

# The Economic Consequences of the International Migration of Labor

Gordon H. Hanson

NBER and University of California, San Diego, La Jolla, California 92093;  
email: gohanson@ucsd.edu

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## Abstract

In this paper, I selectively discuss recent empirical work on the consequences of global labor mobility. I examine how international migration affects the incomes of individuals in sending and receiving countries and of migrants themselves. Were a social planner to choose the migration policies that would maximize global welfare, she would need to know, among other values, the elasticities of wages, prices, taxes, and government transfers with respect to national labor supplies as well as how these parameters vary across countries. My goal is to evaluate the progress of the literature in terms of providing these inputs.

## 1. INTRODUCTION

Given its prominent coverage by national media, the economic consequences of international migration would seem to be one of the burning issues of our time. In receiving countries, public debate about immigration drives national politics, with recent electoral campaigns in Australia, Denmark, France, Switzerland, and the United States each devoting substantial attention to the topic. Immigrants are blamed for disrupting civil society, draining public coffers, and lowering wages, among other woes (Huntington 2004). At the same time, skilled immigrants receive credit for spurring innovation and the growth of technology sectors (Freeman 2006). Sending countries are no less conflicted about labor mobility. Emigration has brought a welcome financial windfall in the form of remittances (Acosta et al. 2007), but it also threatens to drain poor economies of their most educated workers (Docquier & Rapoport 2009).

To an economist, it is no surprise that international migration is contentious. By arbitraging the vast differences in wages that exist between countries, labor flows alter the distribution of income in sending and receiving economies alike. In this dimension, international migration is similar to international trade. Both are mechanisms for globalization that create winners and losers. But there are other dimensions in which trade and migration differ significantly. In most receiving countries, immigrants pay taxes and have the right to draw on at least some public services, changing the net tax burden on native residents. Once they become citizens, immigrants generally obtain the right to vote, altering domestic politics (Razin et al. 2002). In sending countries, emigrants cause corresponding fiscal and political disruptions by their departure. Differences between trade and migration are evident in policy (Hatton & Williamson 2005). While most countries now belong to the World Trade Organization, and maintain a nominal commitment to lowering trade barriers, a multilateral agreement that would allow international labor mobility is a dim prospect, at best.<sup>1</sup>

What does economic research have to say about the costs and benefits of international migration? Should we expect economists to advocate for the free international movement of labor as intensely as they tend to support free trade? The persistence of large differences in average income between countries is *prima facie* evidence that allowing greater international labor mobility would raise world welfare (Pritchett 2006). Allowing labor to move across borders more freely would be a simple and obvious way to help narrow global income gaps.

In this paper, I selectively discuss recent empirical work on the consequences of global labor mobility. I examine how international migration affects the incomes of individuals in sending and receiving countries and of migrants themselves. Were a social planner to choose the migration policies that would maximize global welfare, she would need to know, among other values, the elasticities of wages, prices, taxes, and government transfers with respect to national labor supplies as well as how these parameters vary across countries. My goal is to evaluate the progress of the literature in terms of providing these inputs. In considering the effects of labor mobility, I give equal weight to sending and

<sup>1</sup>The closest sending and receiving countries have come to negotiating a multilateral deal on migration are discussions under Mode IV of the Doha Development Agenda of the World Trade Organization, which if adopted would permit the temporary movement of service providers across borders, addressing a limited set of international labor flows. Because of their narrow scope, even if enacted, the provisions discussed would likely increase global labor flows by only a modest amount. For analyses of the economic impacts of Mode IV liberalizations, see Jansen & Piermartini (2005) and Schiff (2007).

receiving countries, meaning neither receives in-depth treatment. For discussions on how immigration affects receiving countries, see Borjas (1999a) and Card (2005), and on research into how emigration affects sending countries, see Docquier & Rapoport (2009) and Hanson (2007).<sup>2</sup>

Is there a case to be made against the unfettered movement of labor? In low-income sending countries, the complaint has long been that the wrong individuals leave (Bhagwati & Hamada 1974). In most of the developing world, the more skilled have the highest propensity to emigrate (Docquier & Marfouk 2006). If there are positive spillovers associated with human capital (Lucas 1988) or education is financed through taxation (Bhagwati & Rodriguez 1975), the emigration of skilled labor can hinder economic development (Benhabib & Jovanovic 2007). Possible corrections include taxing the emigration of skilled labor (McHale 2009) or requiring receiving countries to admit more unskilled workers from the developing world (Pritchett 2006).

In high-income receiving countries, in contrast, the concern is that the wrong individuals are trying to get in (Borjas 1999b), though this position has generated controversy (Card 2005). In the United States and Europe, the average immigrant has much less schooling than the average native worker. Increased inflows of low-skilled labor may exacerbate distortions created by social-insurance programs or means-tested entitlement programs (Wellisch & Walz 1998), which would possibly increase the net tax burden on native residents (Borjas & Hilton 1996) and thereby fuel political opposition to immigration (Hanson et al. 2007, Facchini & Mayda 2006).

By assessing the economic consequences of labor mobility, one could determine whether existing restrictions on immigration are justifiable on welfare grounds or whether they are welfare-reducing policies, resulting from lobbying by special interests (Facchini & Willmann 2007) or concerns about the impact of immigration on voters (Benhabib 1996; de Melo et al. 2001). Though a World Trade Organization for international migration is unlikely to form any time soon, one would still like to know whether such a venture would be worthwhile. In addition to providing policy makers with guidance on setting the scale of international migration, one would want the literature to give insight on its desired composition. Emigration pessimists suggest labor outflows are too skilled, while immigration pessimists suggest labor inflows are not skilled enough. Both positions cannot be right.

Unfortunately, policy makers would be hard pressed to infer the effects of international migration on global welfare from the existing literature. The issue is not so much that economists disagree on the magnitudes in question. Rather, the problem is that the empirical literature tends to eschew a global general equilibrium perspective. There has been an immense amount of work on how immigration affects U.S. wages, but this is just one outcome of interest. There has been comparatively little work on the impact of immigration on nonlabor income, the consequences of emigration for labor markets in sending countries, how global labor flows affect fiscal balances in labor-importing or labor-exporting economies, or what changes in opportunities for emigration mean for the incentive to acquire skill. To be sure, economists have made progress on each of these topics. But taking the literature as a whole gives the impression that the most relevant consideration for evaluating migration's impact is how foreign labor inflows affect the

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<sup>2</sup>Nor do I address the growing literature on the causes of international migration. See Mayda (2005), Clark et al. (2007), Rosenzweig (2007), Brücker & Defoort (2006), Belot & Hatton (2008), and Grogger & Hanson (2008) for recent work on the topic.

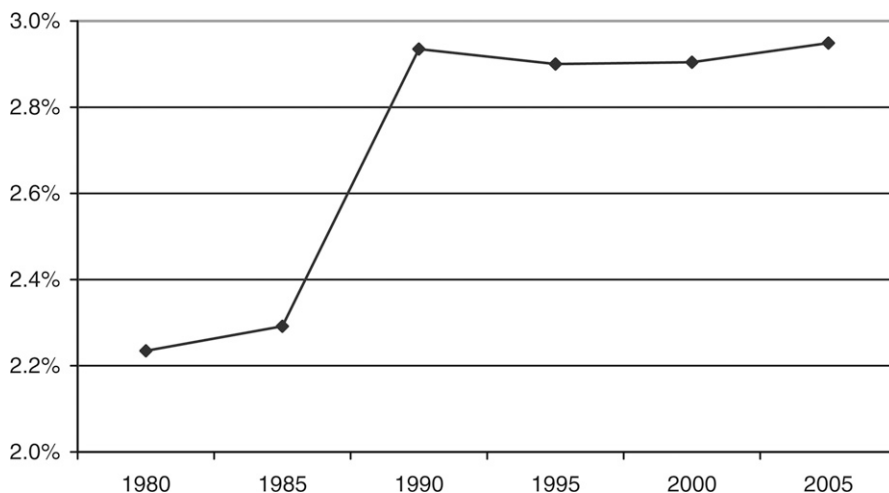
earnings of low-skilled U.S. workers. If we want policy makers to make informed choices about migration policy, we have a lot more work to do.

In Section 2, I summarize facts about international migration that emerge from recently available data. In Section 3, I outline a simple framework for evaluating the welfare consequences of international migration. In Section 4, I discuss empirical research on the consequences of labor flows for incomes in sending and receiving countries and for migrants and their family members. Finally, in Section 5, I consider directions for future empirical work.

## 2. TRENDS IN INTERNATIONAL MIGRATION

Perhaps the most striking fact about international migration is that it is so uncommon. As summarized in (Figure 1), data compiled by the United Nations imply that in 2005 individuals residing outside of their country of birth comprised just 3% of the world's population. Moreover, during the past two decades, the stock of international migrants has grown only modestly, rising from 2.2% of the world population in 1980 to 2.9% in 1990 and increasing only marginally after that. Given substantial differences in average incomes between countries, the small scale of global migration is surprising. In 2005, per capita GDP (adjusted for purchasing power parity) was \$33,600 in high-income OECD countries, compared with \$9200 in Eastern Europe and Central Asia, \$8400 in Latin America and the Caribbean, \$6200 in the Middle East and North Africa, \$3900 in East Asia and the Pacific, \$2100 in South Asia, and \$1700 in Sub-Saharan Africa. Of course, differences in average income may overstate the gain to migration. In Section 4, I discuss recent estimates of cross-country earnings differences, which indicate that although per capita GDP differences do exaggerate the income gain to moving abroad these gains are still substantial.

One explanation for the small scale of international migration is that receiving-country restrictions on immigration are binding. Table 1 shows the share of the population that is



**Figure 1**

Fraction of world population comprised of international migrants.  
Source: United Nations (2006).

**Table 1 Percentage of foreign-born population in total population**

Country	1995	2000	2005	Change 1995–2005
Australia	23.0	23.0	23.8	0.8
Austria		10.5	13.5	
Belgium	9.7	10.3	12.1	2.4
Canada	16.6	17.4	19.1	2.5
Czech Republic		4.2	5.1	0.9
Denmark	4.8	5.8	6.5	1.7
Finland	2.0	2.6	3.4	1.4
France <sup>b</sup>		10.0	8.1	
Germany <sup>c</sup>	11.5	12.5		
Greece <sup>d</sup>		10.3		
Hungary	2.8	2.9	3.3	0.5
Ireland <sup>c</sup>	6.9	8.7	11.0	4.1
Italy <sup>d</sup>		2.5		
Luxembourg	30.9	33.2	33.4	2.5
Mexico	0.4	0.5	0.4	0.0
Netherlands	9.1	10.1	10.6	1.5
New Zealand <sup>c</sup>	16.2	17.2	19.4	3.2
Norway	5.5	6.8	8.2	2.7
Poland				
Portugal	5.4	5.1	6.3	0.9
Slovak Republic <sup>d</sup>		2.5	3.9	
Spain <sup>d</sup>		5.3		
Sweden	10.5	11.3	12.4	1.9
Switzerland	21.4	21.9	23.8	2.4
Turkey		1.9		
United Kingdom	6.9	7.9	9.7	2.8
United States	9.3	11.0	12.9	3.6

<sup>a</sup>Source: OECD [2006 (1995 data), 2007].

<sup>b</sup>2000 value is from 1999.

<sup>c</sup>2004 value is from 2003.

<sup>d</sup>2000 value is from 2001.

<sup>e</sup>1995 value is from 1996.

foreign born in select OECD countries. Aside from tiny Luxembourg, the countries with the largest immigrant presence in 2005 are Australia (24%), Switzerland (24%), New Zealand (19%), and Canada (19%). Australia, New Zealand, and Canada are unique among receiving countries in using a point system (rather than quotas) to govern applications for admission, in which individuals with higher levels of skill are favored for entry. Next in line in terms of the scale of immigration are the large economies of Germany (13%), the United States (13%), France (10%), and the United Kingdom (10%). The United States alone hosts 40% of immigrants living in OECD countries, making it the world's largest receiving country. The United States uses a quota system to govern legal immigration, with two thirds of visas reserved for family members of U.S. citizens or residents. European countries tend to place more emphasis on an individual's refugee or asylee status when making immigrant admission decisions (Hatton & Williamson 2004). In the past decade, there have been substantial increases in foreign-born population shares in a number of rich countries, with the largest changes over 1995–2005 occurring in Ireland (4.1%), the United States (3.6%), New Zealand (3.2%), the United Kingdom (2.8%), Norway (2.7%), Canada (2.5%), Belgium (2.4%), and Switzerland (2.4%).

One indication that receiving-country restrictions on immigration are binding is that inflows of illegal immigrants are both a substantial share of total immigration and these rates are on the rise. In the United States, Passel (2006) estimates that in 2007 there were 12 million illegal immigrants, which accounted for 30% of the U.S. foreign-born population, up from 28% in 2000 and 19% in 1996. More than two thirds of U.S. illegal immigrants are from Mexico and Central America, suggesting that proximity facilitates illegal entry (Hanson 2006). In Europe, Jandl (2003) estimates that in 2003 there were 4 million illegal immigrants in the 15 European Union countries, with the largest stocks in Germany, the United Kingdom, Italy and France. Greece, Italy, Portugal, and Spain have engaged in repeated recent legalizations of illegal immigrants, meaning that the current stock of illegal immigrants in these countries understates the number of immigrants who gain entry illegally.

In high-income OECD nations, low-income countries are an important source of migrants. **Table 2**, using data from Beine et al. (2007), shows the share of the immigrant population in OECD countries by sending region. In 2000, 67% of immigrants in the OECD were from a developing country, up from 54% in 1990. Among developing sending regions, Mexico, Central America, and the Caribbean are the most important, accounting for 20% of OECD immigrants in 2000, up from 15% in 1990. Half of this region's migrants come from Mexico, which in 2000 was the source of 11% of OECD immigrants, making it the world's largest supplier of migrants. The next most important developing source countries are Turkey (3.5% of immigrants); China, India, and the Philippines (each with 3%); Vietnam, Korea, Poland, Morocco, and Cuba (each with 2%); and Ukraine, Serbia, Jamaica, and El Salvador (each with 1%).

Among sending countries, there is substantial variation in the propensity to emigrate. As of 2000, there were 22 developing nations with 10% or more of their adult population having migrated to the OECD, and 16 with emigration rates above 5%. At the other extreme, 52 developing countries had emigration rates below 1%. There is strong persistence in which countries send more people abroad, as seen in **Figure 2**, which plots emigration rates in 1990 and against those in 2000. Countries with the highest emigration rates tend to be small, poor countries that are relatively close to the United States.

Within sending countries, emigrants tend not to be drawn randomly from the population. **Figure 3**, taken from Grogger & Hanson (2008), plots the log odds of emigration for individuals

Table 2 Share of OECD immigrants by sending region, 2000<sup>a</sup>

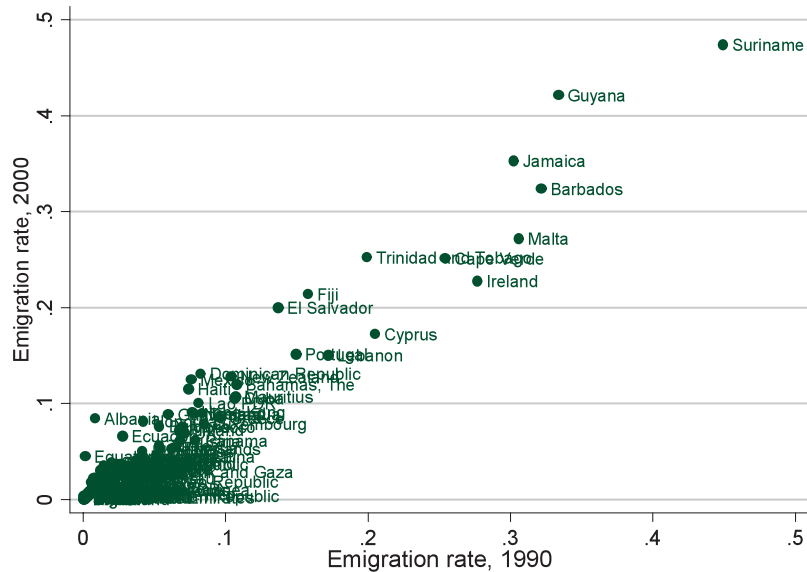
Low-income sending region	Share of immigrants by OECD receiving region				Change in OECD share 1990–2000
	All OECD	North America	Europe	Asia, Oceania	
Mexico, Central America, Caribbean	0.202	0.374	0.025	0.002	0.053
Southeast Asia	0.102	0.137	0.039	0.160	0.016
Eastern Europe	0.099	0.049	0.161	0.116	0.042
Middle East	0.063	0.032	0.113	0.029	0.001
South Asia	0.052	0.052	0.055	0.036	0.011
North Africa	0.044	0.009	0.098	0.018	−0.006
South America	0.041	0.050	0.031	0.035	0.010
Central and South Africa	0.036	0.021	0.061	0.021	0.007
Former Soviet Union	0.029	0.023	0.042	0.010	−0.002
Pacific Islands	0.004	0.003	0.001	0.027	0.000
Total	0.672	0.750	0.626	0.454	0.132
<b>High-income sending region</b>					
Western Europe	0.244	0.152	0.336	0.368	−0.111
Asia, Oceania	0.055	0.062	0.018	0.156	−0.010
North America	0.029	0.037	0.020	0.023	−0.011
Total	0.328	0.251	0.374	0.547	−0.132

<sup>a</sup>Data shown for 2000 on the share of different sending regions in the adult immigrant population of the entire OECD and of three OECD subregions. High-income North America includes Canada and the United States, and high-income Asia and Oceania includes Australia, Hong Kong, Japan, Korea, New Zealand, Singapore, and Taiwan.

Source: author's calculations using data from Beine et al. (2007).

with tertiary education (13 or more years) against the log odds of emigration for individuals with primary education (0–8 years). Nearly all points lie above the 45° line, indicating that in most countries individuals with more education are more likely to leave. Migrants thus appear to be positively selected in terms of schooling. It is high emigration rates for the more educated that raise concerns about brain drain from developing countries. Even though they are positively selected, migrants often have education levels far below those of native residents, owing to the fact that many come from countries with low average levels of schooling.

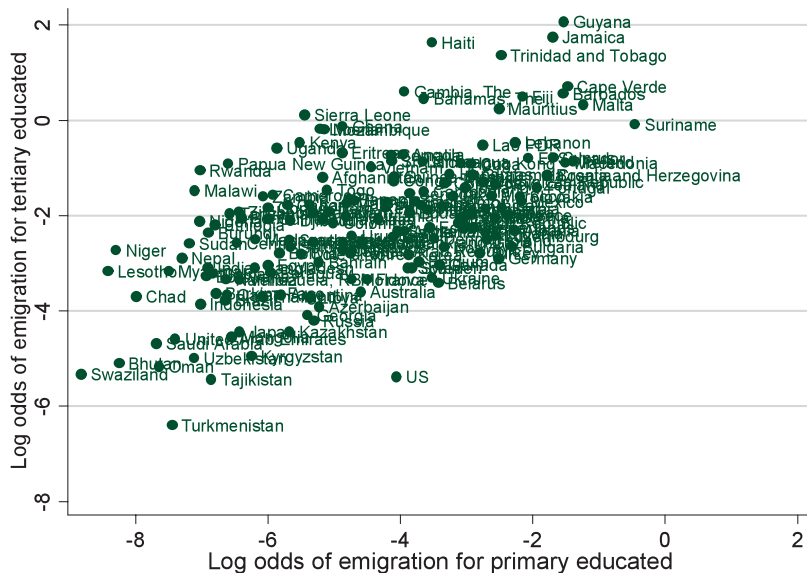
More-skilled emigrants tend to cluster in locations where the reward to skill is relatively high. This phenomenon of positive sorting is evident in **Table 3**, also taken from Grogger & Hanson (2008), which gives the share of international migrants residing in OECD countries by major destination region. Countries in which the reward to being a skilled worker is relatively large attract a disproportionate share of more-educated emigrants. In the United States and Canada, the difference in earnings between high-skilled and low-skilled workers is much greater than in continental Europe; this difference



**Figure 2**

Persistence in emigration rates.

Source: author's calculations using data from Beine et al. (2007).



**Figure 3**

Positive self-selection by education of emigrants, 2000. The log odds are defined as the log ratio of adult emigrants with a given education level relative to the entire adult population of a country (emigrants plus nonemigrants) with the same education level.

Source: Grogger & Hanson (2008).



Table 3 Share of OECD immigrants by destination region and education, 2000<sup>a</sup>

Destination region	All	Education group		
		Primary	Secondary	Tertiary
North America	0.514	0.352	0.540	0.655
Europe	0.384	0.560	0.349	0.236
Australia and Oceania	0.102	0.088	0.111	0.109
All OECD		0.355	0.292	0.353

<sup>a</sup>Data show the share of immigrants in OECD countries by schooling group and destination region for North America (Canada, Mexico, the United States), Australia and Oceania (Australia, Japan, New Zealand, Korea), and Europe (other OECD members as of 2000).

Source: Grogger & Hanson (2008).

is even larger once one accounts for Europe's more progressive tax system. The United States and Canada receive 51.4% of the OECD's immigrants, but 65.5% of its immigrants with tertiary schooling. Europe, in contrast, receives 38.4% of the OECD's immigrants, but only 23.6% of its tertiary-schooled immigrants. Realizing potential global welfare gains from migration may require not just allowing individuals to emigrate from low-income countries in larger numbers but also allowing them to sort themselves across receiving countries according to labor-market rewards to skill.

The small scale of international migration suggests that rich-country restrictions on immigration are at least partially effective at impeding labor inflows from abroad. Migrating legally involves costs associated with obtaining a visa, which can easily run into the tens of thousands of dollars. Illegal entry is also subject to costs, with fees for smuggler services to cross the U.S.-Mexico border in 2006 and 2007 averaging around \$3000 (Hanson 2006) and fees to migrate from China and other distant countries to the United States surpassing \$30,000. Either because of fixed costs to emigration or because of larger gains in labor-market earnings from moving abroad, more-educated individuals tend to dominate labor outflows from poor sending countries to rich destinations. Though migrants tend to be more educated than those that remain in sending countries, they often have much lower education levels than native residents in receiving countries. As a consequence, immigration from poor countries tends to increase receiving countries' relative supplies of individuals with low education levels.

### 3. WELFARE CONSEQUENCES OF INTERNATIONAL MIGRATION

What information would one need to gauge the effects of international migration on national and global welfare? Let  $V(p, y_i)$  be the indirect utility enjoyed by an individual with factor type  $i$  who faces price level for consumption goods and services,  $p$ , and who receives after-tax income available for consumption,  $y_i$ .<sup>3</sup> To keep things simple, I examine

<sup>3</sup>I take liberties with the indirect utility function by treating  $p$  as a price index and thus a scalar. If there was more than one good in consumption, this would require redefining  $V(\cdot)$ . So long as preferences are homothetic, there would be no other complications.

the welfare effects of migration in static terms. Another simplification is to assume there are just two types of individuals, high skilled ( $i = H$ ) and low skilled ( $i = L$ ), where all workers supply labor inelastically. A third simplification is to impose constant returns to scale in production, such that goods' prices are a function of unit factor costs. Consider the migration of low-skilled labor from a low-income sending country (e.g., Mexico) to a high-income receiving country (e.g., the United States). For country  $c$ , the impact of migration on national welfare is given by

$$dW^c = \sum_i \alpha_i^c \left[ \frac{\partial V_i^c}{\partial p} \frac{\partial p}{\partial L} + \frac{\partial V_i^c}{\partial y_i} \frac{\partial y_i}{\partial L} \right] dL^c, \quad (1)$$

where  $\alpha_i^c$  is the fraction of the population with skill type  $i$ . The first term in the brackets in Equation 1 is the impact of migration on consumer prices; the second is the impact of migration on factor income. In the United States, there would be an increase in the supply of low-skilled labor ( $dL^c > 0$ ), whereas in Mexico there would be a decrease ( $dL^c < 0$ ). Suppose preferences are homothetic and the marginal utility of income,  $\partial V_i^c / \partial y_i$ , is a constant. In this case, the impact of migration on national welfare in country  $c$  can be written as

$$dW^c = \beta^c + \lambda^c \left[ L^c \frac{\partial y_L}{\partial L} + H^c \frac{\partial y_H}{\partial L} \right] dL^c, \quad (2)$$

where  $\lambda^c$  is the marginal utility of income divided by the population ( $L^c + H^c$ ) and  $\beta^c = (\partial V_i^c / \partial p)(\partial p / \partial L)dL^c$  would be positive in the United States (so long as immigration lowers the average price of goods) and negative in Mexico (so long as emigration raises the average price of goods). Stating the change in welfare relative to national income,  $Y^c = L^c y_L^c + H^c y_H^c$ , Equation 2 becomes

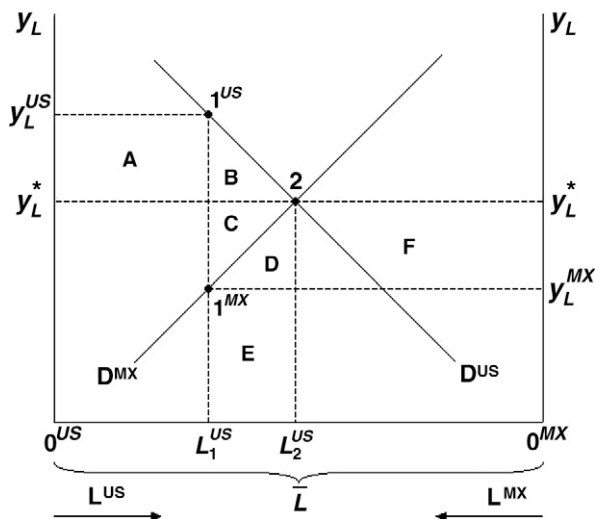
$$\frac{dW^c}{Y^c} = \tilde{\beta}^c + \lambda^c \left[ \theta_L^c \varepsilon_{LL}^c \frac{M^c}{L^c} + \theta_H^c \varepsilon_{HL}^c \frac{M^c}{H^c} \right], \quad (3)$$

where  $\tilde{\beta}^c = \beta^c / Y^c$ ,  $\theta_L^c (\theta_H^c)$  is the share of low-skilled labor (high-skilled labor) in national income,  $\varepsilon_{iL} = (\partial y_i / \partial L)(L / y_i)$  is the elasticity of income for factor type  $i$  with respect to the supply of low-skilled labor, and  $M^c = dL^c$ . Immigration (emigration) of low-skilled labor lowers (raises) low-skilled wages in the United States (Mexico) but raises (lowers) high-skilled wages in the United States (Mexico), owing to the fact that  $\varepsilon_{LL}^c < 0$  and  $\varepsilon_{HL}^c > 0$ .

For the United States, the term in brackets is equivalent to the immigration surplus, described by Borjas (1999a), but expressed in terms of two factors of production, as in Euwals & Roodenburg (2004). For the United States, the immigration surplus is positive, because immigration raises GNP, defined to exclude migrant income. The change in Mexico's GNP, defined to include the incomes of nonmigrants and migrants, is also positive. Because GNP increases in both countries, global welfare rises.

**Figure 4** captures the changes in income more formally, where I assume there is a single good and that migration equalizes wages for low-skilled labor in the two countries. The horizontal width of the box in **Figure 4** gives the total labor supply in the United States and Mexico,  $\bar{L}$ . U.S. (Mexico) labor demand is given by  $D^{us}$  ( $D^{mx}$ ), with origin  $O^{us}$  ( $O^{mx}$ ). In the premigration equilibrium, at point 1, U.S. labor supply is  $L_1^{us}$  and Mexico's labor supply is  $\bar{L} - L_1^{us}$ , causing U.S. wages to exceed Mexican wages:  $y_L^{us} > y_L^{mx}$ .

If low-skilled labor is allowed to move freely between the countries, there will be migration from Mexico to the United States up to the point where U.S. and Mexican



**Figure 4**

Changes in income as a function of migration for Mexico (MX) and the United States (US).  $L$  represents the labor supply, and  $D$  is the labor demand. See text for additional details.

wages are equalized at  $y_L^*$ , shown by point 2, with low-skilled wages rising in Mexico and falling in the United States. U.S. labor supply expands to  $L_2^{US}$  and Mexico's contracts to  $\bar{L} - L_2^{US}$ , as  $L_2^{US} - L_1^{US}$  workers move between countries. In the United States, the loss in income for native low-skilled workers is given by area A and the gain in income for native high-skilled workers is given by area A+B. The change in U.S. GNP equals area B, which is the immigration surplus. Migrants earn income C+D+E, meaning that U.S. GDP (which includes the income that migrants earn in the United States) rises by an amount equal to area B+C+D+E.

In Mexico, native high-skilled workers have an income loss equal to area D+F, due to the departure of low-skilled labor. Nonmigrating native low-skilled workers have an income gain equal to area F and migrating native low-skilled workers have an income gain equal to area C+D. Mexico's gain in GNP equals area C, though it has a loss in GDP equal to area D+E. The gain in world national income equals B+C, as migration eliminates differences in labor productivity between countries. To ensure that international migration generates Pareto gains in welfare, U.S. low-skilled workers would have to receive an income transfer equal to at least A and Mexican high-skilled workers would have to receive a transfer of at least D+F.

A change in the environment that could affect the implications of migration for income is the introduction of redistributive taxes and transfers. Redefine  $y_i$  as after-tax, or net, income, which depends on pretax wage income,  $w_i$ , the income-tax rate,  $t_i$ , and government transfers,  $g_i$ , such that

$$y_i^c = w_i^c(1 - t_i^c) + g_i^c. \quad (4)$$

Under the assumption that  $w_H^c > w_L^c$  (i.e., there are positive returns to skill), an economy with progressive taxes that redistributes income from high-income to low-income individuals would have that  $t_H^c > t_L^c$  and  $g_H^c/w_H^c < g_L^c/w_L^c$ . Returning to Equation 3, the

elasticity of net income with respect to the supply of low-skilled labor,  $\varepsilon_{iL}^c$ , would account for how immigration affects not just pretax labor income,  $w_i^c$ , but also the tax rate,  $t_i^c$ , and government transfers,  $g_i^c$ . This elasticity can be written as

$$\varepsilon_{iL}^c = \rho_{w,i}^c \eta_{w,iL}^c (1 - t_i) - \rho_{t,i}^c \eta_{t,iL}^c + \rho_{g,i}^c \eta_{g,iL}^c \quad (5)$$

where for factor type  $i$   $\rho_{b,i}^c$  is the share of income type  $b$  in net income and  $\eta_{b,iL}^c$  is the elasticity of income type  $b$  with respect to the migration of low-skilled labor (where  $w$  = pretax wages,  $g$  = government transfers, and  $t$  = taxes).

To interpret Equation 5, consider the impact of low-skilled immigration on high-skill labor in the United States. Based on **Figure 4**, an inflow of low-skilled foreign labor raises wages for high-skilled U.S. workers (because  $\eta_{w,HL}^c > 0$ ). However, it may also raise the net tax burden on these individuals. If in the United States the net tax burden ( $t_i^c w_i^c - g_i^c$ ) is positive for the high skilled and negative for the low skilled and immigrants have the right to receive government transfers, then low-skilled immigration could increase U.S. government spending by more than it increases tax revenues. To balance the government budget, the United States would have to increase tax rates and/or decrease government transfers. Were the United States to keep its progressive tax system in place, the net tax burden on the high skilled would rise, offsetting their gain in pretax income. For U.S. low-skilled workers, the loss from low-skilled immigration may be greater than without a tax system in place. Not only would their pretax wage fall as a result of the increase in low-skilled labor supply (because  $\eta_{w,LL}^c < 0$ ), but they could also face lower transfers and/or higher taxes.

If the sending country also has a progressive tax system, the departure of low-skilled emigrants could reduce the net tax burden on nonmigrants, allowing the government to decrease taxes on the high skilled and/or raise transfers to the low skilled. However, the tax effects from low-skilled emigration are less clear-cut once one accounts for life-cycle features of taxes and transfers. Many of the transfers individuals receive over their lifetime come in their youth in the form of public education and subsidized health care. If low-skilled workers enjoy these transfers while young and emigrate before entering the labor force, sending-country governments would be denied the returns on the investments they have made in these individuals. In principle, low-skilled emigration has the potential to increase the net tax burden on nonmigrants in the sending country. With an increase in high-skilled emigration, the change in net tax revenue for the sending country is likely to be negative, given the magnitude of the investments sending-country governments make in their education and the high incomes these individuals earn.

Equations 3 and 5 give a partial inventory of the parameters policy makers would need to know to assess the welfare consequences of international migration. These include the elasticities of wages, tax rates, government transfers, and consumption prices with respect to national labor inflows and outflows. Allowing labor supply to be elastic would exacerbate the welfare effects of tax and transfer policies.

The effects of migration on skill accumulation are also important, given the centrality of human capital to the process of economic growth. Theoretical literature has devoted substantial attention to the impact of emigration on the incentive to acquire human capital in sending countries (Docquier & Rapoport 2009). Absent distortions, moving labor from a low-productivity to a high-productivity environment raises global income. However, if there are positive externalities associated with learning (e.g., Lucas 1988), the exodus of skilled labor from a country may have adverse consequences for economic development in

sending countries (Bhagwati & Hamada 1974). In theory, the impact of brain drain on a sending country can be positive or negative. Miyagiwa (1991) developed a model in which, because of human-capital spillovers, the migration of skilled labor from a low-wage, skill-scarce economy to a high-wage, skill-abundant economy reinforces the incentive for brain drain, depleting the low-wage country of skilled labor. In Wong & Yip (1999), the negative effects of brain drain on the stock of human capital reduce the labor-exporting country's growth rate.

It is also possible, however, that emigration would on net increase the supply of human capital in a country, creating a brain gain (Stark & Wang 2002). With high incomes for skilled labor in rich countries and uncertainty over who will succeed in emigrating, the option of moving abroad may induce individuals to accumulate enough additional human capital to compensate for the loss in skill to labor outflows (Beine et al. 2001). Mountford (1997) shows that in the presence of human-capital externalities an emigration-induced increase in the incentive to acquire skill can help an economy escape a poverty trap and move to a high-growth equilibrium.

To assess the welfare consequences of international migration, policy makers would need to know, in addition to the elasticities in Equation 5, how labor mobility affects the incentive to acquire skill in sending and receiving countries. The framework I have outlined, while very simple, has demanding informational requirements for assessing the welfare effects of migration. I next examine how successful the literature has been in meeting these informational requirements.

## 4. EMPIRICAL RESEARCH ON INTERNATIONAL MIGRATION

I begin the discussion by considering the gain in income to migrants as well as the evidence on the extent to which migrants share these gains with family members in the sending country. I then consider the impact of global labor flows on labor-market earnings, net tax burdens, and skill acquisition in sending and receiving countries.

### 4.1. Income Gains to Migrants

Consider the income gain to migrating from Mexico to the United States. In 2000, per capita GDP in Mexico was \$9700 compared with \$34,500 in the United States (all monetary figures discussed in this section are in 2000 U.S. dollars and adjusted for purchasing power parity). Although the income gain from leaving Mexico for the United States is likely to be large, it is surely overstated by the difference in average income, reported in Table 4.

One issue is that workers in Mexico and the United States have different levels of education and labor-market experience. At the very least, one would want to compare incomes for individuals with similar observable characteristics. Using data from U.S. and Mexico population censuses, Hanson (2006) reports that in 2000 the average hourly wage for a 28–32-year-old male with 9–11 years of education was \$2.40 in Mexico and \$8.70 for recent Mexican immigrants in the United States. At a labor supply of 35 hours per week and 48 weeks per year this would yield a yearly income gain of \$10,600. Combining household data in developing countries with data from the U.S. Census, Clemons et al. (2008) estimate that in 2000 the annual income gain to migration for a 35-year-old urban Mexican male with 9–12 years of education was \$9200.

**Table 4** Gain in annual income for immigrants migrating from Mexico to the United States<sup>a</sup>

Income measure	Reference	Value
U.S.-Mexico difference in per capita GDP	World Bank (2009)	\$24,800
U.S.-Mexico difference in average annual earnings of 28–32-year-old males with 9–11 years of education	Hanson (2006)	\$10,600
Estimated gain in annual earnings from U.S. migration for a 35-year-old urban Mexican male with 9–12 years of education	Clemons et al. (2008)	\$9200
Average gain in income for a legal immigrant from Mexico with 9–12 years of education	Rosenzweig (2007)	\$15,900

<sup>a</sup>All figures are in 2000 U.S. dollars and adjusted for purchasing power parity.

Simply by controlling for observable characteristics, the estimated gain to migration from Mexico to the United States falls from \$25,000 to \$10,000. Even still, migrants and nonmigrants with similar education and experience may not be comparable. They may differ in terms of unobserved cognitive ability, motor skills, or motivation. The data in **Figure 3** suggest that emigrants are positively selected in terms of schooling. If migrants are also positively selected on unobserved characteristics, the estimated \$10,000 gain would overstate the benefits from Mexican emigration. Using a range of econometric techniques, Clemons et al. (2008) attempted to control for self-selection on unobservables in migration as well as for the possibility that the gains to migration include compensation for the cost of moving abroad. They found that observed gains to migration overstate true gains by 1.25–1.5 times. For the Mexico-U.S. case, the gain to migration would fall from \$10,000 to between \$6700 and \$8,000.

A better comparison would be to examine income for the same individual, before and after migration. Rosenzweig (2007) uses data from the New Immigrant Survey to estimate the change in income for new U.S. permanent legal immigrants in 2003. He compared immigrants' current U.S. earnings with their earnings in the last job they held in their country of origin. For a legal immigrant from Mexico with 9–12 years of education, the average gain in income is \$15,900 (at 35 hours a week and 48 weeks a year). Comparing the same individuals in two countries corrects for selection of unobservables but introduces other complications. If preparation for migration means a reduction in labor supply, Rosenzweig's estimates may overstate the gains to migration.<sup>4</sup>

An alternative way to gauge the income gain to migration would be to compare the incomes of two individuals from the same source country where one is randomly selected to migrate to a particular destination and the other is not. McKenzie et al. (2006) use data from New Zealand's visa lottery to examine such an experiment. They compared the income of lottery losers in Tonga (i.e., those who applied for the visa lottery and were rejected) with the incomes of lottery winners who migrated from Tonga in New Zealand. The average increase in income is 263%, which is half as large as the difference in Tongan and New Zealand per capita GDP. McKenzie et al. also compared the incomes of lottery losers in Tonga with the incomes they expected to have earned if they had migrated.

<sup>4</sup>Since Rosenzweig (2007) examines legal immigrants, his figures are not directly comparable to Hanson (2006) or Clemons et al. (2008), whose samples include legal and illegal immigrants.

Expected gains are only 84%. Relatively small expected gains may reflect informational asymmetries between domestic and foreign residents regarding labor-market conditions abroad.

The income gain from migration captures the gross return from moving to another country. Whereas much research has been conducted on the role of migration networks in migration decisions (e.g., Munshi 2003), there is little work that estimates the actual cost of migration. These costs include transport expenses in moving abroad, time lost in changing labor markets, administrative fees for legal migration, border-crossing costs in illegal migration, the psychic costs of leaving home, and perceived changes in uncertainty from living and working in another country. The absence of comprehensive data on migration costs means that we are far from being able to produce estimates of the change in net income emigration.

Through remittances, migrants share a portion of their extra income with family members at home. Remittances have increased markedly in East Asia, the Pacific, Latin America, the Caribbean, South Asia, and Sub-Saharan Africa. As of 2005, remittances exceeded official development assistance in all regions except Sub-Saharan Africa and were greater than 65% of foreign direct-investment inflows in all regions except Europe and Central Asia. Among the smaller countries of Central America, the Caribbean, and the South Pacific, remittances account for a large share of national income, ranging from 10% to 17% of GDP in the Dominican Republic, Guatemala, El Salvador, Honduras, Jamaica, and Nicaragua and representing an astounding 53% of GDP in Haiti (Acosta et al. 2007).

Having migrants abroad provides insurance to households, helping them smooth consumption in response to income shocks, be they domestic or foreign. Yang (2007) examines changes in remittances to households in the Philippines before and after the Asian financial crisis. As of 1997, 6% of Philippine households had a member who had migrated abroad. Some had gone to countries in the Middle East, whose currencies appreciated sharply against the Philippine peso in 1997–1998, while others had gone to East Asia, where currencies appreciated less sharply or even depreciated. Consistent with consumption smoothing, remittances increased more for households whose migrants resided in countries that experienced stronger currency appreciation against the peso.

There is some evidence that increases in remittances are associated with increased expenditure on education and health. Yang (2007) also examines changes in household expenditure and labor supply in the Philippines. Households with migrants in countries experiencing stronger currency appreciation vis-à-vis the peso had larger increases in spending on child education, spending on durable goods, children's school attendance, and entrepreneurial investments. In these households, the labor supply of 10–17-year-old children fell by more, particularly for boys. Using cross-section data on Mexican states, Woodruff & Zenteno (2007) found a positive correlation between emigration and business formation. These results suggest migration may help households overcome credit constraints imposed by the sending-country financial markets.

Differences in per capita GDP across countries appear to overstate the income gain from migrating abroad by two to three times. Even after accounting for this bias, the gross income gain to migration is still large. For a young male with some secondary education, Clemons et al. (2008) estimate the median annual gain from migrating to the United States to be \$11,200, whereas Rosenzweig estimates the annual gain to legal migration to the United States to be \$10,600. The net gains to migration are unknown, however, given

the absence of information about the magnitude of total migration costs. Remittances spread the income gains from migration to individuals in sending countries, allow households to smooth consumption in response to income shocks, and may relax credit constraints on households.

## 4.2. Labor-Market Consequences

The labor-market consequences of international migration have inspired intense debate among scholars. The vast majority of research has focused on the impact of labor inflows on the U.S. wage structure. Only recently has the literature begun to examine other receiving countries or effects on sending economies. The U.S. literature has been extensively reviewed elsewhere (e.g., Borjas 1999a, Card 2005), allowing me to cover the topic briefly. I summarize the current state of the debate and identify questions that are central to resolving it.

Research using data on the national U.S. labor market suggests that immigration depresses wages for U.S. workers. Borjas (2003a) defines labor markets at the national level according to a worker's education and labor-market experience. Over the period 1960–2000, education-experience cells in which immigrant labor-supply growth has been larger—such as for young high-school dropouts—had slower wage growth, even after controlling for education- or experience-specific wage shocks. The evidence is consistent with immigration having depressed wages for low-skilled U.S. workers. The concern about this approach is that it may confound immigration with other labor-market shocks that have hurt low-skilled workers, such as skill-biased technological change. Absent controls for these other shocks, one cannot be sure the attributed wage changes are really due to immigration.

Applying a similar approach to Canada, Aydemir & Borjas (2007) found comparable evidence of the wage effects of migration. In Canada, where immigration has been dominated by workers toward the top end of the skill distribution, immigration is negatively correlated with wages across education-experience cells, with more-educated workers being the ones who have suffered the largest wage effects. Because Canada is presumably subject to many of the same technology shocks as the United States, unobserved technology shocks are an unlikely explanation for the wage effects of immigration in both countries.

The national-level approach also yields comparable results of the wage effects of migration in sending countries. Mishra (2007) found a positive correlation between emigration and wages across education-experience cells in Mexico, where emigrants come disproportionately from the middle of the skill distribution. This means that workers with close to average levels of education are those who have had the largest wage gains from labor outflows. Aydemir & Borjas (2007) obtained similar results and also found that the elasticity of wages with respect to labor supply is roughly similar in Canada, Mexico, and the United States. In all three countries, a 10% change in labor supply due to migration is associated with a 4%–6% change in wages.

An older and larger literature has searched for immigration's impact by correlating the change in wages for low-skilled U.S. natives with the change in the immigrant presence in local labor markets, typically at the level of U.S. cities. These area studies tend to find that immigration has little if any impact on U.S. wages (Borjas 1999a). Card (2005) argues that if immigration has affected the U.S. wage structure one should see larger declines in the



wages of native high-school dropouts (relative to, say, native high-school graduates) in U.S. cities where the relative supply of high-school dropouts has expanded by more. In fact, the correlation between the relative wage and the relative supply of U.S. high-school dropouts across U.S. cities is close to zero.

Yet, one type of cross-sectional evidence is consistent with immigration having lowered wages. Cortes (2008) found that in the 1980s and 1990s U.S. cities with larger inflows of low-skilled immigrants experienced larger reductions in prices for housekeeping, gardening, child care, dry cleaning, and other labor-intensive services. A 10% increase in the local immigrant population is associated with decreases in prices for labor-intensive services of 1.3% percent. One obvious mechanism through which immigration could have lowered prices is through its effects on wages.<sup>5</sup>

The area studies approach also has its problems. Immigrants may tend to settle in U.S. regions in which job growth is stronger, causing one to underestimate the wage impact of immigration when using city- or state-level data. As a correction, many studies instrument for growth in local immigrant labor supply using lagged immigrant settlement patterns. But this strategy requires strong identifying assumptions. It would be invalid, for instance, if the labor-demand shocks that influence immigrant settlement patterns are persistent over time (Borjas et al. 1997).

Research on other receiving countries tends to report negligible estimated impacts of immigration on wages. After the collapse of the Soviet Union, there was a massive migration of Russian Jews to Israel, which increased the Israeli population by 12% in the span of just four years. Over the course of the Russian influx, Friedberg (2001) found that occupations that employed more immigrants had slower wage growth, but this correlation falls to zero once she instruments for immigrants' occupational choice.<sup>6</sup> In applications of the area studies approach outside of the United States, findings of little or no impact of immigration on regional wages include Addison & Worswick (2002) for Australia, Pischke & Velling (1997) for Germany, Zorlu & Hartog (2005) for the Netherlands and Norway, Carrasco et al. (2008) for Spain, and Dustmann et al. (2005) for the United Kingdom.<sup>7</sup>

In light of the theoretical results presented in Section 3, it is surprising that an immigration-induced increase in the relative supply of low-skilled U.S. labor would not depress relative wages for native workers in this skill group. Yet, the estimated wage impact of immigration depends in part on whether one treats the labor market as national or local in scope. The literature offers several possible ways to reconcile the differences in results at the national and subnational levels.

**4.2.1. An immigrant influx in a region induces natives to move out, such that estimating the labor impact of immigration at the subnational level understates its true effect.** The impact of immigration on the migration of native labor is another issue about which there is disagreement. Card (2001, 2005) found that across U.S. cities a higher presence

<sup>5</sup>In Israel, Lach (2008) found negative price effects from immigration, which are not limited to labor-intensive goods. He attributes these to immigrants having more elastic demand and lower search costs.

<sup>6</sup>In earlier work, Hunt (1992) and Carrington & de Lima (1996) found evidence of minimal labor-market effects from the forced return of expatriates in France and Portugal following the end of colonialism.

<sup>7</sup>Negative wage effects of immigration have been found in Germany (De New & Zimmerman 1994) and Austria (Hofer & Huber 2003).

of low-skilled immigrants is associated with higher levels of employment of low-skilled labor, with one new immigrant on net adding approximately one new net worker to a labor market, suggesting that native out-migration does not offset the labor supply effects of arriving immigrant workers. Pischke & Velling (1997) found a similar absence of native displacement effects in Germany. Borjas (2006), using the regional counterpart to the national-level education-experience cells in Borjas (2003b), comes to the opposite conclusion. He found that the growth in the native workforce is smaller in regional education-experience cells in which the growth in immigrant presence has been larger. Moreover, he showed that not accounting for the internal migration of natives causes area studies regressions to understate the wage effects of immigration by about half. Hatton & Tani (2005), using data on regional labor markets in the United Kingdom, also found evidence that the arrival of immigrant workers displaces local native workers.

We have another instance in which time-series evidence suggests one thing while cross-sectional evidence suggests something else. The cross-section evidence is again subject to concerns about the endogeneity of immigrant settlement patterns, but these concerns have been insufficient for the literature to come to a consensus about how immigration affects the location decisions of natives.

**4.2.2. Immigration induces firms to raise investment and increase innovation, partially or fully offsetting the wage impacts of labor inflows.** Although plausible, the impact of immigration on investment or innovation at the regional or national level is supported by little empirical research. There is some evidence that immigration is associated with changes in technology or at least with changes in production techniques. Lewis (2005) found that regions absorb immigrants through their industries becoming more intensive in the use of immigrant labor. In particular, industries in U.S. metropolitan areas that have received larger inflows of low-skilled immigrant labor have increased their relative labor intensity by more. These industries have also been slower to adopt new technologies, suggesting changes in labor supply may affect incentives for technology adoption, as in Acemoglu (1998). Gandal et al. (2004) found evidence of similar within-industry changes in factor intensity in response to the Russian immigration in Israel in the early 1990s. Incidentally, the results of Lewis (2005) rule out changes in sectoral mix accounting for regional absorption of immigrant labor, as could occur in a simple Heckscher-Ohlin model. He found little evidence that regions have absorbed incoming immigrants by shifting employment toward sectors that are more intensive in low-skilled labor.

**4.2.3. Immigrant and native workers are imperfect substitutes in production, such that on net foreign labor inflows do not hurt native workers (and may actually help them).** In initial work, Ottaviano & Peri (2007) found evidence that immigrant and native labor were imperfect substitutes. They estimated a negative and significant correlation between immigrant-native relative wages and immigrant-native relative employment, across Borjas's (2003b) education-experience cells. However, their results appear sensitive to how one defines skill groups. Simply by dropping high-school students from the sample, the finding of imperfect substitutability between immigrants and natives disappears. More generally, Borjas et al. (2008) showed that across a wide variety of specifications one cannot reject the hypothesis that comparably skilled immigrants and natives are perfect substitutes in employment, in line with earlier work by Jaeger (1997). Whatever one

thinks about the wage effects of immigration, low-skilled immigrant and native workers appear to be in the same labor market.

To date, the literature offers two approaches for estimating the wage effects of migration, which yield quite different results. The national-level approach is subject to concerns about how one controls for changes in technology, though these should be at least partly allayed by the fact that countries with very different types of migration shocks exhibit similar migration wage elasticities. The area studies approach is subject to concerns about the endogeneity of immigrant settlement patterns, given the difficulty of assessing the validity of proposed solutions to this problem.

The literature's near obsession with the wage impacts of immigration leaves the impression that these are sufficient to identify immigration's impact on national income. In an economy without distortions, even if all workers lose from immigration, the income gain to capital owners will be sufficient to ensure that national income increases. Indeed, it is unlikely that an economy could experience a gain in national income from immigration without at least some workers being hurt. So far, empirical research has had little to say about the impact of immigration on nonlabor income.

### 4.3. Fiscal Consequences

By changing labor supply, international migration may alter a country's fiscal accounts. With emigrants being positively selected in terms of schooling, sending countries are deprived of high-income taxpayers. To the extent that education and health care are publicly provided, sending countries may have made substantial investments in these individuals while young only to have receiving countries reap the returns.

Although there is a large body of theoretical literature on the taxation of skilled emigration (see, e.g., Bhagwati & Wilson 1989), empirical research on the subject is sparse. In a recent contribution, Desai et al. (2009) examined the fiscal effects of brain drain from India. In 2000, individuals with tertiary education accounted for 61% of Indian emigrants but just 5% of India's total population. Between 1990 and 2000, the emigration rate for those with tertiary education rose from 2.8% to 4.3%, but from just 0.3% to 0.4% for the population as a whole. Desai et al. examined Indian emigration to the United States, which in 2000 was host to 65% of India's skilled emigrants. First, they used Mincer wage regressions to produce a counterfactual income series that gives emigrants the income they would have earned in India based on their observed characteristics and the returns to these characteristics in India. On the tax side, they calculated income tax losses by running the counterfactual income series through the Indian income tax schedule. They also calculated indirect tax losses using estimates of indirect tax payments per unit of gross national income. On the spending side, they calculated expenditure savings by taking the categories for which savings would exist and then estimating savings per individual. Their results suggest Indian emigration to the United States cost India net tax contributions of 0.24% of GDP in 2000. Remittances by skilled emigrants generated a tax gain of 0.1% of GDP, partially offsetting these losses. For India, the tax consequences of skilled migration appear to be small, though small countries with high emigration rates may face larger impacts.

In receiving countries, immigration may exacerbate inefficiencies associated with a country's system of public finance. Where immigrants pay more in taxes than they receive in government benefits, immigration reduces the net tax burden on native taxpayers. The

total impact of immigration on native residents—the sum of the immigration surplus (the pretax income gain) and the net fiscal transfer from immigrants—would be unambiguously positive. With progressive income taxes and means-tested entitlement programs in many receiving countries, positive fiscal consequences from immigration would appear to be more likely the more skilled the labor inflow. In contexts where immigrants pay less in taxes than they receive in government benefits, immigration increases the net tax burden on natives, necessitating an increase in taxes on natives, a reduction in government benefits to natives, or increased borrowing from future generations.

There are also dynamic fiscal effects from immigration (Auerbach & Oreopoulos 1999). If the net tax burden on residents of a country is expected to increase in the future, immigration increases the tax base over which this burden can be spread and reduces the increase that natives would have to bear (Collado et al. 2004). But this is true only if the descendants of immigrants see their incomes rise to a point where they make positive net tax contributions. If the children of immigrants have their educational attainment lag behind that of natives, high levels of immigration today could instead increase the future tax burden on the native population.

In the United States, immigrant households have historically made greater use of subsidized health care, income support to poor families, food stamps, and other types of public assistance (Borjas & Hilton 1996). Immigrant households tend to be larger than native households, have more children, and have very low incomes, making them eligible for more types of benefits. In the past decade, however, the difference between immigrant and native use of welfare programs in the United States has fallen or even reversed, largely because of a sweeping reform of welfare policy in 1996, one effect of which was to restrict noncitizens from having access to many federally funded benefit programs. While immigrant households still make greater use of public health care than native households, they make comparable or less use of other types of public assistance (Borjas 2003b, Capps et al. 2005). In the European Union, the concern is that enlargement to include lower income countries in Central and Eastern Europe will lead to low-skilled migration to higher income countries and, thus, increases in welfare usage (Sinn 2002).

Calculating the total fiscal consequences of immigration, while straightforward conceptually, is difficult in practice. To estimate them correctly, one needs to know many details about the income, spending, and employment behavior of the population of immigrants. As a result, there are few comprehensive analyses of the fiscal impact of immigration. In one of the few such studies, Smith & Edmonston (1997) estimated that in 1996 immigration imposed a short-run fiscal burden on the average U.S. native household of \$200, or 0.2% of U.S. GDP. In that year, a “back of the envelope” calculation suggests that, following the logic of Equation 3, the immigration surplus was approximately 0.1% of GDP (Borjas 1999b), meaning that immigration in the mid-1990s reduced the annual income of U.S. residents by approximately 0.1% of GDP. Given the uncertainties involved in making this calculation, this estimate is unlikely to be statistically indistinguishable from zero. Although we cannot say with much conviction whether the aggregate fiscal impact of immigration on the U.S. economy is positive or negative, it does appear the total impact is small.<sup>8</sup>

Tax and transfer policies create a motivation for a government to restrict immigration, even where the level of immigration is set by a social planner. If immigrants are primarily

<sup>8</sup>This estimate is based on short-run considerations. Allowing for dynamics could change the results.

individuals with low incomes relative to natives, increased labor inflows may exacerbate distortions created by social-insurance programs or means-tested entitlement programs, making a departure from free immigration the constrained social optimum (Wellisch & Walz 1998).<sup>9</sup> Pay as you go pension systems create a further incentive for politicians to manipulate the timing and level of immigration (Scholten & Thum 1996, Razin & Sadka 1999). Given its graying population and unfunded pension liabilities, one may expect Western Europe to be opening itself more aggressively to foreign labor inflows. However, concerns over possible increases in expenditure on social-insurance programs may temper the region's enthusiasm for using immigration to solve its pension problems (Boeri & Brücker 2005).

In the United States, the fiscal consequences of immigration appear to matter for immigration policy preferences. Hanson et al. (2007) found that U.S. natives who are more exposed to immigrant fiscal pressures—those living in states that have large immigrant populations and that provide immigrants access to generous public benefits—are more in favor of reducing immigration. This public-finance cleavage is strongest among natives with high earnings potential, who tend to be in high tax brackets. Facchini & Mayda (2006) obtained similar results for Europe. More-educated individuals are more opposed to immigration in countries where immigrants are less skilled and governments are more generous in the benefits they provide.

The evidence that does exist suggests that the short-run consequences of international migration are modest. However, the literature has examined only a handful of countries. Although there is theoretical literature on the dynamic consequences of migration as well as its impacts on political economy, empirical work on these subjects is sparse. We cannot say much to policy makers about the net fiscal impacts of international migration other than preliminary evidence suggests they are not very big.

#### 4.4. Human-Capital Accumulation

International migration has the potential to affect the accumulation of human capital in both sending and receiving countries. In receiving countries, migration may increase the relative supply of high-skilled labor (e.g., Canada), low-skilled labor (e.g., Spain), or both high- and low-skilled labor (e.g., the United States). To the extent wages fall for the skill group whose relative supply increases, native workers have an incentive to select out of that skill group. Alternatively, immigration may affect native schooling decisions by increasing competition for scarce educational resources.

Using data on the United States, Borjas (2004) estimated a negative correlation between the number of foreign students and the number of native-born students in university graduate programs, suggesting that foreign students may crowd out natives. Even with crowding out, the arrival of foreign students may still lead to an increase in the net supply of skilled labor in the United States. Stuen et al. (2006) found that university departments with more foreign graduate students have more publications in scientific journals, suggesting inflows of foreign students may spur knowledge creation.

Looking lower down the skill ladder, Betts & Lofstrom (2000) and Hoxby (1998) present evidence that immigration adversely affects college attendance for U.S. natives,

<sup>9</sup>In the long run, immigrants may affect voting outcomes directly through their participation in the political process (Razin et al. 2002).

particularly for minority students. Betts (1999) found that increases in the number of student-age immigrants in a U.S. locality are associated with decreases in the likelihood that local black and Latino students will complete a high-school degree. In related work, Betts & Farlie (2003) found that immigration induces natives to select out of public schools and into private schools. For Israel, Gould et al. (2009) found that having more immigrants in one's grade-school class is associated with a lower likelihood that a student will subsequently matriculate in or graduate from high school. While the precise mechanisms behind these relationships are unclear, it does appear that the performance of native students deteriorates following a local influx of immigrant students.

In sending economies, the focus of research has been on how opportunities for emigration affect the incentive to acquire skill. In poor countries, the income gain from emigration is often substantial. Moreover, the gain to migration is larger for individuals with higher education levels (Rosenzweig 2007, Grogger & Hanson 2008). An increase in the probability that individuals from a poor sending country will be allowed to emigrate to the United States or Europe may thus increase the incentive to obtain higher levels of education. The quantitative impact of this brain gain effect depends on the elasticity of the sending-country supply of educational services and the perceived probability of migrating successfully. Where seats in colleges and universities are in limited supply, increases in the demand for higher education may have little effect on the local number of educated workers, unless, of course, individuals are able to migrate abroad for their education (see Rosenzweig 2006). Relatedly, where receiving countries allocate immigration visas in a nonrandom manner (say, by reserving entry slots for family members of existing U.S. residents), many sending-country residents may have little hope of moving abroad, leaving their incentive to acquire skill unaffected by emigration opportunities.

Only a handful of empirical papers have examined the relationship between emigration and human-capital accumulation. For a cross-section of countries, Beine et al. (2006) report a positive correlation between emigration to rich countries and the increase in the stock of human capital. This finding is consistent with emigration increasing the incentive to acquire education. However, it is not clear that one can make inferences about the causal impact of brain drain on educational attainment from the cross-section correlation between emigration and schooling. Individuals are likely to treat education and migration as joint decisions, making the two outcomes simultaneously determined. For causal inference, one would need to observe changes in human-capital accumulation in sending countries before and after there were unexpected and exogenous shocks in the opportunity to emigrate. The literature has yet to uncover such experiments in the data, meaning we still have an incomplete sense of how emigration affects supplies of human capital.

In a related line of research, the literature examines whether studying abroad is a vehicle for more permanent migration. In the United States, many of the individuals who succeed in obtaining temporary or permanent immigration visas reserved for skilled workers are foreign students enrolled in U.S. universities. Coming to the United States on a student visa may increase the likelihood of obtaining an employment visa. Studying abroad is thus partly about completing higher education and partly about creating opportunities for migration. Rosenzweig (2006) found that the latter effect tends to dominate. In the United States, the inflow of foreign students is higher from countries where earnings for skilled workers are lower and where university capacity is higher, not lower.

Other evidence suggests international migration may increase the flow of ideas between countries. In China, India, and Taiwan, the migration of skilled labor to Silicon

Valley—where Indian and Chinese immigrants account for one third of the engineering labor force—has been followed by increased trade with and investment from the United States (Saxenian 2002). Spilimbergo (2009) suggests there is an association between a country's democratic tendencies and the political systems of the countries under which its students did their university training. He found a positive correlation between the democracy index in a sending country and the average democracy index in the countries in which a country's emigrant students have studied. Migration flows may also help erode barriers to trade. Successive waves of emigration from China have created communities of ethnic Chinese throughout Southeast Asia as well as in South Asia and on the east coast of Africa. Rauch & Trindade (2002) found that bilateral trade is positively correlated with the interaction between the two countries' Chinese populations, consistent with ethnic business networks facilitating trade.

In receiving countries, immigration appears to disrupt the schooling of natives. The arrival of immigrants in native students' age and schooling groups is associated with deterioration in their performance at school or in their access to schooling. The literature has yet to uncover the mechanisms behind these effects. In sending countries, the literature has yet to identify how opportunities to emigrate affect the incentive to acquire skill, an issue of first-order performance for understanding how emigration affects economic development. There is indirect and anecdotal evidence that international migration promotes the flow of ideas between countries.

## 5. DISCUSSION

Ample evidence exists that international migration raises gross incomes for migrants, while it redistributes incomes within sending and receiving countries. Because the net impact of immigration on receiving countries appears to be small and because the gain to migration appears to be so large (owing to enormous international differences in labor productivity), it is natural to presume international migration raises global income. At this point, however, the literature does not allow one to do much more than make presumptions. Many unknowns in evaluating migration's impact remain.

Economic theory supports the presumption that international migration expands global output. Moving labor from low-productivity to high-productivity countries improves allocative efficiency in the world economy. No study suggests there are large negative consequences from global migration that would overturn this intuition. In the United States, which is the largest receiving country for immigrants, the short-run net impact of immigration, to a first approximation, appears to be a wash (Borjas 1999b). The global gains from migration are largely captured by migrants themselves, which they share with family members at home through remittances. Unless there are large unmeasured negative externalities from migration or migration exacerbates existing distortions in ways that have not yet been detected, one would be hard pressed, on economic grounds, to justify highly restrictive barriers to global labor flows.

While the gross income gain to migration appears to be large, the net gain is unknown. There is little comprehensive evidence on the magnitude of migration costs. Measuring these costs may explain why global labor flows are so small. Of course, a portion of migration costs are a by-product of receiving-country restrictions on immigration. Restrictions raise the premium on obtaining a student visa, or other form of temporary entry, which facilitate more permanent emigration. They also create an incentive for illegal

migration, allowing smugglers to capture a portion of the gains to migration and dissipating another portion by subjecting migrants to psychic costs and physical risks associated with crossing borders without permission. There is evidence that migrants underestimate the gains to migration (McKenzie et al. 2006) and use networks to lower assimilation or job search costs (Munshi 2003), suggesting uncertainty and informational barriers affect labor mobility.

The impact of immigration on receiving-country labor markets is hotly disputed. The evidence would seem to favor the argument that wage effects from immigration do exist. Studies using national-level data, while subject to concerns about their ability to control for all relevant labor-market shocks, yield consistent qualitative results across sending and receiving countries (Israel is an exception). The results are also consistent with observed changes in native labor supply. Studies using local-level data, whose results suggest immigration has little wage impact, are subject to concerns about the endogeneity of immigrant settlement patterns that have yet to be fully resolved.

The literature has focused on the wage effects of immigration, while largely ignoring impacts on nonlabor income. In theory, one would expect the gains in nonlabor income (plus the gains to workers that complement foreign labor) to more than offset the losses to workers that compete with immigrant labor. There seems to be an implicit premise in existing research that knowing how immigration affects wages is sufficient to know how it affects national income. Grounding empirical work in global general equilibrium may help address this shortcoming.

The net fiscal consequences of international migration are also poorly understood. In sending countries, there have only been a handful of studies on emigration's fiscal impacts and these have focused on the movement of high-skilled workers to high-income destinations. In receiving countries, the impact of immigration on the net tax burden of the native population is a central issue in political opposition to labor inflows. Although many studies exist on how immigration affects government expenditure, there are few on how it affects government revenue, which makes evaluating the net fiscal impact of labor inflows difficult. The few studies that do exist are now dated.

A further unknown is the effect of emigration on the incentive to acquire skill in sending countries. In the cross section, countries that have higher emigrant stocks abroad also have faster growth in the number of educated adults, but this association may or may not be informative about the consequences of brain drain. We still do not know how changes in the opportunity to emigrate affect human-capital accumulation. Many individuals migrate abroad to complete their education, with many ultimately returning to their home countries. This circular migration is important for the accumulation of skill in developing countries, though migrants from the poorest countries are those most tempted to emigrate permanently. The policy implications for developing countries are unclear. Although a mantra of the development community is that education is a public good, and therefore deserving of subsidies, improving high-school or university training in the very poorest nations might actually increase brain drain by making it easier for high-ability individuals to obtain student visas, and ultimately employment visas, from rich countries (Rosenzweig 2006). Yet, even where migration is permanent, having emigrants abroad may help a country lower its barriers to trade, investment, and technology flows.

The economics literature has yet to provide policy makers all the inputs they would need to choose sensible migration policies, even if officials were inclined to base their decisions on welfare grounds. Although the evidence suggests international migration



raises global income, we do not know many relevant details that are essential for determining how open borders should be and whether receiving countries should favor immigrants from particular countries or with particular characteristics.

## DISCLOSURE STATEMENT

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## Errata

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