad, migrants may acquire new ideas about how governments should be structured and how they should function.

The diaspora and return channels have been the primary focus of empirical research. Studies suggest that migrants who are exposed to democratic societies abroad export some form of democracy back home. For example, a study of migrants from Cape Verde, which has the highest emigration rate in Africa, finds that emigrants who are exposed to democratic governments exert pressure on political accountability in their home country (Batista, Lacuesta and Vicente, 2012). For example, households with a family member abroad are more likely to take part in lobbying for greater accountability. Similarly, Senegalese migrants in France and the United States strongly encourage their family

members back home to increase their political engagement by engaging in activities like voting (Collier, 2013).

A study of return migrants to Mali finds ample evidence of effects on political institutions. Lisa Chauvet and Marion Mercier (2014) look at migrants who returned home after spending time in democratic countries. They find that return migrants are more likely to vote than non-migrants. Other people living in close vicinity to return migrants are also more likely to vote. Finally, and perhaps most remarkably, it is the less educated who tend to copy the new political behavior displayed by return migrants. As migrants return with new political norms, they influence the political culture in their surrounding regions, which has the potential to affect governance.

Another issue pertaining to governance and emigration is whether emigration followed by return migration increases the supply of good leaders. Leaders who were educated abroad may be more likely to foster democratic governance. President Sirleaf of Liberia and President Conde of Guinea, the country's first democratic president, are examples. However, counter examples abound as well, such as President Mugabe of Zimbabwe, who heads a notoriously mismanaged government. A study of 932 politicians in developing countries indicates that, on average, democracy increases more under leaders who were educated abroad (Mercier, 2013). More generally, a study of 183 countries over the period 1960 to 2005 shows that foreign-educated people promote democracy in their home countries, provided they received their education in a democratic country (Spilimbergo, 2009).

Impact on economic institutions

The absence channel predicts that emigration, particularly by the highly skilled, has an adverse impact on economic institutions by reducing the supply of people who might design and staff key institutions, such as banks, the legal system and universities. Further, the absence of highly skilled people may reduce demand for productivity- and growth-enhancing reforms to the economic system (Li and McHale, 2009). The prospect channel notes that the possibility of leaving can induce changes in human capital, either positively or negatively, which in turn affects economic growth. Diasporas and return migrants are often a source of new ideas that benefit the economy, and they may transfer technologies that enhance economic growth. In addition, diasporas and return migrants may promote international trade and foreign direct investment.

Empirical work suggests that emigrants abroad are able to enhance international trade by creating trust in the legal system and understanding the language, culture, values, and practices in both the host and origin countries. Providing information to foreign investors reduces communication barriers and increases the incentive to invest in the migrants' origin country. Research shows that high-skilled emigration increases foreign direct investment (Kugler and Rapoport, 2007). This effect even extends beyond the origin country—research indicates that pairs of countries with more ethnic Chinese residents tend to trade more with each other (Rauch and Trindade, 2002).

Impact on social institutions

Emigration can affect social institutions as well. Living abroad can affect people's attitudes and expectations regarding social norms. For example, research shows that emigration to

countries with low levels of gender discrimination promotes gender equality in social institutions in the origin, while emigration to countries with high levels of discrimination has the opposite effect (Ferrant and Tuccio, 2014). The effect occurs regardless of emigrants' gender. Migration can also challenge traditional gender roles when the absence of one spouse causes the other spouse to take on that person's responsibilities. For example, women left behind may become the de facto head of household, in charge of allocating resources and making decisions, while men left behind may need to assume responsibility for running the household and taking care of children. In addition, migration can change intergenerational dynamics. Children may need to take on additional responsibilities if a parent leaves, and elderly parents who expected to live with their adult children may not be able to do so if their children emigrate. Migration also affects fertility. A 1 percent decrease in the fertility rate to which migrants are exposed reduces home country fertility by 0.3 to 0.4 percent (Beine, Docquier and Schiff, 2013).

Final thoughts on source countries

Emigration, and more recently high-skilled migration, presents challenges and opportunities for source countries due to the fact that there are winners and losers. Universal policy recommendations are difficult because of the diversity of migration patterns—policy recommendations depend on the skill levels of migrants, the size of migrant networks in the destination, the sectors affected, the amounts of trade and investment and the size of the source country, among other factors. To further complicate matters, conclusions regarding government policies are hard to make given the scarcity of data and research on the topic. We have much to learn about the impact of emigration and remittances on economic growth, development and institutions.

Problems and discussion questions

1   Why would high- and low-skilled immigration be positively related? Negatively related?
2   How can international migration increase human capital levels in sending countries? Explain the various channels.
3   What are the benefits of high-skilled migration to the sending country?
4   What are the main reasons people send remittances? What factors are likely to influence how much they remit and their reasons for sending funds home?
5   Think of an example for each of the four institutional channels that is not given in the chapter.
6   Show the effects of emigration on employment, wages and social welfare if labor supply is not perfectly inelastic. How do the effects differ from the perfectly inelastic case shown in Figure 11.1?

Notes

1   India moved up to middle-income status in 2007, and China in 1999 (Sumner, 2010). For fiscal year 2015, the World Bank defines high-income countries as those with an average per capita income of $12,746 or higher and middle-income countries as those with per capita annual income between $1,045 and $12,745 (http://data.worldbank.org/about/country-and-lending-groups [4 August 2014]).

2 Researchers typically define low-skilled migrants as those with less than upper secondary schooling (e.g., high school dropouts); medium-skilled migrants as those who have completed upper-secondary education (high school graduates); and high-skilled migrants as those who have completed post-secondary education and above.

3 The data are available at http://www.iab.de/en/daten/iab-brain-drain-data.aspx [20 September 2014].

4 Countries are categorized based on data from the World Economic Outlook Database (http://www.imf.org/external/pubs/ft/weo/2014/01/weodata/index.aspx) as of April 2014.

5 In addition, Clemens (2007) concludes that emigration may spur greater production of health care workers in Africa.

6 See Docquier and Rapoport (2012a) for a thorough review of the literature and discussion of these theories.

7 The World Bank measures remittances as the sum of workers' remittances, compensation of employees, and migrants' transfers (IMF, 2010a). Workers' remittances are current transfers by migrants who are considered residents in the destination country. Compensation of employees comprises wages, salaries and other benefits (in cash or in kind) earned by individuals in countries other than those in which they are residents for work performed for and paid for by residents of those countries. Employees include seasonal or other short-term workers (less than one year) and border workers who have centers of economic interest in their own countries (IMF, 2010b). Migrants' transfers are contra-entries to flows of goods and changes in financial items that arise from migration (change of residence for at least one year) of individuals from one country to another. The transfers to be recorded are thus equal to the net worth of the migrants (IMF, 2010a).

Internet resources

The Institute for Employment Research in Nuremberg, Germany, has created a dataset on immigration and emigration by education, available at http://www.iab.de/en/daten/iab-brain-drain-data.aspx.

The World Bank's resources on migration and remittances are available at www.worldbank.org/prospects/migrationandremittances.

Suggestions for further reading

Docquier, F. and Rapoport, H. (2012a) "Globalization, brain drain, and development." *Journal of Economic Literature* 50(3), pp. 681–730.

Gibson, J. and McKenzie, D. (2011) "Eight questions about brain drain." *Journal of Economic Perspectives* 25(3), pp. 107–128.

Yang, D. (2011) "Migrant remittances." *Journal of Economic Perspectives* 25(3), pp. 129–152.

References

Acosta, P. (2006) "Labor supply, school attendance, and remittances from international migration: The case of El Salvador." *World Bank Policy Research Working Paper* No. 3903. Washington, DC: World Bank.

Acosta, P.A., Fajnzylber, P.R. and Lopez, H. (2007) "The impact of remittances on poverty and human capital: Evidence from Latin American household surveys." *World Bank Policy Research Working Paper* No. 4247. Washington, DC: World Bank.

Acosta, P.A., Lartey, E.K. and Mandelman, F.S. (2009) "Remittances and the Dutch disease." *Journal of International Economics* 79(1), pp. 102–116.

Adams, R.H. and Page, J. (2005) "Do international migration and remittances reduce poverty in developing countries?" *World Development* 33(10), pp. 1645–1669.

Albrecht, D. and Ziderman, A. (1991) "Deferred cost recovery for higher education: Student loan programs in developing countries." *World Bank Discussion Paper* No. 137. Washington, DC: World Bank.

Amuedo-Dorantes, C. and Bansak, C. (2006) "Money transfers among banked and unbanked Mexican immigrants." *Southern Economic Journal* 73(2), pp. 374–401.

Aycinena, D., Martinez, C.A. and Yang, D. (2010) "The impact of remittance fees on remittance flows: Evidence from a field experiment among Salvadoran migrants." Mimeo, University of Michigan.

Bansak, C. and Chezum, B. (2009) "How do remittances affect human capital formation of school-age boys and girls?" *American Economic Review Papers & Proceedings* 99(2), pp. 145–148.

Batista, C., Lacuesta, A. and Vicente, P.C. (2012) "Testing the 'brain gain' hypothesis: Micro evidence from Cape Verde." *Journal of Development Economics* 97(1), pp. 32–45.

Beine, M., Docquier, F. and Rapoport, H. (2008) "Brain drain and human capital formation in developing countries: winners and losers." *Economic Journal* 118(4), pp. 631–652.

Beine, M., Docquier, F. and Schiff, M. (2013) "International migration, transfer of norms and home country fertility." *Canadian Journal of Economics* 46(4), pp. 1406–1430.

Bhagwati, J.N. and Hamada, K. (1974) "The brain drain, international integration of markets for professionals and unemployment: A theoretical analysis." *Journal of Development Economics* 1(1), pp. 19–42.

Bhargava, A. and Docquier, F. (2008) "HIV pandemic, medical brain drain, and economic development in sub-Saharan Africa." *World Bank Economic Review* 22(2), pp. 345–366.

Cervantes, M. and Guellec, D. (2002) "The brain drain: Old myths, new realities." *OECD Observer* No. 230. Paris: OECD.

Chami, R., Fullenkamp, C., Cosimano, T.F., Gapen, M.T., Montiel, P. and Barajas, A. (2008) "Macroeconomic consequences of remittances." *IMF Occasional Paper* No. 259. Washington, DC: International Monetary Fund.

Chand, S. and Clemens, M. (2008) "Skilled emigration and skill creation: A quasi-experiment." *Center for Global Development Working Paper* No. 152. Washington, DC: Center for Global Development.

Chauvet, L. and Mercier, M. (2014) "Do return migrants transfer political norms to their origin country? Evidence from Mali." *Journal of Comparative Economics* 42(3), pp. 630–651.

Clemens, M. (2007) "Do visas kill? Health effects of African health professional emigration." *Center for Global Development Working Paper* No. 114. Washington, DC: Center for Global Development.

Clemens, M. (2009) "Skill flow: A fundamental reconsideration of skilled-worker mobility and development." *Center for Global Development Working Paper* No. 180. Washington, DC: Center for Global Development.

Clemens, M.A. (2011) "Economics and emigration: Trillion-dollar bills on the sidewalk?" *Journal of Economic Perspectives* 25(3), pp. 83–106.

Collier, P. (2013) *Exodus: How Migration is Changing Our World.* Oxford: Oxford University Press.

Coronado, R. (2004). "Workers' remittances to Mexico." *Federal Reserve Bank of Dallas Business Frontier* 1.

Costaldo, A. and Reilly, B. (2007) "Do migrant remittances affect the consumption patterns of Albanian households?" *South-Eastern Europe Journal of Economics* 5(2), pp. 25–54.

Defoort, C. (2008) "Long-term trends in international migration: an analysis of the six main receiving countries." *Population* 63(2), pp. 285–317.

Docquier, F., Lohest, O. and Marfouk, A. (2007) "Brain drain in developing countries." *World Bank Economic Review* 21(2), pp. 193–218.

Docquier, F. and Rapoport, H. (2012a) "Globalization, brain drain, and development." *Journal of Economic Literature* 50(3), pp. 681–730.

Docquier, F. and Rapoport, H. (2012b) "Quantifying the impact of highly skilled emigration on developing countries." In: Boeri, T., Brücker, H., Docquier, F. and Rapoport, H. (eds.) *Brain Drain and Brain Gain: The Global Competition to Attract High-Skilled Migrants*. Oxford and New York: Oxford University Press, pp. 209–296.

Ferrant, G. and Tuccio, M. (2014) "South-South migration and gender discrimination in social institutions: A two-way relationship." Mimeo, University of Southampton.

Gibson, J. and McKenzie, D. (2011) "Eight questions about brain drain." *Journal of Economic Perspectives* 25(3), pp. 107–128.

Gibson, J. and McKenzie, D. (2012) "The economic consequences of 'brain drain' of the best and brightest: Microeconomic evidence from five countries." *Economic Journal* 122(560), pp. 339–375.

Gibson, J., McKenzie, D. and Rohorua, H. (2006) "How cost elastic are remittances? Evidence from Tongan migrants in New Zealand." *Pacific Economic Bulletin* 21(1), pp. 112–28.

International Labour Organization (2013). *Global Wage Report 2012/13: Wages and Equitable Growth.* Geneva: International Labour Organization.

International Monetary Fund (IMF) (2010a) *Balance of Payments Manual* 6th edn. Washington, DC: IMF.

International Monetary Fund (IMF) (2010b) Balance of Payments Statistics Database. Washington, DC: IMF. Available at: http://www2.imfstatistics.org/BOP/ [11 August 2014].

Kugler, M. and Rapoport, H. (2007) "International labor and capital flows: Complements or substitutes?" *Economics Letters* 94(2), pp. 155–162.

Li, X. and McHale, J. (2009) "Emigrants and institutions." Mimeo, World Bank.

Mbiti, I. and Weil, D.N. (2011) "Mobile banking: The impact of M-Pesa in Kenya." *National Bureau of Economic Research Working Paper* No. 17129. Cambridge, MA: National Bureau of Economic Research.

Mendola, M. (2008) "Migration and technological change in rural households: Complements or substitutes?" *Journal of Development Economics* 85(1), pp. 150–175.

Mercier, M. (2013) "The return of the prodigy son: Do return migrants make better leaders?" *IZA Discussion Paper* No. 7780. Bonn: Institute for the Study of Labor.

Mishra, P. (2007) "Emigration and wages in source countries: Evidence from Mexico." *Journal of Development Economics* 82(1), pp. 180–199.

Morawczynski, O. and Pickens, M. (2009) "Poor people using mobile financial services: Observations on customer usage and impact from M-PESA" CGAP Brief Online. Available at: https://www.cgap.org/sites/default/files/CGAP-Brief-Poor-People-Using-Mobile-Financial-Services-Observations-on-Customer-Usage-and-Impact-from-M-PESA-Aug-2009.pdf [14 September 2014].

Nenova, T., Niang, C. T. and Ahmad, A. (2009) *Bringing Finance to Pakistan's Poor: Access to Finance for Small Enterprises and the Underserved*. Washington, DC: World Bank.

OECD-UNDESA (2013) "World migration in figures." *OECD/United Nations Department of Economics and Social Affairs*. Available at: http://www.oecd.org/els/mig/World-Migration-in-Figures.pdf. [Retrieved November 14, 2014].

Opiniano, J. and Castro, T.A. (2006) "Promoting knowledge transfer activities through diaspora networks: A pilot study of the Philippines." In: Wescott, C. and Brinkerhoff, J. (eds.) *Converting Migration Drains into Gains Harnessing the Resources of Overseas Professionals*. Manila: Asian Development Bank, pp. 73–95.

Rauch, J. E. and Trindade, V. (2002) "Ethnic Chinese networks in international trade." *Review of Economics and Statistics* 84(1), pp. 116–130.

Saxenian, A. (1999) *Silicon Valley's New Immigrant Entrepreneurs*. San Francisco: Public Policy Institute of California.

Saxenian, A. (2002) *Local and Global Networks of Immigrant Professionals in Silicon Valley*. San Francisco: Public Policy Institute of California.

Shrestha, S.A. (2011) "Effect of educational returns abroad on domestic schooling: A British Gurkha army experiment." Mimeo, University of Michigan.

Spilimbergo, A. (2009) "Democracy and foreign education." *American Economic Review* 99(1), pp. 528–543.

Sumner, A. (2010) "Global poverty and the new bottom billion: What if three-quarters of the world's poor live in middle-income countries?" *Institute of Development Studies Working Paper* No. 349. Brighton, UK: Institute of Development Studies.

Woodruff, C. (2007) "Mexican microenterprise investment and employment: The role of remittances." *Integration and Trade* 11(27), pp. 185–209.

World Bank (2006) "Global economic prospects 2006: economic implications of remittances and migration." In: *Global Economic Prospects and the Developing Countries (GEP)*. Washington, DC: World Bank.

World Bank (2010) "An analysis of trends in the average total cost of migrant remittances." *Remittance Prices Worldwide* Issue 2.

Yang, D. (2011) "Migrant remittances." *Journal of Economic Perspectives* 25(3), pp. 129–152.