2

The Potential Gains from International Migration

International migration can generate substantial welfare gains for migrants, their countries of origin, and the countries to which they migrate. The main focus of this report is on gains from the remittances that migrants send home (discussed in chapters 4–6); chapters 2 and 3 address the economic costs and benefits of migration and the impact of migration on poverty. In this chapter, we use an economic model to estimate the size of the welfare gains resulting from migration from developing to high-income countries.[1] It must be recognized at the outset that the model fails to capture some known costs and benefits of migration; that the results are dependent on the specification of the model and its key parameters; and that the model cannot incorporate social or political considerations.[2] The results of this simulation do not provide a precise forecast of the likely impact of migration; instead, they provide a consistent framework that offers insights into (a) the economic gains that can be expected from changes in policy or circumstances, and (b) the channels through which migration affects welfare—and both are difficult to measure in reality. The conclusions drawn from the model are supported by several empirical studies, and they hold up well under various alternative assumptions for model specification and parameters.

In chapter 3, we complement this model-based approach to measuring the gains from migration with a review of the economic literature, which covers the implications for migrants and for their origin countries. Here we can refer to a broader range of economic issues than are captured by the model, although without the ability to quantify that the model-based simulation provides.

Starting from the base-case forecast of economic activity described in chapter 1, we introduce an additional increase in migration from developing to high-income countries sufficient to raise the labor force of high-income countries by 3 percent over the period 2001–25. The assumed increase, roughly one-eighth of a percentage point a year, is close to that observed over the 1970–2000 period. We imply no judgment concerning whether such an increase is likely or politically feasible, but rather view the rise in migration as an exogenous shock. As discussed in chapter 3, pressures to migrate are likely to rise over the next few decades, but the actual size of the migrant flows will depend heavily on political decisions in destination countries. This exercise presents us with the following key findings.

The expected decline in the labor force in high-income countries will increase dependency ratios, which could add to the benefits from migration. However, such increases in migration are unlikely to be large enough to have a significant impact on dependency ratios in high-income countries.

Under the assumptions adopted in this modeling exercise, the rise in migration—small

relative to the labor force of high-income countries, but large relative to the existing stock of migrants—would generate large increases in global welfare. Migrants, natives in destination countries, and households in origin countries would experience gains in income, although migrants already living in high-income countries would see a decline in wages relative to the base case. Estimates of these gains and losses are particularly sensitive to assumptions about the degree of differentiation among workers (between natives and migrants and between old and new migrants), the impact of migrants on fiscal balances, and the extent of remittances.

Empirical studies of the impact of migration on natives' wages have had mixed results. In this simulation exercise, the rise in migration leads to a small decline in average wages in high-income countries relative to the baseline, which one would anticipate from a labor supply shock. But the decline has a barely perceptible impact on the long-term growth rate for wages.

Native households in high-income countries enjoy a rise in income, on average, as returns to capital increase, offsetting the mild decline in wages. The impact on developing countries is nearly the reverse, with wage income rising as labor-market conditions for workers improve, while returns on capital decline with the smaller supply of workers. In developing countries the gain from increased remittances greatly exceeds that from changes in factor returns.

The economic benefits for high-income economies could be even larger than those predicted by the model, due to several factors: the model excludes the increased productivity of migrants (and the benefits to their offspring) over time; investment levels could increase substantially in response to higher returns to capital; labor-force participation could rise among natives with the greater availability of migrant labor (for household help, for example); the labor market would become more flexibile, and diversity would increase.

The costs of adjusting to increased migration and the gains from migration depend, in part, on the investment climate. Adjustment costs as a result of migration will be lower if more flexible labor markets and more efficient capital markets in high-income economies reduce transitional unemployment and the cost of replacing capital as economies adjust to the rise in immigration. Similarly, developing countries with strong investment climates will be able to use increased remittances more efficiently, and enable workers who do not migrate to respond to improved labor market conditions. The cost of adjustment may also be lower if migration is spread over time rather than concentrated in spurts.

A principal conclusion from this exercise is that migration can generate significant economic gains for migrants, origin countries, and destination countries—but migration also can have important political and social consequences. For example, natives in destination countries may become concerned about maintaining cultural identity in the middle of a growing diversity, which also has implications relative to minority languages and other issues surrounding the integration of migrants. To some extent, opposition to migration is driven by these concerns, and not by an economic calculation of the gains and losses.

We begin with a discussion of recent trends and discuss how migration to high-income countries has grown over the past 30 years. We then turn to the prospects for migration, including the intense pressures generated by demographic changes. We describe the base-case scenario for migration and the model-based analysis of the welfare gains from increased migration. We conclude with issues that the model does not consider.

International migration trends

Migration to high-income countries has accelerated

The United Nations (UN) estimates that migrants account for some 3 percent of the

Table 2.1 Growth in international migration by destination, 1970–2000

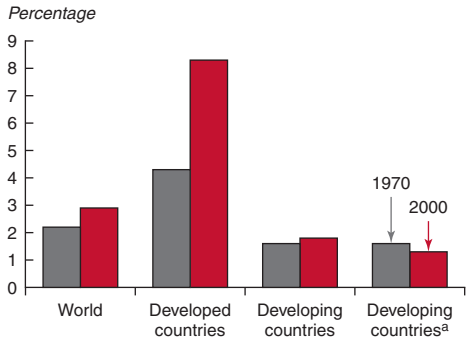
Percent change per year in stock of migrants

	1970–80	1982–90	1990–2000
World	**2.0**	**4.4**	**1.3**
High-income countries	2.4	2.9	3.1
Developing countries	1.8	5.5	–0.1
Excluding former USSR	1.9	2.1	0.0
Former USSR	0.5	25.0	–0.3

Source: United Nations.

world's population, or about 175 million persons.[3] The stock of immigrants to high-income countries increased at about 3 percent per year from 1980 to 2000, up from the 2.4 percent pace in the 1970s (table 2.1). At that rate of growth, the share of migrants in high-income countries' population almost doubled over the 30-year period, and population growth (excluding migration) fell from 0.7 percent per year in the 1970s to 0.5 percent in the 1990s. Immigration has had a particular impact on population growth in several high-income countries. For example, without immigration Germany, Italy, and Sweden would have experienced a decline in population in the past few decades (OECD 2005; IOM 2005). By contrast, migration to developing countries rose by only 1.3 percent per year from 1970 to 2000. With rapid population growth, the share of migrants in developing countries' population (excluding the former Soviet Union) fell (figure 2.1).[4]

Figure 2.1 International migrants as a share of destination countries' population



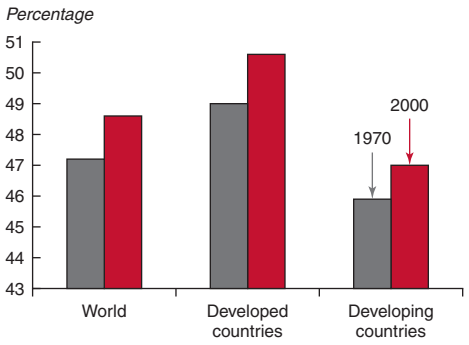
Source: United Nations.

Note: a. Excluding countries of the former USSR.

Most high-income countries saw immigration rise by at least 2 percent per year from 1980 to 2000.[5] This increase reflected, in part, increased demand for services accompanying rising incomes, global competition for highly educated workers as technological advances boosted the premium for skills, the growth of networks of immigrants in high-income countries that facilitated new immigration, and increased refugee movements. Almost 70 percent of the increase in immigration is accounted for by the United States and Germany, which together make up less than 40 percent of the population of the high-income countries. In the United States, the Immigration Reform and Control Act (IRCA) of 1986, which provided permanent status to 2.7 million migrants, facilitated further immigration through rules governing family reunification and may have encouraged further irregular immigration (Passel 2005) by encouraging expectations of future amnesties.[6] Germany saw a large inflow of ethnic Germans following the breakup of the Soviet Union (Dustmann and Glitz 2005), as well as an increase in temporary migration under bilateral agreements.

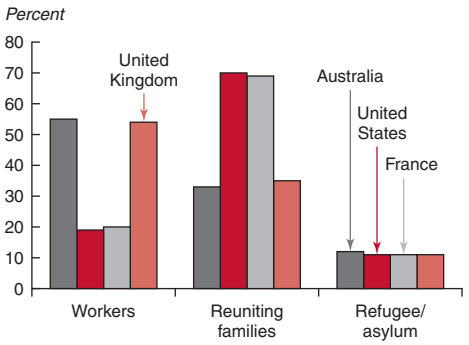
Though the stock of migrants has accelerated sharply relative to the population in the industrial countries, in some respects the composition and patterns of international migration have exhibited continuity over the past few decades. The share of female migrants has remained almost unchanged (47 percent

Figure 2.2 Share of females in international migration



Source: United Nations.
Note: Stock data, reported by countries of destination.

Figure 2.3 Immigration to selected countries, reasons for admittance, 2001



Source: United Nations.
Note: Stock data, reported by destination countries.

of global migrant populations in 1970, compared with 49 percent in 2000—figure 2.2), although women are the great majority of migrants from some countries. More women today are migrating as independent wage earners, rather than to accompany their husbands (IOM 2005). Migration continues to be heavily determined by geographic proximity (from Mexico to the United States, from North Africa to Southern Europe, and from Eastern to Western Europe), as well as by colonial ties (from Latin America to Spain and from a number of Sub-Saharan African countries to Belgium, France, Portugal, and the United Kingdom—OECD 2005). The major countries of destination continue to admit the largest share of permanent immigrants for family reunification (or, in the case of the EU countries, for humanitarian or refugee resettlement), although some countries are refocusing their migration policy toward economic (largely skilled) immigration (figure 2.3).[7] But international migration is also changing, particularly in the direction of flows. For example, more Asians are today seeking work in other Asian countries rather than in the Middle East (Wickramasekera 2002; OECD 2005; IOM 2005), while more Latin Americans are turning to Europe for work opportunities, in addition to North America.

It should be emphasized that the migration data on which these judgments are based tend to be unreliable and incomplete. Many countries and international agencies do not distinguish between regular and irregular migration or among types of temporary migration. Some record migrants' country of birth; others their nationality (OECD 2005). National estimates of the number of migrants can be vastly different depending on whether "migrant" is defined as foreign born or of foreign nationality.

Migration is set to increase

It is likely that the number of people who wish to migrate from developing to high-income countries will rise over the next two decades. About 31 percent of developing countries' population is below the age of 14, compared with 18 percent in high-income countries. We can thus anticipate a large influx in the age categories most suitable for emigration, as lifetime earnings from migration tend to be largest for those emigrating early in their working life. The surge in immigration since the 1980s has established large diasporas in high-income countries, which help to reduce the costs and risks of migration (see chapter 3). The demand for immigrant services in high-income countries will also rise as the

aging of the population shrinks the workforce and increases demand for services that immigrants can supply (such as nursing care). As income standards rise, the demand for other services that employ migrants (such as household and restaurant help) should grow rapidly. The intensifying competition for skilled workers may also draw migrants, especially from countries with strong systems of higher education.

Policies in destination countries can affect migration

Forecasts of migration flows remain problematic. But with the underlying demand for and supply of migrants likely to increase in coming decades, the number of migrants will depend on policy decisions governing admittance and the effectiveness of efforts to police borders and enforce workplace rules. Opposition to immigration may grow as the number of migrants increases, as it did in major countries of destination before World War I. But it is likely that the main policy issue will be how best to manage and live with increased migration. In the simulations that follow, we explore the impact of an increase in migration to 2025 in line with recent historical experience.

The demographic challenge

The labor force in the high-income countries is set to decline

A key driver in the demand for international migrants over the next 20 years will be slowing growth, and then decline, of the labor force in high-income countries. The age group that supplies the bulk of the labor force (15–65 years old) is expected to peak near 500 million in 2010, and then fall to around 475 million by 2025 (figure 2.4). In Japan this age group has already begun to shrink, while in Europe the peak will be reached in 2007–08. In the other high-income countries, the peak will occur later—around 2020 for the United States and 2015 for the rest. Assuming no change in labor-force participation rates, the high-income countries may lose about 20 million workers by 2025, relative to peak employment.[8]

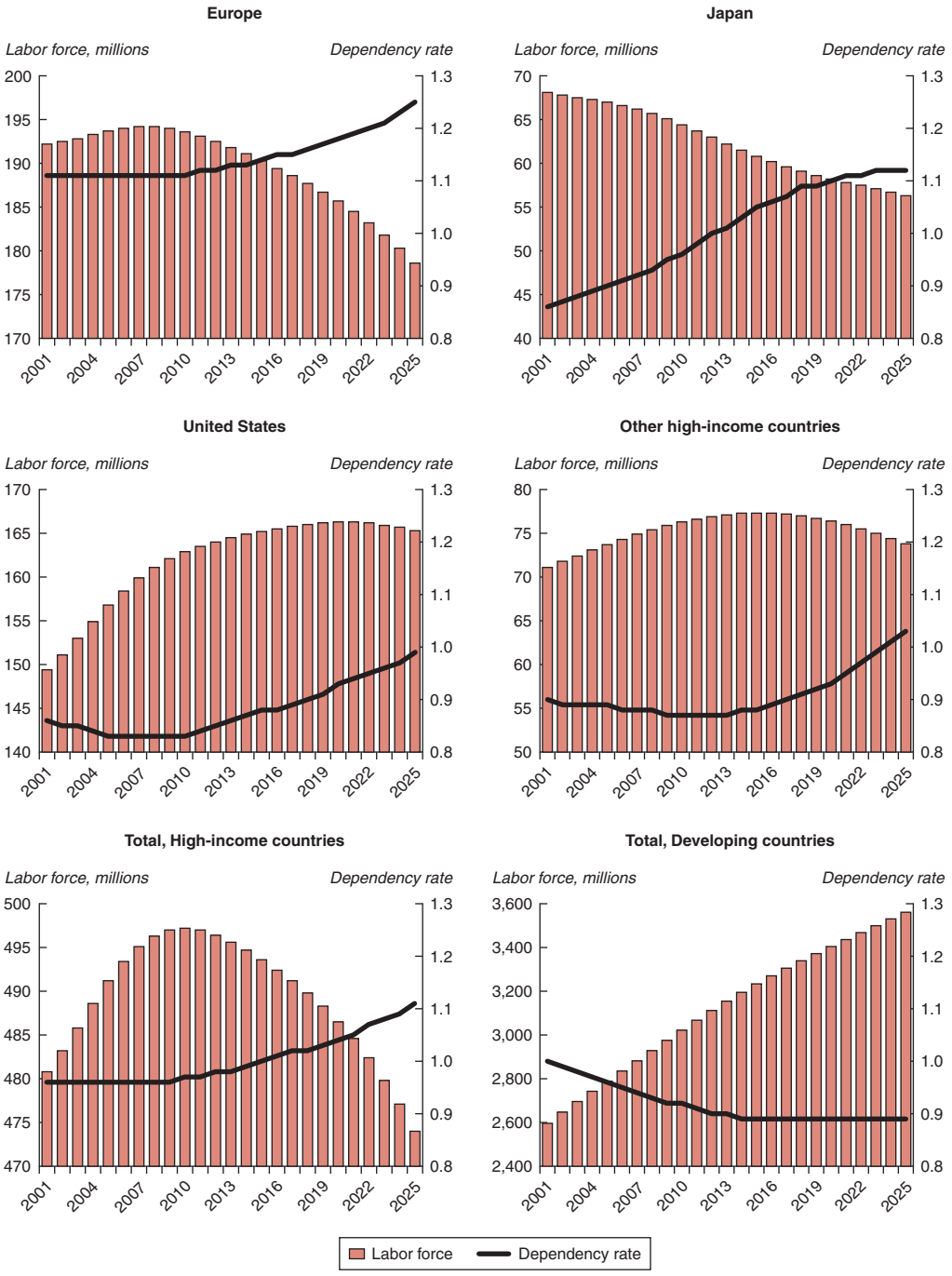
The expected decline in the labor force is accompanied by a rise in the overall dependency ratio, defined as the ratio of nonworkers to workers. For the high-income countries as a group, this ratio is forecast to remain at just under one through 2009. However, by 2025, 100 workers will be supporting 111 dependents, largely reflecting the increased number of the elderly (also, in most countries the number of children under 15 will fall). The largest rise in the dependency ratio will be in Europe. If we focus more narrowly on the number of elderly per worker, every 100 European workers now support 36 elderly people; by 2025 they will have to support 52. In Japan 100 workers will support 60 elderly in 2025.

In the developing countries the labor force will expand

Developing countries show considerable diversity in demographic trends, but overall the bulge of youths born over the last two decades is now entering the labor force, the number of elderly is as yet still rising slowly, and the number of births is falling rapidly. Thus developing countries are forecast to add nearly one billion workers to the world's labor force by 2025, again assuming no change in the labor-force participation rate, and dependency ratios are expected to fall.

The expected expansion of the labor force in developing countries, coupled with large wage premiums in high-income countries, means that migration could help reduce dependency ratios in high-income countries. However, increases in immigration sufficient to have a noticeable impact on dependency ratios would have to be very large. The scenario discussed below envisions an increase in the labor force in high-income countries of 3 percent through migration, or a hike of nearly 50 percent in working migrants in high-income countries. Even if migrants come with no elderly, the dependency ratio in the host coun-

Figure 2.4 Labor force and dependency rates



Source: World Bank databanks (DDP).

Note: The dependency rate is measured as the ratio of the nonworking population to working population.

tries would fall by only about 3 percent under such a scenario. In the case of Japan, it would lower the number of elderly dependents in 2025 from 60 per 100 workers to 59 per 100 workers—barely a dent. Nevertheless, as discussed in more detail below, selective migration—for example, of experienced and skilled workers—can help mitigate the transitional costs of financing pension benefits for rapidly aging populations in high-income countries.

Migration and its development impact

To illustrate the potential gains from increased migration, we compare the base-case forecast for output and consumption in chapter 1 with an alternative scenario, in which the stock of migrant workers is allowed to increase in the high-income countries so as to raise the overall stock of workers by 3 percent (a movement of 14.2 million workers from developing countries to high-income countries by the year 2025). A first approximation of the global gains from such a scenario is simply to calculate the income gains accruing to the new migrant workers—this will reflect the gains to the global economy, because it approximates the increase in global productivity derived from equipping the migrants with more and improved capital and technology. This back-of-the-envelope calculation yields an increase in gross wage income of $772 billion in 2025.[9] As we will see later, when corrected for differences in prices that migrants face in high-income versus developing countries, and taking into account other impacts of migration (on prices, for example) as calculated by the model, global gains fall to $356 billion—an 0.6 percent increase in global income. The scenario is particularly beneficial to developing countries relative to high-income countries. The aggregate percentage gain to developing countries (including the new migrants) is 1.8 percent, whereas the gains to natives in high-income countries amount to 0.4 percent relative to baseline income. These numbers hold up well as an approximation of the gains to global output, regardless of various assumptions made about taxes, non-wage income distribution, key model parameters, and other factors.

Our modeling exercise uses a global general equilibrium model to measure the impact of migration (box 2.1).[10] One of the purposes of the global model is to verify the basic intuition described above—that migration produces a sizeable global gain. But it also is a powerful tool to evaluate distributional impacts—between skilled and unskilled workers, between native- and foreign-born workers, between capital and labor, and across regions—and to show how these distributional impacts vary with policy choices and parameters (for example, the role of fiscal policies or the propensity to remit).

The assumption is that migrants as a share of population remain constant in the baseline scenario

We begin with a base case for global economic activity (outlined in chapter 1), demographic trends (described at the outset of this chapter), and for migration. For the base case, the proportion of migrants in each region remains the same over time—somewhat contrary to the trends of the last two decades. This does not imply that gross migration is stagnant, or even declining. The stock of migrants in any year will equal the previous stock of migrants, plus new migrants, less the attrition through death and return migration. We chose a relatively neutral assumption because of the difficulty in forecasting these complex processes. For some countries—for example Japan and those in Europe—the assumption results in an absolute decline in the stock of migrant workers. This decline parallels the overall decline in the European and Japanese labor forces.[11] For the high-income countries as a group, the stock of migrant workers would increase by some 760,000 between 2001 and 2025, just a small increment from the estimated 27.8 million in 2001. The main issue, however, is not the base case,

Box 2.1 The model used in this study

The underlying analytical framework used in this chapter is the World Bank's standard global general equilibrium model—LINKAGE—which has been used in previous reports for trade policy analysis. It has been modified to differentiate between migrant and native workers and to incorporate remittances. The model is based on release 6.0 of the GTAP database (base year 2001), developed by the Global Trade Analysis Project (www.gtap.org), a global network of researchers and policymakers engaged in the quantitative analysis of international policy issues. It is supplemented for use in our model with a new database developed jointly by GTAP and the University of Sussex (Parsons and others 2005). That database contains a comprehensive estimate of bilateral stocks of migrants for 226 countries and territories.

While the new migration database is undergoing constant improvements as new data become available and obvious errors are corrected, its developers have done a remarkable amount of detective work, largely in national data sources. The GTAP center has used this underlying migration database to build a bilateral migration database for the 87-region level of aggregation of the main GTAP database—including estimates of population and the stock of workers, both skilled and unskilled (Walmsley, Ahmed, and Parsons 2005).[a] World Bank data (described in more detail in chapter 4 of this report) was used to provide the total level of remittances, and the bilateral stock of migrants was used to estimate the bilateral remittance flows subject to the overall total flows.

The standard horizon for the LINKAGE model has been 2015. For the work described here, the model horizon has been extended to 2025, in part because demographic dynamics play a more important role over the longer-term horizon, and in part to allow for more time to phase in the increase in migration.

[a]The 87 regions of GTAP have been aggregated into 21 regions for the purposes of this study. Six of these are high-income regions using World Bank definitions—the European Union and the European Free Trade Area, Canada, the United States, Japan, Australia/New Zealand, and the newly-industrializing economies. The fifteen developing countries/regions include China, the Philippines, India, Russia, Turkey, South Africa, and Mexico as individual countries, plus 6 regions that represent the remaining countries in each geographical area.

but rather the impact of deviations from it—although significantly different base assumptions could affect the deviations aswell.

According to the base-case scenario, migrant workers would make up about 6 percent of the labor force of high-income countries in 2025, though with sharp differences across regions and skills (table 2.2). The vast majority of migrant workers are unskilled—some 25.3 million migrant workers out of a projected total of 28.5 million, or 7.8 percent of high-income countries' labor force. Skilled migrants, on the other hand, represent just 2.2 percent of the total skilled workforce on average.

There are welfare implications if migration rises significantly

The alternative scenario involves a rise in migration sufficient to increase the labor force of high-income countries by 3 percent, phased in from 2010 through 2020.[12] As migrants make up about 6 percent of high-income countries' labor force, a 3 percent rise in the labor force (through migration) implies a 50 percent increase in the number of migrant workers. This may seem like a large change, but the resulting stock of migrants in Europe, Japan, and the United States would remain a far smaller share of population than current levels in some high-migration countries. (In Australia, for example, about a quarter of the population are migrants, in Canada 19 percent, in Kuwait 50 percent). The percentage increase in migrants is large in Japan (as the baseline share of migrants is relatively low), and lower in the United States. The increase corresponds to an annual growth rate of about 1.9 percent, somewhat slower than the

Table 2.2 Labor force structure in the base case and after increases in migrants

In millions except where noted

	Baseline		Migration shock	
	2001	2025	Change in millions 2001–25	Change in percent 2001–25
High-income countries				
Total labor force	480.8	474.0	14.2	3.0
Developing-country migrant workers	27.8	28.5	14.2	49.9
Unskilled	24.6	25.3	9.8	38.6
Skilled	3.1	3.2	4.5	137.9
Developing-country migrant workers as share of total labor force, percent[a]	5.8	6.0		8.8
Unskilled, percent	7.4	7.8		10.5
Skilled, percent	2.1	2.2		5.0
Developing countries				
Total labor force	2,596.2	3,561.0	–14.2	–0.4
Unskilled	2,395.9	3,294.3	–9.8	–0.3
Skilled	200.4	266.7	–4.5	–1.7

Source: Initial 2001 data from migration database under development by GTAP/University of Sussex (Parsons and others 2005 and Walmsley, Ahmed, and Parsons 2005). Scenarios based on World Bank assumptions.
Note: a. The percentage of migrant workers as a share of the total labor force is assumed to be the same for each individual region of the model throughout 2001–25, but the share averaged across all developed regions will change through aggregation effects.

average increase over the period 1980–2000. Moreover, the growth rate is unbalanced, with an annual increase of only 1.5 percent in unskilled workers, but 3.8 percent in skilled workers. A number of additional assumptions are critical to the results.

First, the high-income countries' labor force of *both skilled and unskilled workers* increases by 3 percent.[13] As the share of skilled workers among migrants is much smaller than the share of skilled workers among high-income country natives, the shock results in a much larger percentage increase for skilled migrants. The number of unskilled migrant workers increases by 39 percent, while the number of skilled migrant workers rises by 138 percent.[14]

Second, the share of migrants by region of origin remains constant; in other words, the new migrants reflect the same allocation by region of origin as existing ones. Thus if Mexicans constitute 30 percent of foreign migrants in the United States in the base case, they maintain the same share after the increase in migration. This assumption is made to simplify the analysis, although it does fail to reflect the likely migration pressures implied by large differences in demographic trends in sending regions (for example, Sub-Saharan Africa versus Latin America).

Third, foreign workers are assumed to bring family members in proportion to the dependency ratio in their home country. As a result, the total number of migrants in high-income countries increases from 65 million (6.5 percent of high-income countries' population) in the baseline for 2025, to 93 million (9 percent of population) after the shock. This assumption can change the average dependency ratio of the host country. It can also have other implications not modeled explicitly—including fiscal impacts, because the families of new migrants may require additional public services (such as schooling), not fully compensated by the taxes paid by the new migrants.

Fourth, remittances are assumed to be a fixed proportion of migrants' labor income, equal to the level in the base year. The average for developing countries is 17 percent, although the level varies with the migrant's origin and destination countries. New migrants are

assumed to send remittances to their home country at the same rate (relative to income) as existing migrants.[15]

Returns to households

The gains from increased migration are large

With the labor force moving, it is best to assess the effects on real income in terms of households as opposed to the national level (as is typically done in analyses of trade reform). Households are broken down into four groups. First are the native households in high-income countries.[16] Second are previous migrants from developing countries now living in high-income countries, that is, those who were in place in the baseline scenario. Third are native households in developing countries—households that do not migrate.[17] And finally, we have the households of the new migrants. Each household's welfare is broken down between the change in private consumption and the change in the consumption of public services.

Natives in high-income countries gain $139 billion in real income, or 0.4 percent of the baseline, as a result of the rise in migration (table 2.3). Nonmigrating households in developing countries see a rise in real income of nearly 0.9 percent from baseline levels.[18] A significant portion of the increase is due to the remittances from the new migrants, with some improvement in labor-market conditions for remaining workers. Those who are likely to lose—in the absence of any compensatory mechanism—are the existing migrants in high-income countries, who are relatively close substitutes for the new migrants. Their private consumption would decline by over 9 percent and overall consumption (including public services) by 6 percent compared to baseline levels.

New migrants and their countries of origin reap benefits (through remittances)

The main gains come from the higher incomes the new migrant workers can earn in the destination country relative to what they would have earned in their country of origin. New migrants earn $481 billion in real (after-tax) income in 2025 over the base case. However, the dollar increase in income overestimates the welfare gains for migrants. Essentially, an additional $1 spent in the high-income countries does not provide the same amount of welfare as an additional $1 spent in the home country, because prices are higher in high-income countries. Whereas the prices of

Table 2.3 Change in real income across households in 2025 relative to baseline

	Real income			Real income adjusted for cost of living		
	Private	*Public*	*Total*	*Private*	*Public*	*Total*
	Change, $ billions			Change, $ billions		
Natives in high-income countries	139	–1	139	139	–1	139
Old migrants in high-income countries	–88	0	–88	–88	0	–88
Natives in developing countries	131	12	143	131	12	143
New migrants	372	109	481	126	36	162
World total	554	120	674	308	48	356
	Change, %			Change, %		
Natives in high-income countries	0.44	–0.01	0.36	0.44	–0.01	0.36
Old migrants in high-income countries	–9.41	–0.02	–6.02	–9.41	–0.02	–6.02
Natives in developing countries	0.94	0.44	0.86	0.94	0.44	0.86
New migrants	584	607	589	198	203	199
World total	1.20	1.15	1.19	0.67	0.45	0.63

Source: World Bank model simulations.

traded goods (for example, cars and electronics) are the same worldwide, at least in principle, the prices of nontraded goods and services (for example, housing and haircuts) are much higher in high-income countries.

A simple example may clarify the idea. Take a household of two persons living in their home country. One works and earns $200. The other does not work. Each spends $100, half on tradable goods (each priced at $1) and half on nontradable goods (likewise priced at $1). Now the worker moves to a high-income country and earns $700. Assume that spending patterns do not change. The worker remits $200 back to the home country, so the income (and welfare, in money terms) of the other doubles. The new migrant buys the same goods—50 units of tradable goods and 50 units of nontradable,[19] but the price of the latter is now $9 and not $1. The migrant thus spends $500, but welfare is unchanged, because the basket of purchased goods is identical.

Welfare evaluations are of course more complex than this simple example illustrates. For one thing, new migrants will have to adjust their spending patterns to deal with their new environment. Heating oil and warm clothes are necessities that will not boost a migrant's welfare above what it was in the home country. For another, the decision to migrate is not taken for simply static reasons; there are significant dynamic reasons for migrating—for example, better opportunities for one's children that are not captured in this simple framework. Nonetheless, the difference in purchasing power illustrated in the example is a strong motivation for migrating, even on a temporary basis. The more wage income earned in high-income countries that can be spent in lower-income countries, the greater will be the welfare benefits. Box 2.2 provides additional detail on the computation and interpretation of global welfare gains from migration.

To account for the change in prices faced by the new migrants, their "new" consumption in the destination country is adjusted to account for differences in the cost of living, using purchasing power parity (PPP) exchange rates from the World Bank's database.[20] Thus instead of an increase of $481 billion, the rise in welfare for new migrants is $162 billion.[21]

Table 2.3 shows the change in these components for the four household groups and the world. Measured in national accounting terms, that is, with no adjustments for the difference in the cost of living for the new migrants, global real income rises under the model by 1.2 percent relative to the baseline, or 0.6 percent with the cost-of-living adjustment. Global private consumption increases in real terms by $308 billion in 2025 (with the cost-of-living adjustment), with real government expenditures increasing by an additional $48 billion. The total real gain—with equal weight for high-income—and developing-country gains—is $356 billion, with just under half accruing to the new migrants, though natives in both high-income and developing countries also are better off. In percentage terms—where relative weights between high-income and developing countries are irrelevant—the scenario clearly indicates that the relative gains are much higher for developing-country households than high-income country households, rivaling gains from global reform of merchandise trade.

Obviously, global income and global gains would also be larger if expressed in PPP terms. As the percentage increase in welfare for migrants living (originally) in developing countries is larger than the percentage increase for those living in high-income countries, a switch to PPP measures would also increase the global gains as a percentage of global income. If in the migration scenario presented here the gains are PPP-adjusted, the global gains would amount to 0.9 percent of global income in the baseline, instead of 0.6 percent using the EV aggregation. This scenario illustrates that migrants living (originally) in developing countries gain the most from migration in percentage terms.

The impact of higher migration on prices is mild in aggregate in high-income countries, with a small decline in the average price of

Box 2.2 Calculating and interpreting global welfare gains from migration

Two sets of issues arise with respect to the so-called global gains from a policy shock. First, how should the gains of specific groups be evaluated and how do the gains compare with traditional measures, such as GDP or national accounting standards? Second, how should the gains be aggregated over groups and countries, and how should the aggregated gains be interpreted?

Evaluation of the welfare gains of specific groups. In standard applications of general equilibrium (GE) models, the welfare impacts of specific groups are evaluated using a concept from welfare theory called equivalent variation (EV). The concept is relatively straightforward. Welfare changes as a result of changes in nominal income and changes in prices. EV calculations summarize this welfare change in terms of an equivalent change in income alone, showing by how much income at original prices would have to change to achieve the same change in welfare as observed in a simulation.[a]

For most households, the standard notion of the change in real income, that is, the difference in nominal income adjusted by the change in the CPI, is a good approximation of EV.[b]

This is not the case for new migrants, however. There is no standard price index that can be used as a deflator for the change in the nominal gains for the new migrants, since the prices they face in their new host country have no linkages to the prices they paid in their home countries. GE and macro models typically calibrate base-year prices in each region to one (or unit value) by choosing corresponding volume units.[c]

This approach does not allow one to take into account the price increases that new migrants face as a result of their migration. In the simulations, the macro PPP exchange rate (as an approximation of the rise in prices faced by migrants from developing to high-income countries) has been used to adjust the gains to the migrants—although this is just an approximation of the true welfare gains.[d]

Because of the cost-of-living adjustment to the welfare gain of new migrants, the real gain reported is no longer equal to real income gains of countries—and real output gains—measured using national accounting standards. However, the standard real income measure is still a good approximation of the welfare gains for the other households in the model.

To the extent that new migrants remit part of their income to their country of origin and that income is spent in that country of origin, the increase in the cost of living that new migrants face is not relevant. Therefore, the EV measure of remittances is larger than the same nominal income spent by the new migrant in the host country. This difference illustrates the incentive for new migrants to remit income home.

Aggregation. The second issue relates to the interpretation of the "global" gains. Typically, to derive aggregate or global gains, EV (expressed in a common currency, typically the U.S. dollar) is summed across all households. For individual persons or homogeneous groups this EV aggregation, expressed as a percentage of original income, is a good approximation of the change in welfare (or more precisely, it is a good indication of the change in welfare).[e]

However, no clear link exists between global welfare and the aggregation of EV across heterogeneous groups, because we do not know how to weigh individual welfare across heterogeneous groups (a particularly difficult issue in aggregating across countries at very different stages of development, as is done here). For example, while most groups gain from migration in the scenario discussed in the text, some lose. The fact that the change in global welfare (expressed as the aggregation of EV across groups) is positive does not mean that the welfare gains of the winners are considered more important than the welfare losses of the losers. Thus, global gains as expressed in aggregate EV should not be interpreted as a value judgment on how to weigh individual or local welfare gains.

The aggregation of EV across groups does, however, have a useful interpretation, which is linked to the notion of compensation and Pareto optimality. As long as the global gains are positive—using the standard practice of adding up EVs across households—then it is possible through redistribution to compensate households that lose (so that no one is worse off relative to the baseline scenario),

Box 2.2 *(continued)*

when some households are better off. In that sense *the global gain can be compared with an equal rise in global output plus redistribution.*

In this report we maintain this standard practice of reporting EV aggregates, making the gains comparable to global gains in many other studies.

An alternative approach to calculating global gains would be to add up changes in income measured in PPP terms. The rationale for that alternative is that because prices of nontraded goods are lower in developing countries, the addition of a dollar to a developing country would enable the purchase of a larger amount of goods and services than in an high-income country. In that case, both base income and gains for new migrants and for those who remain in developing countries would be roughly three times as large as reported here. This is true for all gains, whether they come from migration itself, from remittances, or from changes in wages and prices in developing countries. As a result, the share of those who live (originally) in developing countries in global aggregates would increase in the measurement of both global income levels and global welfare gains. However, the percentage increase in income for developing countries would not be affected.

[a]One of the advantages of the EV measure is that it transforms the ordinal concept of welfare into a cardinal concept of income. While it is impossible to measure how much one welfare level differs from another (one can only conclude that one level is preferred to another), the corresponding increase in income can be measured, and the size of the increase has a clear meaning.

[b]For example, in trade-reform scenarios, the change in the price index is a relatively good approximation of the welfare impact, since the new price is approximately the old price less the tariff.

[c]There are exceptions. For example, in the case of climate-change models, it is necessary to know the relative prices of the different fuels to accurately determine the carbon tax.

[d]See Timmer and van der Mensbrugghe (2005) for more details.

[e]The size of the change in individual welfare is undetermined, since welfare is an ordinal concept.

absorption (private consumption, private investment, and government spending) of 0.1 percent. However, prices of some key nontradables decline by larger amounts—0.8 percent on average for public services (including health-related services) and 0.2 percent for construction and recreational services. These price declines will be even sharper for specific subsectors where migrant workers are concentrated (for example, household help), for which we currently have no comprehensive data.

The allocation of the gains across developing countries depends on various factors, including the skill loss and the resulting impact on production, the locations to which migrants move and the relative wage differential, and the propensity to remit. By developing region, the gains to households under the model vary from 0.6 percent for Europe and Central Asia to 1.1 percent for South Asia and Latin America and the Caribbean (table 2.4).

For the new migrants, the real income gains—cost-of-living adjusted—increase by nearly 200 percent. There are large differences across regions, with the highest gains (in percentage terms) accruing to migrants from Sub-Saharan Africa (619 percent) and the lowest to migrants from the Middle East and North Africa and Europe and Central Asia. The main reason for the disparity is the relative differential between wages in origin and destination countries. Variations in wages paid to migrants from different regions in destination countries are minor, whereas there are very wide variations in wages in countries of origin. For example, the average wage for a migrant in Europe in the base year is about $16,500—with only minor variation across migrants. However, the average wage in Sub-Saharan Africa is only $470, whereas in the Middle East and North Africa it is $2,700. Thus, the migrant from Sub-Saharan Africa

Table 2.4 Real income impacts across developing regions

Change in 2025 relative to the baseline, adjusted for differences in cost of living

	Natives in region		New migrants from region	
	$ billions	Percent	$ billions	Percent
Total developing	143	0.9	162	199
East Asia and Pacific	37	0.7	32	215
South Asia	21	1.1	2	175
Europe and Central Asia	14	0.6	25	138
Middle East and North Africa	18	0.9	11	134
Sub-Saharan Africa	7	0.9	7	619
Latin America and the Caribbean	47	1.1	85	224

Source: World Bank model simulations.

will gain much more in both absolute and percentage terms than one from the Middle East and North Africa.

The impact of migration on trade would be mild

Whether migration and trade are substitutes for each other is an old debate. For example, in the discussions leading up to the signing of NAFTA—the free trade agreement among the United States, Canada, and Mexico—one of the key arguments was that trade would replace migration and reduce the pressure for Mexicans to migrate to the North. Likewise, allowing for increased migration—for example of unskilled workers—could reduce trade, because it would enable the high-income countries to continue producing low-skill-intensive products at competitive cost.

Evidence of the link between trade and changing the comparative advantage emerges in the migration scenario described here. For example, the largest gains in export revenue for high-income countries come in agriculture, clothing, other manufacturing, recreational services, and public services—all labor-intensive sectors, the first four being relatively intensive in unskilled workers and the last in skilled workers.

Change in comparative advantage has only a mild impact on trade flows in this scenario, however, as migration affects trade through several channels, some of which increase, and others that decrease, trade flows:

- First, the rise in incomes due to migration produces a small rise in global trade flows, with regional differentiation (because income gains differ considerably among regions). In addition to higher incomes, the rise in migration changes the size of regional economies, with implications for their demand for imports and ability to export.
- Second, the nature of the shock assumed in our model differs from the standard debate over trade and migration. The share of skilled workers in total migrants is larger in the shock than in actual migration over the recent past. A large proportion of skilled workers will find employment in nontraded sectors—for example, as doctors and nurses—rather than in producing traded goods. This will have general equilibrium effects to the extent that the price of nontraded goods will decline by more than the price of traded goods. Thus there will be a relative shift to nontraded goods and a potential reduction in demand for imports of traded goods. Overall, the larger share of skilled versus unskilled workers does tend to reduce trade flows.
- Third, the increase in remittances provides an opportunity for developing

countries to import more and export less, as their current-account balance will increase by the size of the remittances ($98 billion in net terms). The model results show that total imports into developing countries would increase by $58 billion in 2025 (1.1 percent relative to the baseline), as aggregate exports decline by $40 billion (0.7 percent).[22] The change in remittances leads to an appreciation of the real exchange rate and therefore a loss in relative export competitiveness.[23] For instance, the output price index in developing countries rises by 0.6 percent on average, whereas it declines by 0.1 percent for high-income countries.

In summary, the scenario provides evidence that changes in comparative advantage due to migration do influence trade flows. However, overall migration and trade are not substitutes for each other, because migration has many other economic effects that have more power to stimulate or reduce trade. One implication of this finding is that migration policies should not be pursued because of their specific impact on trade flows. Likewise, in trade policies the impact on migration should not be a main focus.[24] Trade and migration policies should be evaluated on their own merits.

Migrants' impact on government fiscal accounts is broadly neutral

The assumption concerning the level of consumption of public goods and services by new migrants has important implications for individual gains, and global gains, under the modeled scenario. We assume that the new migrants' level of consumption of public goods and services equals the amount they pay in taxes, that is, their impact on the public budget is revenue-neutral. This is broadly consistent with the available evidence (box 2.3). To provide some sense of how different approaches would affect the scenario results, we present two alternative assumptions regarding the distribution of public goods and services to the new migrants (table 2.5). The default assumption had a largely neutral impact for existing residents in the host country. Under another assumption—new migrants pay taxes but receive no benefits from public goods and services—existing residents, native and migrant, enjoy a rise in real incomes of $126 billion ($117 billion for natives and $9 billion for existing migrant households). Note that the global welfare gains increase as well, since the income accruing to natives (and existing migrants) is not adjusted for the differences in the cost of living between developing and high-income countries.[25] A second extreme

Table 2.5 Impact of different assumptions on the consumption of public goods and services by selected groups in 2025

Change in cost-of-living-adjusted real income in 2025; billions of dollars

		Default assumption—"New" migrants receive benefits equal to their taxes		"New" migrants receive no public benefits but pay taxes		"New" migrants receive per capita average benefit	
	Private	Public	Total	Public	Total	Public	Total
Natives in high-income countries	139	−1	139	117	256	−85	54
Old migrants in high-income countries	−88	0	−88	9	−79	−6	−94
Natives in developing countries	131	12	143	12	143	12	143
New migrants	126	36	162	−18	108	75	201
World total	308	48	356	120	428	−4	304

Source: World Bank model simulations.

Box 2.3 The impact of immigrants on fiscal balances

Immigrants' net contribution to fiscal revenues is usually considered to be small. The net fiscal impact of immigration on the United States has been minimal (Coppel, Dumont, and Visco 2001; Auerbach and Oreopoulos 1999). The U.S. Binational Study on Migration (1997) found that irregular migrants did impose a significant fiscal burden on state and local government. However, school expenses accounted for the bulk of these costs, and (as the authors note) education is an investment that may readily be recovered in greater future productivity. Moreover, Lee and Miller (2000) found that the overall fiscal consequences of altering the volume of immigration to the United States would be quite small. Gott and Johnston (2002) and Sriskandarajah, Cooley, and Reed (2005) estimated that immigrants made a positive contribution to public finances in the United Kingdom. Gustafsson and Osterberg (2001) found that new immigrants to Sweden generated a net fiscal cost, but this turned into a positive contribution after a few years. Nana and Williams (1999) found that immigrants to New Zealand had a positive fiscal impact. Bonin, Raffelhuschen, and Walliser (2000) found that the net fiscal contribution of immigrants to Germany could be significant if the government selects for skills.

Calculations of the net fiscal cost of immigration are fraught with difficulties, for several reasons.

First, the computation at any point in time depends heavily on the methodology used, what expenditures and revenues are included, which public services should be regarded as pure public goods (and the extent of economies of scale in expenditures), and whether households or individuals are considered.

Second, static calculations of the current net fiscal impact fail to take into account the age structure of the immigrant population. Smith and Edmonston (1997) found that immigrants arriving between the ages of 10 and 25 years produced fiscal benefits under most scenarios, while immigrants arriving in their late 60s generally imposed a long-term burden. Studies that follow immigrants over time generally conclude that in net-present-value terms, immigrants and their descendants tend to contribute more in terms of tax revenues than they absorb in expenditures, but the orders of magnitude are typically small (OECD 1997). Intergenerational models are sensitive to the discount rate used and assumptions concerning the allocation of the fiscal burden over future generations.

Third, the computation will depend on the level of skills, experience, education, and fertility of immigrants. Rowthorn (2004) calculates that skilled migrants to the United States typically make a large positive contribution to the fiscal balance, whereas unskilled immigrants cost more on average than the taxes they pay. Storesletten (2000) calculates that the net-present-value contribution of the average high-skilled immigrant to the U.S. budget is $96,000; the medium-skilled immigrant's contribution is −$2,000; and low-skilled immigrant's contribution is −$36,000.

The results may change over time, as migrant characteristics and government policies change. The probability that an immigrant to the United States will receive public benefits has risen since the 1970s, probably due to an increasing share of immigrants from poorer countries (Gustmann and Steinmeier 1998).

An issue of particular concern has been the impact of migration on government-financed pensions. Likely increases in immigration can make only a small net contribution to strengthening the financing of pensions in the United States (Fehr, Jokisch, and Kotlikoff 2004), although selecting immigrants for working age and high skill levels could improve the picture (Storesletten 2000). By contrast, increases in immigration could make a significant contribution to financing pensions in Germany (Bonin, Raffelhuschen, and Walliser 2000) and Spain (Collado, Iturbe-Ormaetxe, and Valera 2004).

assumption is that new migrants receive the same amount in public benefits as the average household in the destination country. This would imply a net positive transfer to the new migrant households, since they would receive more in public benefits than they paid in taxes.[26] In this case natives in high-income countries would lose $85 billion in aggregate public goods and services, although this amount would not translate one-for-one into a benefit for new migrants due to the cost-of-living adjustment. These simulations underline

the effect of public policy on the distribution of gains from migration.

Additional gains from migration can be substantial

The gains for migrants from this scenario essentially provide the same message as earlier estimates. In their seminal paper, Walmsley and Winters (2003) estimate that a relaxation on the movement of temporary workers on the same order as that modeled here—that is, 3 percent of the labor force of the high-income countries—would yield global income gains of $150 billion (using a 1997-based comparative static model). The result from our scenario that is roughly comparable to their figures (that is, global gains before adjustment for cost of living and measured relative to 2001, rather than 2025) are more than double their results.[27] However, our figures are comparable with the more recent work done by Walmsley and her colleagues.[28] One of the key reasons for the increase in the global welfare impact is a reevaluation of the assumed wage differential between the home and host country. In their initial work, Walmsley and Winters had assumed that new migrants made up 50 percent of the difference between the home and host country's wages. Their new assumption (used in our model as well) is 75 percent, based in part on the fact that the migrants are permanent rather than temporary. Hamilton and Whalley (1984) and Moses and Letnes (2004) have shown that removing all restrictions on labor movement, admittedly not a realistic scenario, would yield a huge increase in world output. Overall, these papers suggest that labor-market restrictions are imposing a much larger burden on the global economy than are trade restrictions. The World Bank's trade model suggests that removing all remaining merchandise trade barriers would yield $287 billion in global real income gains in 2015. For the purpose of comparison, when the gains from the two different scenarios—those from an increase in migration, and those from global trade reform—are scaled to the same reference year, 2001, the gains from trade reforms are $155 billion versus $175 billion from the migration scenario.[29] This leaves little doubt that easing restrictions on the movement of labor could provide a significant boost to the global economy. Moreover, in comparison with the most recent work on global merchandise trade reform, the gains from an increase in migration are more balanced toward income increases for developing countries relative to developed countries. In a study by Anderson, Martin, and van der Mensbrugghe (2005), the gains to high-income and developing countries are 0.6 and 0.8 percent, respectively, relative to baseline income. In the scenario modeled here, the income increases are 0.4 percent for native households in high-income countries and 1.8 percent for developing countries (including the new migrants).

Returns to factors of production

Four critical factors determine the distribution of gains from migration among skilled workers, unskilled workers, and owners of capital: (a) the size of the increase in migration; (b) the distribution of nonwage income (profits); (c) the degree of substitution between workers by region of origin; and (d) the degree of substitution or complementarity between workers and capital. We have already posited that the increase in migration is large, with an average increase in the migrant labor force of around 50 percent over a 20-year period, and comparable (if somewhat less) to the rise in the share of migrants in high-income country population over 1970–2000. In the absence of any specific data on the source of migrant income, we assume that migrants—both existing and new—receive no nonwage income. In essence, their real income will be driven by changes in wages. The effects of this simple assumption on the distribution of gains are significant, and the implications of relaxing it are discussed below.

Substituting between migrant and native workers determines who gains

The key issue of who reaps the benefits involves the degree of substitution among different workers. The allocation of demand for workers assumes differentiation among workers from different regions. This is done in two steps. First, "similar" workers are bundled together into "native" workers and "foreign-born" workers.[30] In the second step, these two bundles are decomposed into labor demand by region of origin. We assume that there is more differentiation between a native and a foreign-born worker (that is, a lower substitution elasticity) than between two workers from different countries of origin within each of the two aggregate bundles. For example, in the case of the United States, employers see a greater difference between a U.S. worker and a generic immigrant from a developing country than between a Mexican and a Salvadoran worker. The implication is that a rise in the supply of migrants has a greater impact on old migrants than on native workers, which plays a key role in the distributional outcomes of the increase in migration. The assumption of labor demand differentiation operates for both skilled and unskilled labor in the model.

In the default case, we assume that wages are flexible, with a substitution elasticity between unskilled migrants and natives that is roughly comparable to that implied in the conclusions of the meta analysis in Longhi, Nijkamp, and Poot (2004); they conclude that a "one percentage point increase in the proportion of immigrants in the labor force lowers wages across the investigated studies by only 0.119 percent." (See box 2.4 for a review of empirical studies of the impact of migration on wages.) In the scenario described here, the 50 percent increase in the stock of migrants raises their proportion of the labor force by about 3 percentage points, producing a 0.5 percent decline in the wages of natives.[31] We also assume perfect substitution between new and old migrants (the large majority of both categories being unskilled). The empirical evidence of the extent to which migrants are substitutes for natives or for existing migrants is sparse. Thus in addition to exploring the implications of the assumptions made, we also devote attention to alternative assumptions.

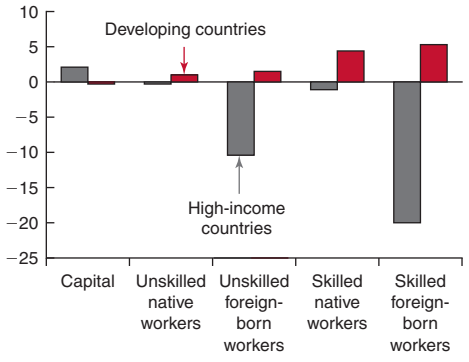
Finally, in a departure from previous work but in line with a developing consensus, we assume that skilled workers are near complements with capital (meaning that they are more productive, and thus earn higher returns, when used together with capital), whereas unskilled workers are substitutes for capital and skilled labor.[32] This specification has important consequences for the distributional impacts of increased migration. Whereas investment rises with increased income, the overall increase in the stock of capital is modest, so that the rise in the supply of skilled workers is not matched by an equivalent increase in capital. Thus the marginal productivity of additional skilled workers declines, provoking a decline in the wage of skilled workers (by more than the fall in the wages of unskilled workers).

Increased migration can generate substantial changes in income distribution among workers and owners of capital

The change in factor returns is depicted in figure 2.5. In the high-income countries only

Figure 2.5 Factor returns and migration

% change in factor returns, 2025, relative to baseline



Source: World Bank simulations.

Box 2.4 Empirical studies of the impact of immigration on wages

Most cross-sectional studies find that immigrants have no impact, or a very limited impact, on the wages or employment of natives (LaLonde and Topel 1997 and Borjas, Freeman, and Katz 1997 for the United States; Pischke and Velling 1994 for Germany). However, cross-sectional approaches relate wage differences across local labor markets to the share of immigrants in each market. If immigrants are attracted to high-wage areas, which is likely, it is difficult to identify the exogenous impact of immigrants on wages.[a] Studies of sudden, politically driven inflows of immigrants likewise fail to detect a significant impact on natives' wages or employment in affected areas.[b] However, native workers may adjust to large, sudden inflows of immigrants by moving to other areas (or through reduced inflows from other areas), again obscuring the relationship between immigration and labor-market outcomes.[c]

This problem has encouraged the use of panel techniques that can discern the combined effects of time and cross-sectional effects. Some panel studies have found a significant impact on the wages of unskilled natives, who in addition have suffered declines in wages due to skill-biased technical change and increased trade. Borjas (2003a), analyzed the impact of immigration in the United States across different levels of skills and experience and estimates that immigration reduced the wages of native high-school dropouts in the United States by 8.9 percent from 1980 to 2000. Jaeger (1996) finds that immigration lowered the real wage of U.S. high-school dropouts by as much as 3.6 percent in the 1980s. DeNew and Zimmermann (1994) find that a one percentage point rise in the share of migrants in the labor force reduces the wages of blue-collar workers by almost 6 percent. By contrast, Dustmann and others (2003) find that immigration has little impact on native wages (or employment) in the United Kingdom, including for the low-skilled.

Where wages are relatively inflexible, an inflow of migrants may affect employment levels rather than wages. Angrist and Kugler (2002) find that increased immigration in Europe is associated with a significant decline in native employment, particularly for the low-skilled. Hunt (1992) finds that a one percentage point rise in the share of immigrants in the French labor force (following Algerian independence) increased the unemployment rate by 0.2 percentage points. This shows more adjustment through employment than through earnings compared to U.S. studies, which may be due to French rules governing wages (Dustmann and Glitz 2005). The comparison underlines the importance of the investment climate, and in particular, labor-market flexibility, in the efficient absorption of migrants. Some studies show that immigration reduces native unemployment in the long term (Poot and Cochrane 2004), presumably because increased consumption demand from immigrants raises the demand for labor.[d]

Thus some articles support the view that unskilled immigrants are relatively close substitutes for native workers (without attempting to distinguish between the effects on native workers and old migrants). However, the share of low-skilled native workers in destination countries is falling. The share of U.S. adults with less than a high-school education declined from 47 percent in 1970 to 22 percent in 1998 (Massey 2000). About 90 percent of new native entrants to the U.S. labor force in 2004 had completed high school (U.S. Labor Survey 2005). By contrast, the average migrant from rural Mexico has six years of education and does not speak English (Mora and Taylor 2005). Many low-skill immigrants may have such limited education and language skills that they do not compete with native low-skilled workers at all, but instead take jobs that natives are unwilling to do. In this view, the rise in immigration in high-income economies since 1980 has been accompanied by increases in native educational levels; essentially natives moved out of certain kinds of jobs, creating a demand for immigrant labor.

[a] The researchers do attempt to correct for endogeneity by using instrumental variables.

[b] Examples include the Mariel boatlift from Cuba (Card 1989), the repatriation of Algerians of European origin to France (Hunt 1992), the inflow of workers to Austria after the breakdown of the communist regimes (Winter-Ebmer and Zweimuller 1999), and the return of Portuguese from Africa in the 1970s (Carrington and de Lima 1996).

[c] Still, Card (2001) finds no evidence that immigration into an area leads to offsetting net outflows of workers.

[d] See Gross (1999) for this result for France.

capital enjoys an increase in returns under the model—with wages declining for all labor categories, skilled and unskilled, native and foreign-born. With essentially only a labor shock, the scarcity value of capital increases. The negative impact on unskilled native wages is small, at around 0.3 percent, depending on the assumed elasticity of substitution between migrant and native workers.[33] The greater impact is felt by existing, unskilled migrants, whose wages decline by more than 10 percent.[34] At least two factors mitigate that decline. First, labor markets are not completely segmented, so that part of the adjustment falls on native workers. Second, other general equilibrium effects are at work, such as a relative shift in the demand for unskilled workers as the price of capital (combined with skilled labor) rises and a relative shift in demand toward goods that use unskilled labor intensively, raising the relative demand for unskilled workers.

The impact of the shock on the wages of skilled workers is greater than for unskilled. Wages decline by 1.1 percent on average for skilled natives, significantly more than for unskilled natives. Old skilled migrants suffer a wage decline of 20 percent, which is double that of old unskilled migrants. The impact on skilled workers is larger than for unskilled because skilled workers are assumed to be near complements with capital; with capital increasing only slightly, this would tend to drive down skilled wages. And the impact is largest on old skilled migrants because the rise in migration of skilled workers is large relative to the stock of old skilled migrants, and the new migrants are assumed to be closer substitutes for skilled migrants than are native workers.

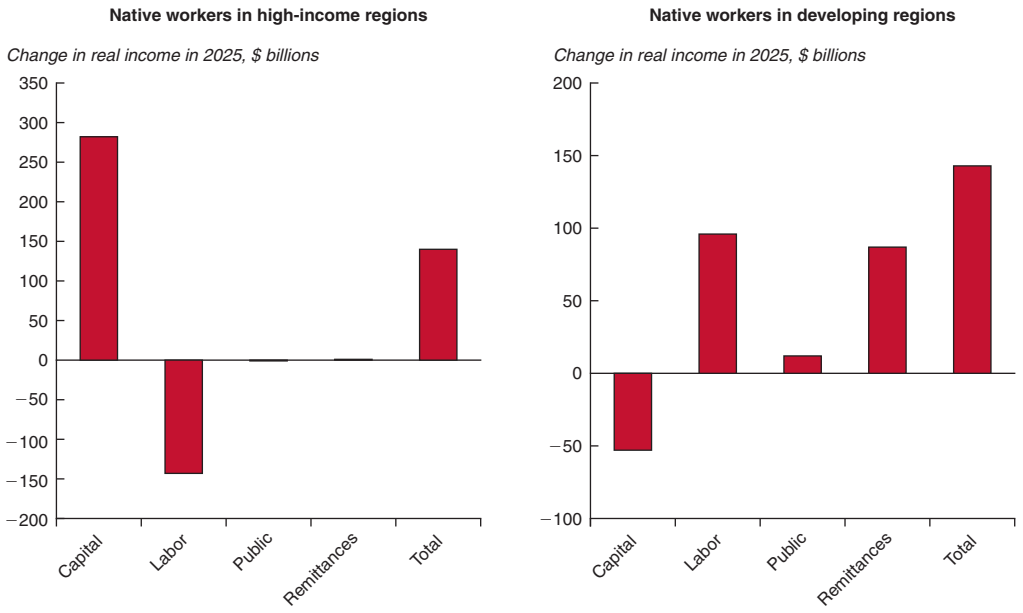
The greater impact of migration on skilled than unskilled wages is not at first sight consistent with the limited evidence available. In those studies that find any significant impact of migration on native wages, the largest impact tends to be on unskilled wages (see above). Our seemingly contrary result arises for three reasons. First, unskilled immigration to high-income countries has been much larger than skilled migration, so that the wage impact of unskilled migration is easier to detect in empirical work. Second, the shock modeled here represents a one-time increase in skilled migration that is larger than the existing stock, which has built up over time. And third, the model assumes little change in the capital stock, while increased investment in response to migration would dampen the fall in skilled wages, a point to which we return in the conclusion to this chapter.

The impact in developing countries is nearly the reverse. Capital returns suffer and labor returns improve, with larger improvements for skilled workers than for unskilled workers. The magnitudes differ because the relative size of the shock differs. For example, the decline in unskilled workers in developing countries is only 0.3 percent, versus 1.7 percent for skilled workers.

Assuming that all capital income accrues to native households, native households in high-income countries are on aggregate better off after the shock, with real incomes increasing by 0.4 percent. That is, the increase in capital income more than offsets the loss in wage income. Part of the old migrants' 6 percent decline in real income is due to the assumption that they own no capital, so enjoy no nonwage income.[35] An alternative, extreme assumption is that on a per capita basis, old migrants receive the same amount of nonwage income as natives. This alternative would reduce old migrants' loss to 3.4 percent of base real income.

To summarize, the new migrants are clearly the large winners, particularly in percentage terms. Under the assumptions of the model, existing migrants are likely to be losers—though the extent of their loss will depend on their degree of substitutability with native workers and their share of nonwage income. Native households in both high-income and developing countries are better off. The sources of their gains, though, are very different (figure 2.6). In the high-income countries the gains are generated by higher returns to capital—somewhat offset by

Figure 2.6 Source of gains for native workers



Source: World Bank simulations.

lower wages. The gains for natives in high-income countries would be lower if we assumed a more even distribution of capital (toward migrants) and a greater degree of labor substitutability. In developing countries, the gains to natives essentially are generated by higher wage income and higher remittances—somewhat offset by lower returns to capital. These gains would be lower should the propensity of the new migrants to remit be lower than average.

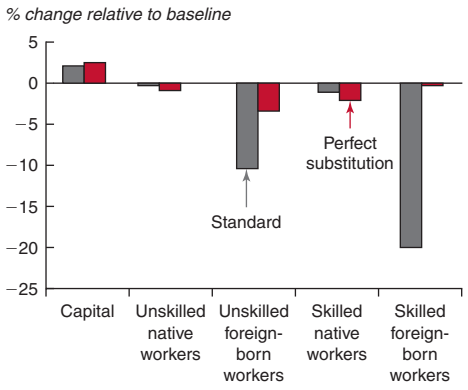
If migrants are viewed the same as natives, then increased migration reduces natives' wages

The degree of labor-market differentiation plays a critical role in determining the effect of the increase in migration on native and foreign households. An alternative scenario—maintaining the same increase in migration—assumes that employers are perfectly indifferent to hiring native workers versus foreign-born workers.[36] This empirical issue is linked to real-world dynamics since, over the long run, differences in labor characteristics could fade as migrants adjust to their new environment and as employers cease to see them as different.[37]

The impacts of the alternative scenario on factor returns are shown in figure 2.7. The most notable impact is that native wages (for skilled and unskilled workers) decline by more when natives and migrants are viewed as perfect substitutes for each other, while the wages of the foreign-born decline by significantly less.[38] For skilled workers, the average decline becomes negligible; the burden of adjustment is spread out more evenly between native and foreign-born workers. For the given shock, and depending on the assumed elasticity of substitution between foreign and native workers, the impact on native wages ranges from a slight increase to a decline of 1 percent (box 2.5).

Because increasing migration constitutes a clear labor-supply shock, one would expect it

Figure 2.7 Factor returns and migration in high-income countries, 2005



Source: World Bank simulations.

to affect wages (or employment, where movement in wages is constrained). But it is important to view these changes in dynamic terms. First, assuming differentiation between native and foreign-born workers, the impact on native workers' wages in high-income countries is slight even in absolute terms (–0.04 percent for unskilled workers and –0.4 percent for skilled workers). More important, in dynamic terms, these changes alter the rate of growth of wages over the next two decades only slightly. In the base case, nominal wages will increase by 3.6 and 4.7 percent, respectively (average annual growth between 2001 and 2025), for unskilled and skilled workers in high-income countries. With an increase in migration, the growth rate is unchanged for unskilled workers and drops to 4.6 percent for skilled workers. Even in the worst-case scenario for native workers, where foreign-born workers are assumed to be perfect substitutes for natives, the dynamic trends are almost exactly the same as in the baseline scenario.

The effects of the modeled shock are obviously larger for existing migrants. With labor differentiation, their long-term wage growth trend drops to 3.1 percent for unskilled workers and 3.9 percent for skilled workers from their baseline trend of 3.6 and 4.9 percent—still positive but significantly lower. In the more optimistic scenario for existing migrants, where native workers bear a larger part of the burden, the trend growth in wages is virtually identical to the baseline, declining to 3.4 and 4.8 percent, respectively, for unskilled and skilled workers.

The assumption of perfect substitutability of native and migrant labor has a small impact on the global income gain ($379 billion instead of $356 billion), but significant distributional effects. First, in high-income countries perfect substitution implies a more pronounced pro-capital bias, as native labor suffers a larger loss. However, the negative impact on existing migrant households is much smaller: less than 1 percent, compared with the 6 percent suffered with labor differentiation. This has a positive impact for developing countries, because their loss in remittances from existing migrants drops dramatically. Second, with perfect substitution the new migrants benefit from a larger wage differential and thus a higher income gain. And again, for developing countries, this translates into higher remittances. Overall, the change in real net remittances is $129 billion under perfect substitutability, as opposed to $88 billion. The bottom-line is that the real income of new migrants increases by 250 percent, as opposed to 200 percent, and the gains for natives in developing countries rise to 1.2 percent, instead of 0.9 percent.

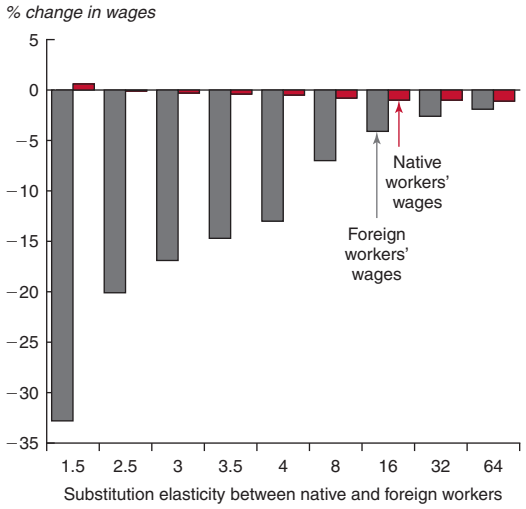
Several other parameters affect the relative impact of increased migration on wages and returns to capital. For example, as shown in box 2.5, the relative impact will depend on the substitution between capital and labor. The lesser the degree of substitution (or the less flexible the economy), the greater will be the negative impact on wages. Most econometric evidence suggests a capital–labor substitution elasticity of around 1, somewhat higher than that used in the model.[39] Another crucial assumption in the standard model is that skilled workers and capital are near complements. An alternative would be to assume that unskilled and skilled workers were both substitutes with capital. This would moderate the decline

Box 2.5 Increased migration and its impact on wages

The impact of increased migration on wages can be summarized by a few simple formulas. The key parameters are the share of foreign workers in the economy, the capital-labor elasticity of substitution, and the substitution between native and foreign workers. These relations are summarized in the table below.[a] The values refer to an economy where foreign labor is 5 percent of the labor force (s_f^l). The capital-labor substitution elasticity (σ^v) is 0.9; and the substitution (σ^l) between native and foreign workers is 4.[b] The point elasticity is given in the third column of the table. The estimated impact of a 50 percent increase in the stock of foreign workers is simply the point elasticity multiplied by 50. The actual impact comes from a calibrated numerical model. The two are relatively close, despite the size of the shock. This is because the results are largely driven by the low share of foreign workers in the economy; therefore most of the economy stays near its initial equilibrium. The aggregate wage falls by only 1 percent. This is allocated across the different workers depending on their substitutability. With an elasticity of 4 (used in the default scenario), migrant workers see a 10 percent decline in wages; domestic workers see only a 0.5 percent decline. If migrants and native workers are perfect substitutes, then wages of native workers would decline by 1 percent, that is, by the same amount as the aggregate wage.

The figure shows the impact on wages—of both foreign and native workers—using different assumptions about their substitutability. The shock is a 50 percent increase in the stock of foreign workers with the same assumptions used for the numerical example in the table. The impacts on wages converge only at very high levels of substitutability. In actual econometric work, it might be hard to estimate the substitution elasticity with great precision, particularly since the shocks are unlikely to be as considerable as those modeled here.

Wage impact from a 50 percent increase in foreign workers, under various substitution assumptions



Source: World Bank staff calculation.

Summary of elasticities with respect to an increase in foreign workers

Expression	Description	Point elasticity	Estimated impact	Actual impact
$\varepsilon_{W,F} = -\frac{s_f^l s_k}{\sigma^v}$	Aggregate wage	−0.0222	−1.1	−1.0
$\varepsilon_{FW,F} = -\frac{s_n^l}{\sigma^l} - \frac{s_f^l s_k}{\sigma^v}$	Wage of foreign workers	−0.2597	−13.0	−10.1
$\varepsilon_{NW,F} = \frac{s_f^l}{\sigma^l} - \frac{s_f^l s_k}{\sigma^v}$	Wage of native workers	−0.0097	−0.5	−0.5

[a]These relations are for a small single-sector closed economy but line up relatively well with the impacts from the global model. Because it is closed and single-sector, the relations may not hold exactly because of other general equilibrium effects. See van der Mensbrugghe 2005b.

[b]The other parameters are the capital share (s_k), the share of foreign labor in output ($s_f = s_l.s_f^l$), and the share of native workers in the labor force (s_n^l).

of skilled wages and the rise in the returns to capital, essentially because there would be more (assumed) flexibility in the economy. When capital and skilled workers are complements, a sharp increase in skilled workers, without a concomitant increase in capital, raises the scarcity value of capital. If we make capital and skilled labor more substitutable, the decline in the wages of skilled workers will create more demand for them and dampen the negative impact on their wages.

Caveats—what the model leaves out

While the scenarios discussed here provide a wealth of insights, they do not address many important aspects of the impact of migration. Using side calculations, it is possible to get a sense of two such aspects.

The model does not account for changes in migrant characteristics over time

The model assumes that migrant characteristics do not change over time. This is useful in highlighting the immediate impact of migration, but less realistic over the medium term. As migrants remain in the destination country, they tend to take on the characteristics of native workers. For example, they learn or improve their fluency in the language, they better understand (and may tend to adopt) the social mores of the destination country, and they may become more educated. Employers are likely to view a migrant that has lived in the country for 20 years as being more similar to a native worker than a migrant who arrived yesterday. This issue has several implications for the calculation of the gains from migration. Migrants who have spent a longer time in the destination country will be less perfect substitutes for new migrants, mitigating the drop in their wages predicted by the model. Similarly, as the degree of labor differentiation declines, the impact on native wages will rise, thus reducing native households' gains. On the other hand, increased productivity as migrants improve their education may generate larger gains to owners of capital and could benefit native workers through spillover effects such as training. Remittances may decline as migrants become more removed from the origin country.

The process of catch-up in productivity is not captured in our current model, but we have done some side calculations to see how the results could be affected. The catch-up rate and workers' length of stay are two factors that affect catch-up. How long does it take the average migrant to achieve the level of productivity of native workers? Borjas (2003b) provides mixed evidence on this point for migrants in the United States. First, he shows that the catch-up rate depends very much on when the migrants arrived, with earlier migrants doing better than later migrants. Second, he finds no absolute convergence, with migrants' wages remaining below those of native workers.

The second factor relates to workers' length of stay. The longer workers stay, the better placed they are to improve their skills and adapt to local work practices, including language skills (if necessary). At one extreme, all migrants may be assumed to be temporary workers staying for a short period to return home permanently. Or they may be assumed to be permanent workers arriving young and with high educational attainment or acquired skills.

Under the most optimistic scenario, where catch-up occurs within a year, our simple, calibrated model predicts gains in the output of high-income countries that are about 25 percent higher than in the case of no catch-up.[40] Under a more plausible scenario, where the process of catch-up takes 10 years and annual attrition[41] is around 10 percent, the output gain in high-income countries is about 12 percent higher than with no catch-up. It appears, therefore, that the catch-up phenomenon could boost the gains from migration substantially.

The model does not account for the potential of migration to spur higher investment

The model generates only a modest rise in the capital stock as a result of the increase in migration. Increased returns to capital, and thus interest rates, do increase savings. However, this effect is marginal, in keeping with empirical estimates of the responsiveness of savings to changes in interest rates. In reality, higher investment in response to the higher returns to capital may be financed by capital inflows, which do not change in the model. There is some evidence, however, that large immigration can attract capital flows. For example, Davis and Weinstein (2002) argue that skilled labor, unskilled labor, and capital are all attracted to the United States, owing to U.S. technological superiority. The mass migration from Europe to the new world before World War I encouraged large inflows of capital.

Higher investment would lessen the decline in wages suffered by skilled workers, dampen the rise in the return to capital, and increase the demand for unskilled workers in the high-income countries—but it could have the opposite effects in developing countries. To verify this intuition, we simulated the same migration shock and added to the shock a 0.4 percent decline in the level of investment in developing countries, with a concomitant transfer of these resources to high-income countries.[42] Those assumptions indeed have a positive impact for the high-income countries and dampen the capital-income gains and labor-income losses. Overall, the gain for native households in high-income countries improves by 4.5 percent (from $139 billion to $145 billion). But it comes at the expense of natives in developing countries, whose income gain drops from $143 billion to $125 billion, a drop of 12.5 percent. The global gains fall to $345 billion, a 3 percent fall. This suggests—in the absence of an increase in savings—that the potential reallocation of global savings toward high-income countries is negative at the global level and that capital is more productive in developing countries.

Other factors not covered by the model are more difficult to quantify

There are various costs associated with migration that the model does not take into account. One issue concerns adjustment costs, as changes in the technology of production and in the mix of goods imply transitional unemployment and changes in the pattern of investment. The magnitude of these costs depends in part on the structure of labor-market institutions (such as constraints on hiring and firing and minimum-wage legislation) and on the efficiency of capital markets. Countries with more flexible labor markets and sound banking, stock, and bond markets are likely to experience lower adjustment costs, underlining the importance of the investment climate for realizing the potential gains from migration. The size of adjustment costs will also depend on whether migration is concentrated or spread over time. This point also has policy implications. If a country anticipates needing migrants in the future or recognizes that migration pressures are bound to rise due to demographic changes, it would be better to loosen constraints on migration earlier and more gradually than to be confronted with a sharp rise later on. Migration also involves direct costs, including transportation and transitional expenses, as well as the noneconomic costs suffered by migrants separated from their families (for example, the impact on children raised without one or both parents—see chapter 3). In general these are either short-term costs that should not greatly change the calculation of benefits from permanent migration or problems that decline over time as migrants and families adjust to permanent changes or take steps to reunite.

Several other issues that may affect the gains from migration are impossible to quantify. First, our model does not distinguish between irregular and regular migrants. If migrants are irregular, they may be paid lower wages (see chapter 3), which would reduce their welfare gains (and remittances) relative to the model results, while it increases the gains of natives. However, irregular migrants

also may impose costs on destination countries—among them the costs of enforcement (as governments seek to limit what some may view as undesirable changes in the country's culture and demographic characteristics); a possible burden on public spending, which may be higher for irregular migrants (see box 2.3); and the potential for other forms of illegality generated by the presence of a large, undocumented group of foreign workers.

Second, immigrants may improve the efficiency of employment from the perspective of firms by providing a source of labor that can easily be employed in new geographic locations, and hired or fired in response to changes in cyclical conditions. Piore (1986) describes how many migrants (at least initially) tend to view their stay as temporary, filling jobs with lower salaries and less stability than those of natives.[43] Large numbers of immigrants work in construction, which facilitates new developments in areas that require a mobile labor force. However, over time, migrants will become more permanent and demand jobs similar to those held by natives.

Third, our model does not reflect the social or economic implications of increasing diversity in the destination country. The social impact lies outside our present scope, but diversity has potential economic costs and benefits that should be considered. Some writers argue that increased diversity has an economic value. Glasser, Kolko, and Saiz (2001) emphasize the role of a rich variety of services and consumer goods in enhancing the attractiveness of cities. Florida (2002) relates an index of diversity to a concentration on high-technology industries. Ottaviano and Peri (2004) find that cultural diversity has a net positive effect on the productivity of U.S.-born citizens. By contrast, Schiff (1998) uses a theoretical model to underline how a society's shared values can reduce the cost of transacting business, owing to higher trust and easier enforceability of sanctions. Thus immigration, which increases diversity, may lower productivity by raising transaction costs. Finally, Alesina and Ferrara (2004) find that increases in ethnic diversity are associated with lower growth rates, holding all else equal. However, diversity may be more beneficial to growth at higher income levels.[44] Clearly much will depend on the kinds of diversity involved: immigrants who rely on national affinities to cement loyalty to violent gangs presumably have a very different impact on growth and welfare than immigrants who open ethnic restaurants.

Fourth, the model may not fully capture the beneficial effect of immigration on increasing the supply of labor in the service sector. Although reductions in the prices of services are captured, the resulting expansion in the supply of native labor (as more parents can afford child care and workers have more time to devote to their jobs) is not.

Fifth, the model does not reflect the possibility that skilled migration may lower growth in origin countries, for example, because of positive externalities from the presence of skilled workers or increases in the price of services that require technical skills (see chapter 3).

Finally, the model assumes constant returns to scale, while immigration may be more beneficial if significant sectors enjoy increasing returns to scale. Increasing returns may be derived, for example, from fixed production costs, network effects (the unit price of providing telephone service falls as the customer base grows), reduced transport and communications costs (as the local market expands), or increased productivity due to interactions among highly skilled workers. In their role as consumers and workers, immigrants may facilitate an expansion of the market, thereby raising productivity by increasing returns. On the other hand, large inflows of immigrants may induce congestion, straining public transportation systems, for example, or bidding up the price of land. Such effects are particular to the sector and geographic area involved, so it is difficult to draw broad conclusions. However, skilled immigrants have made significant contributions to high-technology sectors that are subject to increasing returns to scale.

These qualifications to the scenario results illustrate how model exercises must abstract from reality to provide quantitative measures of the impact of migration. Some of the issues that the model does not consider would likely be small in the medium term (adjustment costs, transportation costs) or would tend to increase the economic benefits of migration (improved productivity of migrants over time, greater labor-market flexibility and supply of labor). Other issues would increase benefits to destination countries, while potentially harming origin countries (higher investment, economies of scale). Still others may have both economic and social effects, without lending themselves to determinations of their direction and size (diversity, irregular migration).

Notes

1. In keeping with the overall thrust of this report, we focus here on South-North migration, although it is important to recognize that a large portion of migrants from developing countries move to other developing countries.

2. Some readers may also find the chapter too technical, as it necessarily deals with detailed specification issues—for example, the degree of differentiation between native and migrant workers, the fiscal impact of migrants, and how to take into account the change in prices between developed and developing countries when evaluating gains to migrants.

3. Data on the stocks of migrants are generally taken from census reports in countries of destination and thus include both regular and irregular migrants. However, irregular migrants tend to be less likely to report their immigrant status, so the estimate of total migrants is probably low.

4. The breakup of the Soviet Union and emergence of 15 new independent countries in 1991 created new populations of "international" migrants without migration having taken place.

5. The exceptions were Belgium, France, Ireland, Portugal, and the United Kingdom.

6. In their regression equation explaining immigration to the United States, Hatton and Williamson (2002) calculate that IRCA doubled the Mexican immigration rate from 1989 to 1991.

7. Germany, Ireland, and the Czech Republic are in the process of establishing new immigration regimes, with a major focus on economic migration. The EU is also discussing the Green Paper on an EU Approach to Managing Economic Migration (EU 2005).

8. These numbers will be moderated to the extent that labor-force participation rates in the 65+ cohort are positive, if small. Moreover, labor-force participation rates for the elderly are likely to increase as pensions and benefits stagnate or decline with fiscal pressures and as life expectancy rates continue to increase. We may also witness an increase in labor-force participation rates among people of working age.

9. These global gains are comparable to the recent findings by Walmsley and Winters (2003), when adjusted for the size of the economy in 2001 relative to the projected size of 2025.

10. The model's specification is described in van der Mensbrugghe (2005a).

11. "Migrants" refers to migrants from developing countries unless otherwise stated.

12. The phase-in period is somewhat arbitrary. Because of its 10-year implementation, it minimizes adjustment costs to some extent. The five-year period between 2020 and 2025 enables an assessment of long-run steady-state impacts.

13. This is by design. An alternative would be to increase the stock of migrants in proportion to their current structure—by host region and skill level. In this case, the largest proportional increase would be for unskilled workers in the United States.

14. A switch of 14 million workers from developing to high-income countries has only a small impact (a decline of 0.4 percent) on aggregate employment in developing countries, albeit with potentially greater consequences among the relatively more scarce skilled workers.

15. Many factors determine the level of remittances. For example, new migrants may leave many dependents in their home countries, which would tend to raise remittances. On the other hand, at least in the short-term, moving and start-up costs could lower remittances.

16. For simplicity, migrants from other high-income countries are added to the true natives.

17. Again, for simplicity, all migrants in developing countries—both from rich and developing countries—are lumped together for the purposes of the aggregate analysis.

18. The impact on households other than the "new" migrants is not affected by cost-of-living adjustments. Since these households do not move, they face the same system of prices, and thus their change in real income simply depends on the standard real income measure.

19. This assumes a perhaps implausible Leontief utility function but the purpose is simply to illustrate the point that corrections need to be made for differences in the cost of living.

20. Were the true prices available, one could do a standard equivalent variation calculation that would take into consideration the change in prices.

21. In the high-income countries, new migrants' total real consumption is $562 billion, compared with $80 billion in the baseline, hence the real increase of $481 billion. When the $562 billion is adjusted for the difference in the cost of living, real consumption, as perceived from the point of view of the new migrant, is only $244 billion, taking the change in real income down to $162 billion. The cost-of-living adjustment averages 2.3, lower than the 3.1 GDP-weighted average PPP of developing countries. This occurs because middle-income countries (with a relatively low PPP adjustment) have a higher weight in migration than in developing countries' GDP.

22. High-income countries, on the other hand, see a substantial rise in exports, $211 billion (2.2 percent), and a more modest $113 billion rise in net imports (1.2 percent), with imports from developing countries declining by $23 billion. This implies that although a large part of the increase in high-income exports can be attributed to the increase in remittances, a significant portion is also coming through intraregional trade among high-income countries driven in part by changing comparative advantage.

23. A standard "Dutch disease" effect of foreign inflows.

24. Studies of the impact of trade reform in developing and industrial countries tend to show that wages in developing countries rise relatively more—particularly for unskilled workers—than in industrial countries, but those changes are relatively minor compared to the initial gap in wages. For example, unreported results from Anderson, Martin, and van der Mensbrugghe (2005) show that full merchandise trade reform would increase unskilled real wages in developing countries by 3.7 percent (unweighted average), but by only 0.7 percent in industrial countries. This could induce a small reduction in the incentive to migrate, but it would not substantially alter the significant wage multiple of 4 to 5 (taking into account cost-of-living differentials).

25. The cost-of-living adjustment for the new migrants treats their consumption of public goods and services the same as their private consumption—that is, it is adjusted by the same PPP factor.

26. The assumption is that the new migrant households come with the dependency ratio of their home country.

27. There will be compositional impacts in translating gains from 2025 to 2001, since developing countries are growing on average more rapidly than high-income countries.

28. Results presented at the eighth annual conference on Global Economic Analysis held in Lübeck, Germany. See http://www.gtap.agecon.purdue.edu/events/conferences/2005/program_day3.htm.

29. The full merchandise trade reform scenario is with a standard model and ignores any beneficial impact through higher trade-induced productivity or scale economy effects. Note that the gains from reform of services trade could be multiples of merchandise trade reform. See Anderson, Martin, and van der Mensbrugghe (2005).

30. In the case of high-income countries, 'similar' workers would be migrant workers from other high-income countries. Other migrant workers are bundled together in a so-called 'foreign-born' aggregate.

31. One would expect the elasticity to increase as the proportion of migrants in the population increases (box 2.5).

32. See, for example, Bchir and others (2002).

33. Box 2.5 shows how wages—native and foreign—are related to an increase in the stock of migrants. Two parameters are crucial—the substitution between native and foreign workers and the share of foreign workers in the labor force.

34. The general equilibrium elasticity is only 0.27 for unskilled workers; for roughly a 40 percent increase in supply, wages decline by around 10 percent.

35. Migrants from other high-income countries (also assumed to have no nonwage income) see only a small change in their real incomes, as their wages are closely linked to the wages of native workers.

36. Observed wage differentials can arise from a combination of two effects—differences in productivity and differentiated labor demand. If labor is perfectly substitutable, then the equilibrating condition is the equality of efficiency wages, that is, productivity-adjusted nominal wages. If labor is differentiated, efficiency wages are no longer necessarily equalized, and the equilibrium wage will be determined by supply and demand conditions for the differentiated labor.

37. The empirical evidence on "catch-up" is limited. In the case of migrants to the United States, Borjas (2003b) shows that migrants who arrived in the 1960s almost caught up with natives within a 10–15 year period. Those who arrived in the 1970s made less progress in closing the gap with natives. However, the wages of migrants arriving in the 1980s actually fell further behind those of natives after a 10-year period. The scenarios described in this chapter assume no change in the relative productivity of migrants. Such an assumption would require a more elaborate specification of migrants to capture their changing composition over time, similar to modeling capital vintages. By

ignoring the catch-up process, our results may underestimate the longer-term gains from migration.

38. The changes in wages by region of origin are identical for all workers in each high-income region, but due to aggregation effects, this will not necessarily be true when averaging across regions.

39. The model has a vintage structure with a lower substitution elasticity for "old" or installed capital and a higher substitution elasticity for "new" capital. The actual substitution will be a weighted average of the old and the new vintages, with a higher average for countries with relatively high rates of investment.

40. This follows directly from the assumption that the productivity level of migrants is initially 75 percent that of natives.

41. The attrition rate will be a combination of factors—return migration, retirement, and death. The first factor is probably most important the first year, whereas the other two factors will depend on the age of the migrant.

42. The value of 0.4 percent was chosen because it corresponds to the change in the number of workers in developing countries—though it should be noted that the change in workers represents a change in the stock level, whereas the change in investment is a change in flows.

43. He notes that this trend may be changing, as technology and globalization encourages smaller-scale production and more permanent immigration.

44. This may occur because "the productivity benefits of skill complementarities are realized only when the production process is sufficiently diversified," or because high-income economies are able to develop institutions that help them cope better with the potential for conflict inherent in ethnic diversity (Alesina and Ferrara 2004).

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