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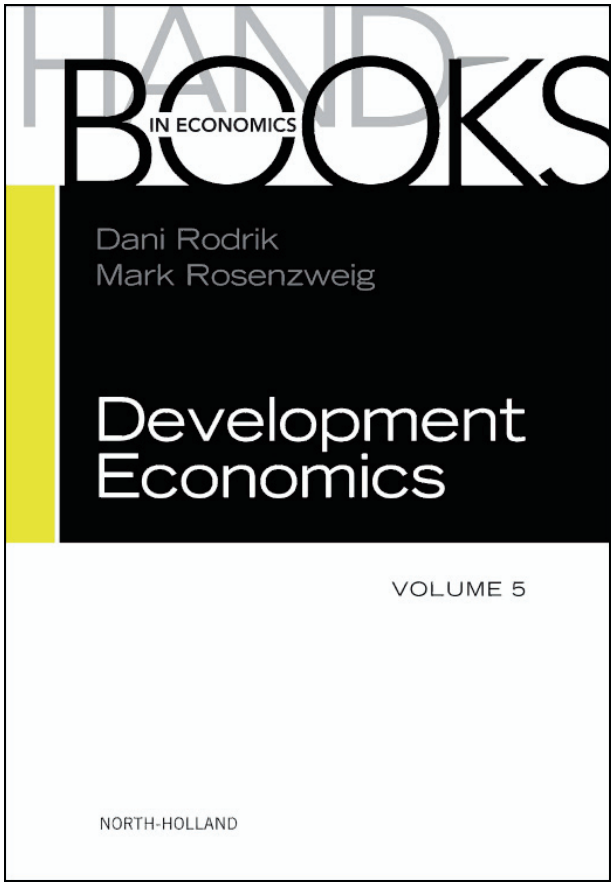

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CHAPTER 66

International Migration and the Developing World

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Contents

1. Introduction 4364
2. The Dimensions of International Migration 4366
   2.1 Data sources 4367
   2.2 International migration patterns 4368
   2.3 Skilled emigration 4375
   2.4 Networks and migration costs 4383
   2.5 Discussion 4385
3. Impact of Emigration on Sending Countries 4386
   3.1 Labor markets and fiscal accounts 4386
   3.2 Remittances and return migration 4390
   3.3 Information and the flow of ideas 4394
   3.4 Discussion 4395
4. Immigration Policy Regimes 4396
   4.1 Political economy of immigration policy 4396
   4.2 The design of immigration policy regimes 4398
   4.3 Discussion 4402
5. Final Discussion 4403
End Notes 4405
References 4408

Abstract

In this chapter, I discuss the recent academic research on international migration, focusing on the causes and consequences of emigration from developing countries and the motivations behind the restrictions imposed by the developed countries on immigration. My aim is to identify facts about international migration relevant to those concerned about why labor moves between countries, how these movements affect the countries that send these laborers, and why the receiving countries are so selective about the immigrants that they admit.

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1. INTRODUCTION

International migration is now recognized as an important mechanism for globalization. Between 1990 and 2005, the number of individuals living outside of their country of birth increased from 154 to 190 million, reaching a level equivalent to 3% of the world population (United Nations, 2005). While there are sizable labor flows between low-income countries,[1] it is the rising flows from low- to high-income countries that have attracted most attention from scholars and policy makers.

As workers migrate from Latin America to the United States, Africa to Europe, or Southeast Asia to Australia, there is a global shift in labor supply from labor-abundant to labor-scarce economies. Absent dynamic adjustment in capital or technology, labor flows tend to lift wages in sending countries and depress them in receiving ones (Aydemir & Borjas, 2007), helping reduce international differences in factor prices. Migrants enjoy substantial income gains from moving abroad (Rosenzweig, 2007), which they share with family members through remittances. International labor flows respond to economic and political shocks, smoothing labor-market adjustment to macroeconomic fluctuations. The surge in emigration from Mexico following the 1995 peso crisis, for instance, may have dampened the wage impact of the country's harsh economic contraction (Hanson & Spilimbergo, 1999).

Moving labor across borders creates a conduit for the global transmission of ideas. Returning migrants, including students who have gone abroad for their education, arrive home with news about advances in foreign technology, exposure to alternative political systems, and contacts with foreign business. As of 2006, 45 heads of government were products of US higher education (Spilimbergo, 2006). The migration of Indian engineers to Silicon Valley in the 1980s later paved the way for US firms to outsource business services to Bangalore and Hyderabad (Saxenian, 1999, 2002), much as overseas Chinese business networks have come to intermediate trade between mainland China and the rest of the world (Rauch & Trindade, 2002).

The contribution of international migration to arbitraging wage differences, reducing macroeconomic volatility, diffusing knowledge across borders, and facilitating trade suggests that there may be substantial welfare gains for letting labor flow between countries. Yet, most labor-importing countries tightly restrict admissions. While the right to emigrate is codified in international treaties,[2] the right to immigrate lacks similar support.

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There has never been a Washington consensus on international migration. Rich country impediments to immigration contrast with their pro-liberalization stances on trade and investment (Hanson, Scheve, & Slaughter, 2007; Hatton & Williamson, 2005). Although OECD countries have lowered barriers to foreign trade and capital in recent decades, they have not commensurately reduced barriers to foreign labor.

In the academic literature, there is ambivalence about international migration, reflected in a dissensus on global migration policy. Labor economists debate whether immigration benefits the receiving countries (e.g., Borjas, 1999a; Card, 2005) while development economists disagree on whether emigration is good for sending countries (e.g., Bhagwati & Hamada, 1974; Stark & Wang, 2002). These disputes arise in part from concerns that migration may exacerbate distortions in factor markets. Without such distortions, unrestricted migration would unambiguously raise global income and welfare (Hamilton & Whalley, 1984). However, in labor-importing countries, the existence of social-welfare programs (financed by nonlump-sum taxes) may make a departure from free immigration the constrained optimum, especially where low-skilled labor would dominate labor inflows (Wellisch & Walz, 1998). In labor-exporting countries, human-capital externalities and subsidies to higher education may create a second-best justification for taxing skilled emigration (McHale, 2007).

Given the cognitive dissonance in economics about globalization (trade and capital flows are unambiguously good, labor flows are unambiguously complicated), it is perhaps no surprise that in their dealings with the developed world developing countries devote much more time to negotiating international trade and investment agreements than to discussing international migration. Should developing country policy makers be more optimistic about the capacity for emigration to raise living standards? Are there environments where emigration is particularly helpful or harmful? Is there scope for international coordination on migration policy?

In this chapter, I discuss recent academic research on international migration with the aim of evaluating the causes and consequences of emigration from developing countries and the motivations behind the developed-country restrictions on immigration. My goal is not to give an exhaustive account of the literature but rather to identify facts about international migration relevant to those concerned about why labor moves between countries, how these movements affect the sending-country economies, and why the receiving countries are so selective about the immigrants they admit.[3]

Section 2 begins with a brief discussion of the current patterns in international migration. International labor movements are on the rise, with considerable variation across sending countries in terms of how many individuals emigrate, who selects into migration, and where they go. In general, the more educated account for a disproportionate share of emigrants and they tend to move to countries that offer relatively high rewards for their skill. Distance, language, and migration networks also appear to shape international labor movements.

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While there is an enormous literature on the consequences of immigration for receiving countries (and for the United States, in particular),[4] research on impacts on sending countries, as discussed in Section 3, is less developed. Labor outflows tend to put an upward pressure on the wages in sending countries, with these effects concentrated in specific regions and among the young. Despite four decades of research on brain drain, we still do not know whether skilled emigration raises or lowers the stock of human capital in sending countries. It does appear that contacts with the outside world promote trade flows, technology adoption, and political openness. Recently, measured remittances have risen much faster than emigration. While these income flows have raised consumption, and perhaps educational investments, among family members at home, there is a confusing tendency in the literature to portray remittances as a causal factor in development rather than as a consequence of intra-household specialization.

With global migration policy being controlled by labor-importing countries, the determination of these policies is an important factor in the economic development of labor exporters. As discussed in Section 4, theoretical literature explains immigration restrictions as the result of political pressure by groups that would be hurt by labor inflows and concerns over the fiscal consequences of immigration. Less explored is the *design* of immigration policy (Cox & Posner, 2007). Legal immigration tends to be governed by quotas, whose number varies according to explicit selection criterion. Illegal immigration, which makes up a rising share of global labor flows, is governed by enforcement policies, which define an implicit selection criterion for unauthorized migrants by determining the smuggling fee they pay to enter a country and the wage discount they must endure on the job. The screening of entrants at the border highlights informational problems in identifying 'desirable' immigrants, which may offer a rationale for multilateral coordination on migration policy.

By way of conclusion, in Section 5, I identify gaps in the literature regarding the causes and consequences of emigration, outline directions for future research, and briefly discuss implications drawn from the literature for whether labor-exporting countries should view emigration as a mechanism for development.

2. THE DIMENSIONS OF INTERNATIONAL MIGRATION

There is a widespread perception that international migration is on the rise. Until recently, however, one would have been hard pressed to examine global labor movements for more than a handful of countries. It is only in this decade that cross-country data on emigrant stocks have become available, implying that research on international migration is still at an early stage. I begin this section with a review of data sources on the stock of international migrants and then address rates of emigration in sending countries, the magnitude of immigration in receiving countries, the correlates of bilateral migration flows, and issues related to the emigration of skilled labor.

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2.1 Data sources

There have been several recent attempts to measure international migration.[5] In an earlier effort, Carrington and Detragiache (1998) estimated emigration rates in 1990 for individuals with tertiary education from 61 source countries to OECD destination countries. Their approach was based on data that provide limited information on the educational attainment of immigrants, requiring them to use the characteristics of US immigrants to impute the schooling of immigrants in other receiving countries. Adams (2003) applied a similar methodology to estimate emigration rates for 24 large labor-exporting countries in 2000. In an attempt to cover a larger number of sending countries, the OECD (2003) listed the foreign-born population 15 years and older in 2000 by source country and education level (primary, secondary, tertiary, unknown) for each OECD country.[6] As these population counts include some individuals still in school, the reported education of the foreign-born population may not reflect the immigrants' ultimate educational attainment. A further problem with the OECD data is that schooling is unknown for a substantial portion of the foreign-born population.

In an important recent work, Docquier and Marfouk (2006) extended the OECD data by constructing more complete estimates of the stocks of international migrants. They used the population census of 30 OECD countries in 1990 and 2000 to obtain the count of adult immigrants (25 years and older) by source country and level of education (primary, secondary, or tertiary schooling). They combine these counts with the size of adult populations and the fraction of adult populations with different levels of schooling from Barro and Lee (2000) to obtain emigration rates by education level and source country. The DM data contain 174 source countries in 1990 and 192 in 2000. While the set of source countries is comprehensive, the coverage of destination countries excludes those counties not in the OECD as of 2000.[7]

There are myriad problems in assembling the DM data, which underscore the complications involved in obtaining an accurate description of international migration.

- OECD countries differ in how they define immigrants. While most national censuses identify immigrants as individuals born abroad (with foreign citizenship at birth), a few countries (Germany, Greece, Italy, Japan, Korea) only identify immigrants who are noncitizens (though most immigrants appear not to have naturalized).
- In some countries (Belgium, Greece, Portugal) the census identifies immigrants but not their education levels, making it necessary to estimate the allocation of immigrants across education groups using data from household surveys.
- OECD countries differ in how they define educational attainment, with some (Austria, Germany) recording educational certification (e.g., a vocational degree) rather than the highest grade of schooling completed, which complicates the assignment of individuals to categories based on years of schooling.
- Some immigrants may have completed a portion of their schooling in the destination country, making emigration rates by education level difficult to interpret. Beine, Docquier, and Rapoport (2006a) address this issue by extending the DM data to

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include counts of migrants based on the age at arrival in the destination country, with older-arriving immigrants likely having completed more of their schooling at home.
- Some immigrants are students who will return to their home countries after completing their education, suggesting a portion of the immigrant stock may not be permanent. DM addresses this issue in part by including only individuals 25 years and older, most of whom have completed their schooling.
- DM coverage of illegal immigrants is unknown. The immigrants in the DM data are those captured by national censuses, most of which seek to enumerate all long-term residents, regardless of their legal status. Still, illegal immigrants may be undercounted in censuses, due to tendencies to reside in irregular housing units or to avoid being identified by government authorities.[8]

With these caveats in mind, the DM data (and their extension by Beine et al., 2006a) are the most comprehensive available on international migration.

Also, noteworthy are several recent surveys that track individual migrants over time in specific sending or receiving countries, the two most important of which are the New Immigrant Survey (NIS) in the United States and the Mexican Family Life Survey (MXFLS). The United States and Mexico are, respectively, the world's largest labor-importing and labor-exporting country. The NIS (http://nis.princeton.edu/) is a random sample of individuals who received a US legal permanent residence visa (or green card) in 2003-2004 (and who were resurveyed in 2007). While the NIS excludes temporary and illegal immigrants, it does contain detailed information on the type of visa the immigrant has obtained (e.g., family-based, employment-based, or refugee-based), which is missing in most other data on international migration. MXFLS (www.mxfls.uia.mx/) is a random sample of 10,500 households in Mexico in 2002, whose members were located and resurveyed in 2005, wherever they happened to be living. This survey structure provides observations on individuals before and after they chose to migrate internally (within Mexico) or externally (to the United States).

2.2 International migration patterns

Low-income countries are an increasingly important source of migrants to high-income countries. Table 1 shows the share of the immigrant population in OECD countries by sending-country region.[9] In 2000, 67.2% of immigrants in the OECD were from a developing country, up from 54.0% in 1990. This gain came almost entirely at the expense of Western Europe, whose share of OECD immigrants fell from 35.5% to 24.4%. Among developing sending regions, Mexico, Central America, and the Caribbean are the most important, accounting for 20.2% of OECD immigrants in 2000, up from 14.9% in 1990. Half of this region's migrants come from Mexico, which in 2000 was the source of 11.3% of OECD immigrants, making it by far and away the world's largest supplier of international migrants.[10] As seen in Table 2, the next most important developing source countries for OECD immigrants are Turkey (3.5% of OECD immigrants), China, India, and the Philippines (each with 3.0%).

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Table 1 Share of OECD immigrants by source region, 2000

Developing source region	Destination region				Change in all OECD Immigrant share
	All OECD	North America	Europe	Australia, Oceania	1990-2000
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, Southern 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
Subtotal	0.672	0.750	0.626	0.454	0.132
High income source region					
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
Subtotal	0.328	0.251	0.374	0.547	−0.132

Notes: This table shows data for 2000 on the share of different sending regions in the adult immigrant population of the entire OECD and of three OECD sub-regions. 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.

The growing importance of lower-income countries in the supply of international migrants has contributed to an overall increase in labor flows into rich countries. Table 3 shows the share of the population that is foreign born in select OECD members. The size of the immigrant population varies across destinations, reflecting

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Table 2 Share of OECD immigrants by source country, 2000

Source country	Destination region			
	All OECD	North America	Europe	Australia, Oceania
Mexico	0.113	0.219	0.001	0.000
United Kingdom	0.053	0.041	0.027	0.206
Italy	0.042	0.027	0.062	0.038
Germany	0.038	0.028	0.049	0.045
Turkey	0.035	0.003	0.085	0.005
India	0.030	0.038	0.023	0.018
China	0.030	0.039	0.009	0.066
Philippines	0.030	0.046	0.007	0.030
Vietnam	0.022	0.032	0.008	0.026
Portugal	0.022	0.011	0.040	0.002
Korea	0.021	0.025	0.002	0.075
Poland	0.020	0.019	0.024	0.010
Morocco	0.019	0.002	0.048	0.000
Cuba	0.015	0.028	0.002	0.000
Canada	0.015	0.025	0.004	0.006
France	0.014	0.007	0.027	0.005
United States	0.014	0.012	0.015	0.017
Ukraine	0.013	0.009	0.022	0.002
Spain	0.013	0.004	0.027	0.002
Greece	0.013	0.008	0.015	0.028
Serbia	0.013	0.003	0.027	0.009
Jamaica	0.012	0.019	0.006	0.000
Ireland	0.012	0.006	0.021	0.009
El Salvador	0.012	0.022	0.000	0.001
Netherlands	0.011	0.007	0.014	0.020

Notes: This table shows the share of adults immigrants in regions of the OECD accounted for by the 25 largest source countries in 2000.

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Table 3 Share of foreign-born population in total population, OECD countries

					Change
	1995	2000	2002	2004	1995-2004
Australia	23.0	23.0	23.2	23.6	0.6
Austria	–	10.5	10.8	13.0	–
Belgium	9.7	10.3	11.1	–	–
Canada	16.6	17.4	17.7	18.0	1.4
Czech Republic	–	4.2	4.6	4.9	–
Denmark	4.8	5.8	6.2	6.3	1.6
Finland	2.0	2.6	2.8	3.2	1.2
France (a)	–	10.0	–	–	–
Germany (b)	11.5	12.5	12.8	12.9	1.4
Greece (c)	–	10.3	–	–	–
Hungary	2.8	2.9	3.0	3.2	0.4
Ireland (d)	6.9	8.7	10.0	11.0	4.0
Italy (c)	–	2.5	–	–	–
Luxembourg	30.9	33.2	32.9	33.1	2.2
Mexico	0.4	0.5	–	–	–
Netherlands	9.1	10.1	10.6	10.6	1.6
New Zealand (d)	16.2	17.2	18.4	18.8	2.6
Norway	5.5	6.8	7.3	7.8	2.3
Poland	–	–	1.6	–	–
Portugal	5.4	5.1	6.7	6.7	1.3
Slovak Republic (c)	–	2.5	–	3.9	–
Spain (c)	–	5.3	–	–	–
Sweden	10.5	11.3	11.8	12.2	1.7
Switzerland	21.4	21.9	22.8	23.5	2.2

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Table 3 Share of foreign-born population in total population, OECD countries—Cont'd

	Change				
	1995	2000	2002	2004	1995-2004
Turkey	–	1.9	–	–	–
United Kingdom	6.9	7.9	8.6	9.3	2.3
United States	9.3	11.0	12.3	12.8	3.5

Notes: (a) 2000 value is from 1999; (b) 2004 value is from 2003; (c) 2000 value is from 2001; (d) 1995 value is from 1996.
Source: *International Migration Outlook*, OECD (2006) edition.

differences in both their attractiveness and openness to international migrants. Aside from tiny Luxembourg, the countries with the largest immigrant presence in 2004 are Australia (23.6%), Switzerland (23.5%), New Zealand (18.8%), and Canada (18.0%). Next in line are the large economies of Germany (12.9%), the United States (12.8%), France (10.0%), and the United Kingdom (9.8%), with the United States alone hosting 40% of immigrants living in OECD countries. In the last decade, there have been substantial increases in foreign-born population shares in a number of rich countries, with the largest changes over 1995-2004 occurring in Ireland (4.0%), the United States (3.5%), New Zealand (2.6%), the United Kingdom (2.3%), Norway (2.3%), and Switzerland (2.2%).[11] Japan is at the other extreme of openness to immigration, with a foreign-born population of less than 1.5% of its total population.

There is abundant evidence that a rising share of labor inflows in rich countries are made up by illegal entrants, with data for the United States being the most extensive. Passel (2006) estimates that in 2005 illegal immigrants accounted for 35.2% of the US foreign-born population, up from 28.0% in 2000 and 19.3% in 1996. Of the 2005 population of illegal immigrants, 56% were from Mexico, implying that 60% of the population of Mexican immigrants in the United States was unauthorized.[12]

Apparent in Table 1 is a tendency for different destination regions to draw more heavily on migrants from particular source countries. Mexico, Central America, and the Caribbean together are the largest source region for North America, but send few migrants to other parts of the world; Eastern Europe is the most important developing source region for OECD Europe; and Southeast Asia is the most important developing source region for Australia and Oceania. Proximity clearly plays a role in bilateral migration flows, but, as we discuss below, so do other factors, including income.

There is substantial variation across countries in the propensity to emigrate. As of 2000, there were 25 countries (22 of which were developing nations) with 10% or

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more of their adult population having migrated to the OECD, and another 24 countries (16 of which were developing) with emigration rates above 5%.[13] At the other extreme, 54 countries (52 of which were developing) had emigration rates below 1%. Figure 1A plots emigration rates for countries against their log population densities in 2000, where the emigration rate is the fraction of a country's adult population that has migrated to an OECD country. There is a clear positive relation between emigration rates and population density, indicating that more densely populated countries tend to send a higher fraction of their population abroad.[14]

The relation between emigration rates and income is more complex, as seen in Figure 1B. There appears to be a threshold level of per capita GDP—of approximately $3000 at 2000 PPP-adjusted prices—below which emigration rates are very low. Above this threshold, emigration is strongly decreasing in average income.

There is a growing literature on the correlation between international migration and income. In a recent contribution, Clark, Hatton, and Williamson (2007) regress the emigration flow to the United States on a large number of sending-country characteristics for a panel of 81 countries over the period 1971-1998. They calculate the emigration flow as the log ratio of US legal immigrants admitted to the source-country population.[15] Consistent with Figure 1A, they find an inverted U in the relationship between sending-country average income and emigration, with emigration rates increasing in income at low income levels and decreasing in income at higher income levels. In their data, the per capita GDP level at which the emigration rate is at a maximum is 10% of US per capita GDP (or $3400 at 2000 PPP-adjusted prices).

Clark et al. also find that migration flows to the United States are higher for countries that speak English, are geographically closer to the United States, and have large existing populations of US immigrants. They estimate an elasticity of emigration flows with respect to a distance of −0.20 to −0.28, which would imply that in moving from El Salvador (3400 km. from the United States) to Brazil (7700 km from the United States) emigration to the United States would fall by 20%.[16] The positive correlation between current migration flows and lagged migration stocks may reflect migration networks—in which older migrants help newer migrants in becoming established in a destination country—or provisions in US immigration policy that favor relatives of US residents in the granting of entry visas.[17]

The regression approach in Clark et al. follows a tradition in the migration literature of estimating bilateral migration flows as a function of characteristics in the source and destination countries only.[18] This imposes the assumption that opportunities for migration to other destinations do not affect bilateral flows for a given country pair. In theory, however, migration from, say, Ecuador to Spain should be affected not just by conditions in the two countries but also by what is happening in other potential destinations that Ecuadorian migrants might consider. The problem of other destinations is analogous to one that arises in the estimation of the gravity

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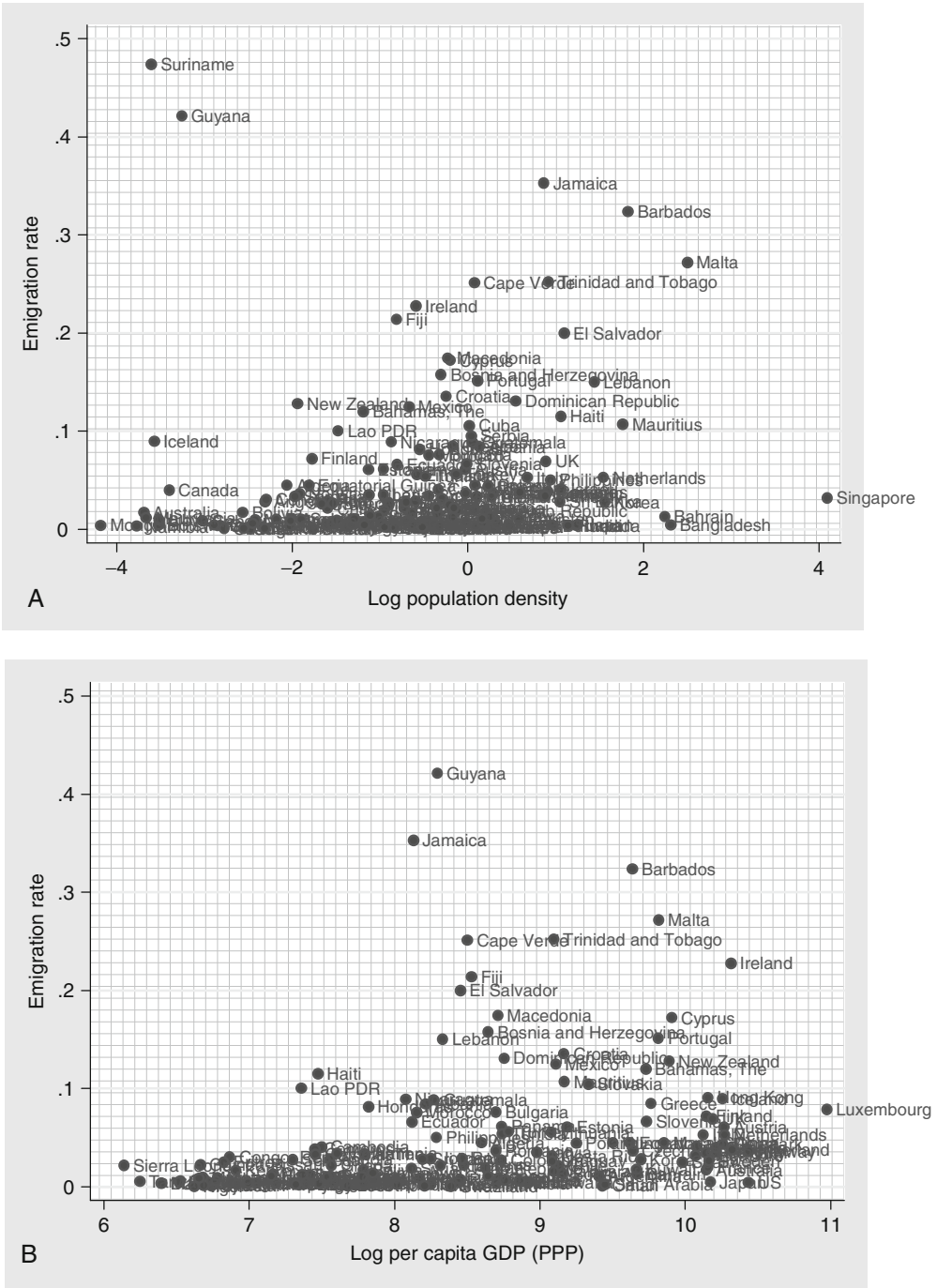

Figure 1 (A) Emigration rates and population density, 2000. (B) Emigration rates and per capita GDP, 2000.

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model of international trade. Anderson and van Wincoop (2004) show that failing to control for the opportunities to buy from or sell to other trading partners—which they to refer as the multilateral resistance to trade—results in biased estimates of the determinants of bilateral trade. As shown in Section 2.4, failing to control other migration opportunities could similarly produce biased estimates of the determinants of bilateral migration.

One attempt to address the issue of other destination countries is given by Mayda (2005), who examines bilateral migration between a large number of source countries and 14 OECD destination countries over the period 1980-1995. She regresses bilateral migration rates on income per capita in the source country, income per capita in the destination country, and average income per capita in other OECD destinations, among other control variables. Bilateral migration is increasing in destination-country income and decreasing in the income of other destinations, consistent with the idea that better economic conditions in third countries deflect migration away from a given destination. One limitation of this specification is that it relies on the assumption that average income in other destinations is a sufficient statistic for other migration opportunities.

2.3 Skilled emigration

2.3.1 Brain drain

Much of the literature on international migration focuses on the movement of skilled labor, whose departure may drain poor economies with scarce supplies of human capital. Figure 2 plots the emigration rate for adults with a tertiary education against the emigration rate for all adults. In 2000, there were 44 countries (41 developing) with emigration rates for the tertiary educated above 20%.

The Docquier and Marfouk data could overstate the extent of brain drain, since many tertiary emigrants might not have attained postsecondary education had they not had the opportunity to study abroad. To consider this possibility, Beine et al. (2006a) examine the age of arrival for tertiary emigrants in the DM data. They find that 68% of tertiary migrants arrive in the destination country at age 22 or older, 10% arrive between ages 18 and 21, and 9% arrive between ages 12 and 17, suggesting the majority of tertiary emigrants depart sending countries at an age at which they would typically have acquired at least some postsecondary education. Another way in which tertiary emigration rates could overstate brain drain is if individuals migrate for the purpose of obtaining their education and then spend some time working in the destination country before returning home. What appears to be brain drain would actually be brain circulation. In the case of migration to the United States, Rosenzweig (2006) finds that 20% of foreign university students remain in the United States.[19]

Brain drain is a concern where there are distortions in the acquisition of skill. Absent distortions, moving labor from a low-productivity to a high-productivity environment unambiguously raises global income (Benhabib & Jovanovic, 2007; Hamilton &

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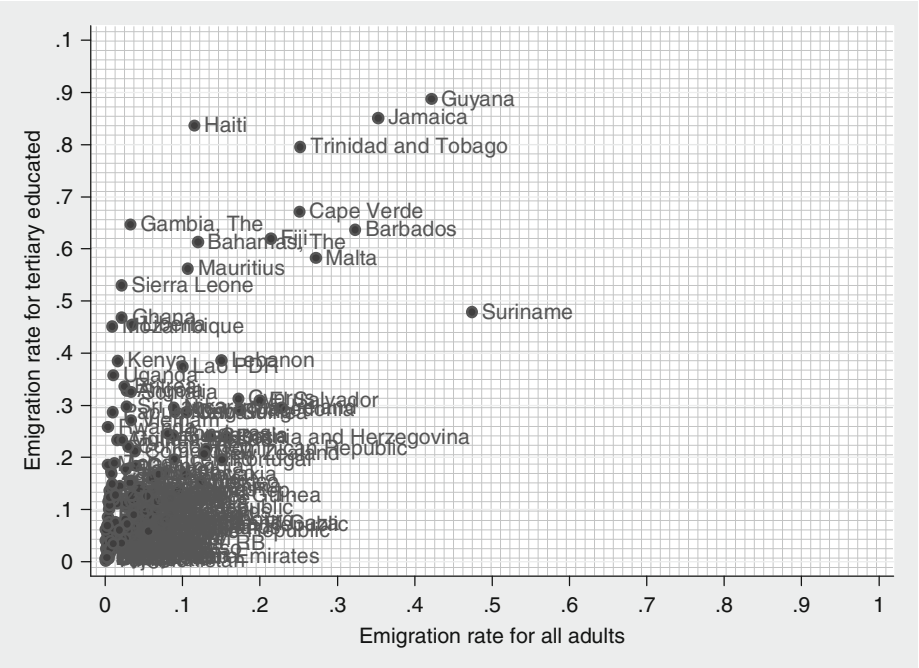

Figure 2 Emigration rates for the more educated, 2000.

Whalley, 1984). However, if there are positive externalities associated with learning (e.g., Lucas, 1988), then the social product of human capital exceeds its private product and the exodus of skilled labor from a country may have adverse consequences for its economic development (Bhagwati & Hamada, 1974; Grubel & Scott, 1966; McColloch & Yellen, 1977). Another negative impact of brain drain is that many individuals have their education subsidized by the state, meaning their emigration would deprive their origin country of tax contributions to offset the cost of their schooling (Bhagwati & Rodriguez, 1975).

Recent literature counters that the opportunity for emigration may actually increase the supply of human capital in a country, creating a brain gain (Stark, Helmenstein, & Prskawetz, 1997; Stark & Wang, 2002). The logic is that, with relatively high incomes for skilled labor in rich countries and uncertainty over who will succeed in emigrating, the option of moving abroad induces individuals to accumulate enough additional human capital to compensate for the loss in skill to labor outflows (Beine, Docquier, & Marfouk, 2001; Mountford, 1997).[20] Crucial for this argument is that the probability of emigrating is large enough to affect the expected return to investing in skill (and that this probability does not vary too much across individuals, such that many people believe they have a nontrivial chance of moving abroad).

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Only a handful of empirical papers examine the relationship between emigration and human-capital accumulation. For a cross-section of countries, Beine, Docquier, and Rapoport (2006b) report a positive correlation between emigration to rich countries (measured by the fraction of the tertiary educated population living in OECD countries in 1990) and the increase in the stock of human capital (measured as the 1990-2000 change in the fraction of adults who have tertiary education).[21] While this finding is consistent with emigration increasing the incentive to acquire education, the cross-section correlation between emigration and schooling is not well suited for causal inference about the impact of brain drain on educational attainment. Education and migration decisions are likely to be jointly determined, making each endogenous to the other. Valid instruments for migration are very difficult to find. For causal analysis, one would need to observe changes in human-capital accumulation in sending countries before and after they experienced unexpected and exogenous shocks in the opportunity to emigrate. Such experiments have yet to be found in the data.

2.3.2 Inequality and selection into migration

The relatively high propensity for the highly educated to migrate abroad is seen clearly in Figure 3, which plots the share of emigrants with tertiary education against the share

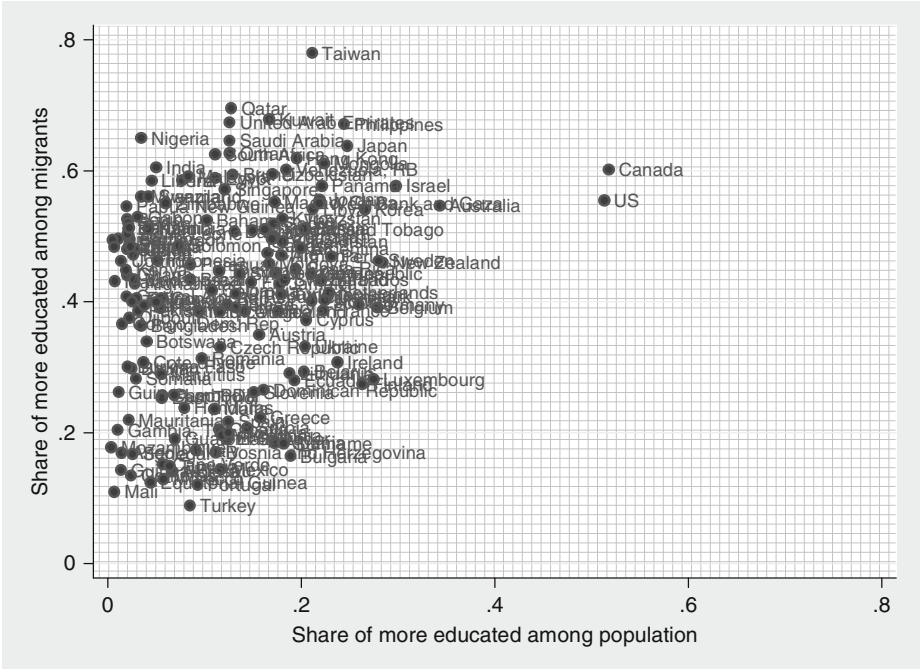

Figure 3 Selection of emigrants in terms of education, 2000.

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of the general population with tertiary education in 2000. Nearly all points lie above the 45-degree line, indicating that in the large majority of countries emigrants are positively selected in terms of schooling.

Positive selection of emigrants is at odds with much recent empirical literature on international migration. In an influential line of work, Borjas (1987) uses the Roy (1951) model to show how migration costs and international variation in the premium for skill shape the incentive to migrate.[22] In countries with low average wages and high wage inequality, as appears to be the case in much of the developing world, there is negative selection of emigrants. Those with the greatest incentive to relocate to rich countries (which tend to have high average wages and low wage inequality) are individuals with below-average skill levels in their home countries.

Much of the recent empirical research on Borjas' negative-selection hypothesis examines labor movements either from Mexico to the United States or Puerto Rico to the US mainland. Puerto Rican outmigrants tend to have low education levels relative to nonmigrants (Borjas, 2006; Ramos, 1992), consistent with migrants being negatively selected in terms of skill. Mexican emigrants, however, appear to be drawn more from the middle of the country's schooling distribution,[23] consistent instead with intermediate selection. Figure 3 suggests Mexico and Puerto Rico are exceptional cases. Positive selection of emigrants appears to be a nearly universal phenomenon.

Despite overwhelming evidence that emigrants are positively selected in terms of schooling, there is confusion in the literature over the relationship between income inequality and the incentive to emigrate. A common empirical approach is to explain bilateral migration using sending-country per capita GDP and income inequality (e.g., as measured by the GINI coefficient) relative to the receiving country (e.g., Clark et al., 2007; Mayda, 2005). A positive parameter estimate on the GINI coefficient is interpreted as an indicator that migrants are negatively selected in terms of skill.

However, this approach characterizes selection into migration only under restrictive conditions. In Borjas (1987), migration costs are assumed to be constant across individuals in time-equivalent units, in which case an individual will choose to migrate from source-country s to destination-country d as long as

$$\ln W_d - \ln W_s > \pi, \tag{1}$$

where π is the amount of labor time lost in migration (measured in terms of the sending-country wage). Expressing wages in Mincerian terms

$$W_k = e^{\mu_k + \delta_k z}, \tag{2}$$

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where W_k is the wage in country k, μ_k is the base log wage (the log wage for an individual with zero skill) in country k, δ_k is the skill premium (the change in the log wage from acquiring an additional unit of skill) in country k, and z is an individual's skill level. We can then rewrite Eq. (1) as

$$(\mu_d - \mu_s) + z(\delta_d - \delta_s) > \pi, \tag{3}$$

which indicates that as long as $\mu_d - \mu_s > 0$ and $\delta_d - \delta_s < 0$ (i.e., source-country s has relatively low base wages and high wage inequality), the incentive to emigrate is decreasing in an individual's skill level.

Borjas (1991) shows that the result on negative selection in Eq. (3) is obtained only for a special version of the Roy model. Since the migration cost is constant in terms of labor time, the monetary cost of migration is higher for more-skilled individuals. Where the cost of migration is nonincreasing in skill—as for migration costs that are fixed in monetary units—migrants may be negatively or positively selected. Credit constraints in sending countries could make migration costs *decreasing* in skill. Suppose, for instance, education and migration are subject to a fixed monetary cost, credit-market imperfections make wealthier individuals subject to lower borrowing costs (e.g., Banerjee & Newman, 1993; Rapoport, 2002). Then, the wealthier will be more likely to become educated and more likely to migrate abroad (Assuncao & Carvalho, 2009). For Mexico, McKenzie and Rapoport (2007) find an inverted U-shaped relationship between migration and wealth, consistent with low-wealth individuals being too poor to afford migration and high-wealth individuals having an incentive not to leave.

More generally, it is not the Mincerian skill premium that shapes the skill composition of migrants, as in Eq. (3), but the overall reward to skill. This implication is present in the study by Rosenzweig (2007), who derives a Roy model of migration with moving costs that include components that are fixed in monetary units and time-equivalent units. It is the *level* difference in the reward to skill between source and destination that conditions migrant selectivity. Suppose in Nigeria someone with a primary education would earn $1000 a year and someone with a tertiary education would earn $10,000 a year, the comparable sums in the United States are $20,000 and $60,000, respectively. In Nigeria, the base wage is relatively low (the Nigeria-US log difference in base wages is −3) while the skill premium is relatively high (the Nigeria-US difference in the log wage ratio of high-skilled to low-skilled labor is 1.2), and the gross income gain to migration is much larger for the more educated person ($50,000 vs. $19,000). As long as migration costs are nondecreasing in skill and the marginal utility of income is not strongly decreasing, the incentive to emigrate would be much larger for the more educated person.

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Is the positive selection of emigrants evident in Figure 3 due to cross-country differences in the income that accrues to skill? To see how one might answer this question, consider the difference in the incentive to migrate from country s to country d between an individual with skill level z and an individual with zero skill. Suppose that the cost of migrating from s to d is given by

$$C_{sd} + \theta_{sd} z + \epsilon_{sd}, \tag{4}$$

where C_{sd} is a fixed migration cost, θ_{sd} is the differential migration cost per unit of skill (which may be positive or negative), and ε_{sd} is a mean zero random migration cost (which for simplicity is assumed to be uncorrelated with z). Using Eq. (2), a skilled individual will be relatively likely to emigrate if

$$(e^{\mu_d + \delta_d z} - e^{\mu_s + \delta_s z}) - (e^{\mu_d} - e^{\mu_s}) > \theta_{sd} z. \tag{5}$$

Imposing the simplifying assumption that migration costs are skill neutral ($\theta_{sd} = 0$), the condition for positive selection in Eq. (5) becomes

$$e^{\mu_d - \mu_s} > \frac{e^{\delta_s z} - 1}{e^{\delta_d z} - 1}. \tag{6}$$

On the basis of Eq. (6), the selection of emigrants in terms of skill is ambiguous. Working in favor of positive selection is the presumed relatively high base wage in the destination country ($\mu_d > \mu_s$); working against positive selection is the presumed relatively high skill premium in the sending country ($\delta_d < \delta_s$).

In principle, with coefficients from Mincer wage regressions run in different countries, it would be possible to evaluate whether the condition for positive selection in Eq. (6) is satisfied. While Psacharopoulos and Patrinos (2004) report that the Mincerian skill premium has been estimated for at least 82 countries, it is difficult to compare the magnitudes of the reported estimates, as there is enormous variation across studies in control variables, skill definitions, and sample restrictions. One recent exception is the study by Hanushek and Zhang (2006), who use micro data from the International Adult Literacy Survey to estimate wage regressions for individuals in 13 countries. Their results suggest the Mincerian return to an additional year of schooling is 0.064 in the United States, 0.076 in Chile, and 0.080 in Poland. All else equal, these estimates indicate that there would be more tertiary educated than primary educated emigrants from Poland (Chile) to the United States, as long as the US base wage was at least 1.5 (1.3) times that in Poland (Chile).

To obtain a crude estimate of relative base wages, let GDP in country k be given by $Y_k = K_k^{1-\alpha}(\sum_i \lambda_{ik} L_k)^{\alpha}$, where K_k is the capital stock, L_k is the number of workers

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(under the assumption that each worker supplies one person year of labor), and λ_{ik} is the productivity of the ith worker relative to a worker with no skill, which is assumed proportional to the number of years of education. The base wage (i.e., that for a worker with $\lambda_{ik} = 1$) can be written as $W_k = (Y_k/L_k)_k^{-1}$, where Y_k/L_k is GDP per worker and $_k$ is mean years of schooling. Using this formulation, in 2000 the estimated ratio of base wages (in PPP terms) for the United States and Poland is 2.7 and for the United States and Chile is 1.8, suggesting both high-inequality Chile and low-inequality Poland satisfy the condition in Eq. (6) for emigrants to the United States to be positively selected. Figure 3 shows that emigrants from both countries are in fact positively selected in terms of schooling.[24]

Rosenzweig (2007) examines migrant selectivity with data from the New Immigrant Survey. The NIS reports the wage an individual earned in his last job before coming to the United States, which Rosenzweig uses to estimate the marginal product of labor (per efficiency unit) by source country.[25] A country's overall emigration rate to the United States is decreasing in the marginal product of labor, suggesting countries with higher labor productivity send fewer migrants to the United States. Rosenzweig estimates that raising a country's marginal product of labor by 10% relative to the United States would reduce the number of emigrants obtaining US employment-based visas by 8.3%. The average schooling of emigrants to the United States is increasing in the marginal product of labor, indicating that in countries with higher labor productivity it is the more educated migrants who are most likely to leave. In a related work, Rosenzweig (2006) finds that the number of students who come to the United States for higher education and who stay in the United States after completing their education are each decreasing in the marginal product of labor in the source country, suggesting that low rewards to skill in a country induce students seeking university training to pursue their schooling abroad.

Any analysis of migrant selection based on observed characteristics leaves open the question of how migrants are selected on unobservables. McKenzie, Gibson, and Stillman (2006) examine this issue using data on Tonga, in which individuals may apply to a lottery to obtain a visa to move to New Zealand. Comparing visa applicants who lost the lottery (meaning they stayed in Tonga) with nonapplicants, they find that those desiring to migrate have higher earnings, controlling for observed characteristics, suggesting prospective migrants from Tonga are positively selected in terms of unobserved skill. McKenzie, Gibson, and Stillman find that failing to account for selection on unobservables leads to substantial overstatement of the gains to migration.

What does Eq. (5) imply about migration flows between countries? Suppose the random migration cost in Eq. (4) has an extreme value distribution, with the correlation in these costs across destination countries being equal to $0 \leq \sigma < 1$, in which case

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we can apply results in Berry (1994) to write the log odds of migrating to destination country d for skill group z from source-country s as

$$\ln \frac{E^{z}_{sd}}{E^{z}_{s}} = [W_{\mathrm{d}}(\mathrm{z}) - W_{\mathrm{s}}(\mathrm{z})] - \theta_{sd}\mathrm{z} + \sigma \ln E^{\mathrm{z}}_{sd/\mathrm{D}} + \eta^{z}_{sh}, \tag{7}$$

where E^{z}_{sh} is the share of skill group z in s that migrates to d, E^{z}_{s} is the share of skill group z that remains in s, $E^{z}_{sd/D}$ is the fraction of skill-group z emigrants from s that choose destination d, and η^{z}_{sh} is a disturbance term. The bilateral migration flow is increasing in the level difference in wages between the source and destination, decreasing in bilateral migration costs, and increasing in the attractiveness of the destination relative to alternative destinations, as captured by $E^{z}_{sd/D}$. Equation (7) demonstrates the problem by estimating bilateral migration flows as a function of bilateral country characteristics only: the relative attractiveness of a destination is likely to be correlated with its own wages and migration costs, meaning that excluding $E^{z}_{sd/D}$ from the regression in Eq. (7) would introduce omitted variable bias into the specification.

One implication of Eq. (7) is that the higher the reward to skill in a destination, the more skilled will be the composition of its immigrants. Grogger and Hanson (2008) develop a fixed-effects estimator for Eq. (7) and, using data from Beine et al. (2006a), find that the bilateral flow of more educated migrants (relative to less educated migrants) is increasing in the destination-country earnings gap between high-income and low-income workers. These results can account for the observed pattern of emigrant sorting across destinations, seen in Table 4. The United States is by far and away the largest destination country for international migrants, with Canada being the second largest. In 2000, 53% of the foreign-born population in OECD countries resided in North America, while 36% resided in the European

Table 4 Share of OECD immigrants by destination region and education level, 2000

	Education group			
Destination region	All	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

Notes: This table shows the share of OECD immigrants by destination region and education group in 2000. Source: Grogger and Hanson (2008).

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Union, and 10% resided in Australia and Oceania. The draw of United States and Canada is the strongest for the more educated. While North America attracts only 38% of emigrants with primary education, it attracts 66% of emigrants with tertiary education. In Europe, the shares are flipped, as it attracts 22% of emigrants with tertiary schooling and 53% of emigrants with primary schooling. This pattern of emigrant sorting is consistent with observed differences in the reward to skill. Among OECD destinations, the level of difference in income between high- and low-skill labor is largest in the United States, with Canada having the fourth-largest difference (the United Kingdom and Australia coming in at numbers two and three). Continental Europe, on the other hand, has a relatively low income gap between high- and low-skill labor. The consequence of these income differences appears to be that North America and Australia attract a more-skilled mix of immigrants, while Continental Europe attracts a less-skilled mix.

2.4 Networks and migration costs

Although the evidence in Table 3 points to growth in international migration, the global stock of emigrants remains small, at around 3% of the world population. This is surprising, given that the gains to international migration appear to be enormous. Hanson (2006) reports that in 2000 the average hourly wage for a male with nine years of education was $2.40 in Mexico and $8.70 for recent Mexican immigrants in the United States (in PPP-adjusted prices). At the average labor supply for adult male workers of 35 h per week for the United States, this would amount to an annual income gain of $12,000. Using data from the New Immigrant Survey, Rosenzweig (2007) estimates an annual income gain to similarly educated legal Mexican immigrants of $20,000.

One way to reconcile large and persistent cross-country income differences with small global labor movements is that receiving countries are successful in restricting labor inflows. While long queues for immigration visas in the United States and other countries do indicate that legal admission restrictions bind, rising levels of illegal immigration suggest that borders are porous. Further, observed costs of illegal entry are small in comparison to estimated income gains. In a sample of high migration-communities in Mexico during 2002-2004, Cornelius (2005) finds the average price paid by migrants for the service of being smuggled across the US border was $1700.

Another explanation for small global labor flows is the existence of large unobserved migration costs associated with credit constraints in financing migration, uncertainty over economic opportunities abroad, the psychic cost of leaving home, or other factors. There is considerable academic interest in the role of migration networks in lowering such costs. Survey evidence suggests that transnational migration networks provide prospective migrants with information about economic conditions in destination countries, support in managing the immigration process, and help in obtaining housing and finding a job

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(Massey & Espinosa, 1997; Massey, Goldring, & Durand, 1994). In the presence of network effects, labor outflows may accelerate over time (even as source-destination wage differences decline), due to a growing stock of migrants lowering moving costs for later migrants (Carrington, Detragiache, & Viswanath, 1996).

Much of the research on migration networks focuses on Mexico, for which there are individual-level data on migration behavior.[26] On the process of crossing the border, Orrenius and Zavodny (2005) report that among young males in Mexico the probability of migrating to the United States is higher for individuals whose fathers or siblings have emigrated. Gathmann (2004) documents that migrants with family members in the United States are less likely to hire the services of a professional smuggler, and, among those that do, likely to pay lower prices. And McKenzie and Rapoport (2006) find that average schooling is lower among migrants from communities in Mexico with a stronger US presence. These results are consistent with networks lowering migration costs.

One might be concerned that the presence of migration networks reflects unobserved characteristics of communities or families that are associated with a higher propensity to migrate, making the correlation between migration behavior and networks difficult to interpret. To address the issue of endogeneity in migration networks, Munshi (2003) instruments the size of the US population from a migrant's origin community in Mexico using lagged rainfall in the Mexican origin community. He finds that Mexican migrants in the United States are more likely to be employed and more likely to be employed in a higher-paying nonagricultural job than the larger US population of residents from their origin community in Mexico. These results suggest that having a larger network improves a migrant's ability to assimilate economically in the United States. Among nonagricultural workers, 78% received assistance in finding a US job, and among this group 47% received help from a relative and 47% received help from a friend or *paisano* (someone from their home region in Mexico).[27]

While we still know little about the magnitude of migration costs, research on networks suggests that migrant flows are sensitive to changes in these costs. Other evidence on the sensitivity of migration to migration costs comes from illegal crossings at the Mexico-US border. For illegal migration, the intensity of border enforcement is an important determinant of entry costs, which take the form of fees paid to smugglers. Cornelius (2005) reports that smuggler prices to enter the United States illegally increased by 37% between 1996-1998 and 2002-2004, which spans the period during which the United States stepped up border enforcement efforts in response to the terrorist attacks of 9/11/01. Gathmann (2004) examines the consequences of expanded border enforcement for migration.[28] She identifies the correlates of smuggler prices paid by migrants from Mexico to the United States and estimates the impact of smuggler prices on migrant demand for smuggler services.[29] The price a migrant pays to a smuggler is higher in years when border

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enforcement is higher, but the elasticity of smuggler prices with respect to enforcement is small, in the range of 0.2–0.5. During the sample period, a one-standard-deviation increase in enforcement would have led to an increase in smuggler prices of less than $40. The demand for smuggler services and the probability of choosing to migrate to the United States are both quite responsive to changes in coyote prices. However, given the small enforcement elasticity of coyote prices, the observed increase in US border enforcement over 1986–1998 (during which time United States spending on border enforcement increased by four times in real terms) appeared to reduce the average migration probability in Mexico by only 10%.

In many destination countries, migrants reinforce networks by forming home-town associations that help members of their home communities make the transition to living in a new location. By creating links between the destination country and a specific community in the source country, these associations may lower migration costs for individuals linked by kinship or birthplace to migrants living abroad. Of 218 home-town associations formed by Mexican immigrants enumerated in a 2002 survey in California, 87% were associated with one of the nine central and western states in Mexico that have dominated migration to the United States since the early twentieth century (Cano, 2004), indicating that migrant networks in Mexico are organized along regional lines.[30]

Regional variation in migration networks creates regional variation in migration dynamics. McKenzie and Rapoport (2007) show that in Mexican communities with historically weak migration networks, moderately more wealthy individuals are more likely to migrate, though very high wealthy individuals are not. Migrants are thus drawn from the middle of the wealth distribution, meaning that migration increases inequality. In communities with strong migration networks, however, lower wealthy individuals can afford to migrate, so that in these locations migration lowers inequality.

2.5 Discussion

Over the last decade and a half, migration flows from developing to developed countries have been increasing. The phenomenon is just beginning to be understood, as cross-country data on international migration have only recently become available. Bilateral migration flows are negatively affected by migration costs, as captured by geographic or linguistic distance between countries, the absence of migration networks, or the stringency of border enforcement against illegal entry. Emigration rates are highest for developing countries at middle income levels and with higher population densities. In most developing countries, it is the more educated who have the highest likelihood of emigrating. The positive selection of emigrants in terms of schooling is due in part to differences in the reward to skill across countries. High average labor productivity in the United States and other destinations more than compensates for these countries having relatively low percentage returns to additional years of education, giving more educated individuals

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(or individuals seeking higher education) a relatively strong incentive to leave poor countries. Emigrants appear to sort themselves across destinations according to income-earning possibilities, with the countries that have the highest reward to skill—measured as the level difference in wages between high- and low-skilled labor—attracting the most educated mix of immigrants. Little is known about the precise magnitude of migration costs, the impact of skilled emigration on the incentive to acquire education in sending countries, or how receiving-country immigration policies affect the scale or composition of international migration.

3. IMPACT OF EMIGRATION ON SENDING COUNTRIES

Emigration changes a country's supply of labor, skill mix, and exposure to the global economy. These effects may have important consequences for a sending country's aggregate output, structure of wages, fiscal accounts, and trade and investment flows, among other outcomes. In this section, I discuss recent empirical research on the impact of emigration on developing economies.

3.1 Labor markets and fiscal accounts

To organize the discussion, it is useful to have a framework that identifies the channels through which emigration affects the well-being of individuals in an economy. Consider a country that produces a single output from two labor inputs, skilled labor (indexed by h) and unskilled labor (indexed by l), each of which is paid its marginal product. I assume there are H identical skilled workers and L identical unskilled workers, and that the two types of labor are complements in production. Let $V(Y_i)$ be the indirect utility enjoyed by a worker of type i, which depends on after-tax income available for consumption, Y_i. In turn, after-tax income depends on the wage, W_i, the income-tax rate, t_i, and government transfers, G_i, such that

$$Y_i = W_i(1 - t_i) + G_i. \tag{8}$$

The change in welfare that results from the emigration of ΔH skilled workers for a *nonemigrating* worker of type i can be written as

$$\frac{\Delta V_i}{\Delta H} = V_i' \left[\frac{\partial W_i}{\partial H}(1 - t_i) + \frac{\partial G_i}{\partial H} - W_i \frac{\partial t_i}{\partial H} \right], \tag{9}$$

where V_i' is the marginal utility of income. The first term in brackets in Eq. (9) captures the change in a worker's labor earnings; the second two terms capture the change in the net fiscal transfer that a worker receives from the government.

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For an unskilled worker, the emigration of skilled labor, a complementary input, lowers his marginal product ($\partial W_l/\partial H < 0$), reducing his labor income. Assuming the government budget is balanced, taxes and transfers in a country would need to adjust to compensate for the loss in the net fiscal contribution of the emigrating workers. If skilled workers make a positive net fiscal contribution (i.e., the tax structure is progressive), skilled emigration would tend to reduce transfers ($\partial G_i/\partial H < 0$) and increases tax rates ($\partial t_i/\partial H > 0$) for all workers, ensuring that the posttax income of unskilled labor falls. All else equal, skilled emigration would reduce the welfare of unskilled workers.

For a nonemigrating skilled worker, the emigration of skilled labor raises his marginal product ($\partial W_h/\partial H > 0$), increasing his labor income. Following the above logic, skilled emigration would tend to reduce transfers received and increase taxes paid by nonemigrating skilled workers. Taking the positive change in pretax income together with the negative change in net fiscal transfer, the impact of skilled emigration on the posttax income and welfare of skilled workers is ambiguous.

Most research on the labor-market impacts of emigration focuses on Mexico. Mishra (2007), applying the regression framework in Borjas (2003), examines the correlation between emigration to the United States and decadal changes in wages for cohorts in Mexico defined by their years of schooling and labor-market experience. She estimates that over the period 1970-2000, the elasticity of wages with respect to emigration in Mexico is 0.40, implying that a 10% reduction in labor supply due to emigration would raise wages by 4%. Using a similar approach, Aydemir and Borjas (2007) estimate a wage elasticity for emigration in Mexico of 0.56.[31]

Wage elasticities of this magnitude suggest that emigration has had a substantial impact on Mexico's wage structure. Based on her estimation results and the fact that between 1970 and 2000, 13% of Mexico's labor force emigrated to the United States, Mishra (2007) calculates that emigration has raised average wages in the country by 8%.[32] Upward wage pressure has been strongest for young adults with above-average education levels (those with 9-15 years of schooling), who in the 1990s were the individuals most likely to emigrate (Chiquiar & Hanson, 2005). Increased labor flows between Mexico and the United States appear to be one factor contributing to labor-market integration between the two countries.[33]

In response to changes in labor supply associated with emigration, one might expect the supply of capital in Mexico to adjust, with the country becoming less attractive to inward foreign direct investment. Alternatively, higher wages could erode Mexico's comparative advantage in labor-intensive industries, reducing the net exports of labor services embodied in goods. Either change would tend to offset the effects of emigration on wages in the country. Since the estimation approaches proposed by Mishra (2007) and Aydemir and Borjas (2007) are reduced forms, they

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capture the wage impact of emigration, *net* of these, and other adjustments. Their results suggest that any response of capital accumulation or trade to emigration is too slow or too small to undo the wage consequences of labor outflows, at least over 10-year time intervals.[34] Such a finding is not all that surprising. Factor-price differences between the United States and Mexico create an incentive for trade in goods, north-to-south flows of capital, and south-to-north flows of labor. Despite dramatic reductions in barriers to trade and investment between the two countries during the last two decades, US-Mexico wage differences remain large. Since trade and investment are insufficient to equalize factor prices within North America, theory would predict that migration from Mexico to the United States would affect wages in both countries, consistent with the evidence.[35]

In many sending countries, the propensity to emigrate varies greatly across subnational regions. In Mexico, central and western states have long had the highest labor flows abroad. The literature attributes regional variation in emigration to the emergence of migration networks, which grew out of the hiring practices of US agriculture. In the early 1900s, US labor contractors utilized Mexico's railroad network to recruit workers in the country's interior (Cardoso, 1980). Communities close to rail lines have had the highest emigration rates in the country since at least the 1920s.[36] With the advent of large-scale emigration from Mexico in the 1980s and 1990s, the historically high-migration states have had relatively large labor outflows. Between 1990 and 2000, the cohort of men in their 20s born in high-migration states declined by 33.4 log points, while the number of similarly aged men born in low-migration states dropped by only 9.4 log points. Since mortality rates are relatively low for this age group, the relative decline in the number of young men from high-migration states (of 24 log points) is most likely due to emigration. Hanson (2007) finds that over this time period, wages in high-migration states rose by 6-9% relative to wages in low-migration states, controlling for regional shocks associated with globalization.[37]

The Mexican emigration experience differs from other countries in terms of the absence of positive selection, the high fraction of those leaving who enter the destination country as illegal migrants, and the sheer scale of the exodus. The positive selection of emigrants in most source countries raises the prospect of important fiscal impacts from international migration. In countries with progressive income taxes, the loss of skilled emigrants could adversely affect public budgets through a loss of future tax contributions. These lost contributions are, in part, the returns to public investments in the education of emigrating workers, which, after emigration, accrue to destination countries.

While there is a large body of theoretical literature on the taxation of skilled emigration (e.g., Bhagwati & Hamada, 1974; Bhagwati & Wilson, 1989; Docquier & Rapoport, 2007), empirical research on the subject is sparse. One recent contribution is by Desai, Kapur, and McHale (2003), who examine the fiscal effects of brain drain

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from India.[38] In 2000, individuals with tertiary education made up 60.5% of Indian emigrants but just 4.5% of India's total population. Between 1990 and 2000, the emigration rate for the tertiary educated rose from 2.8% to 4.3%, compared to an increase of just 0.3% to 0.4% for the population as a whole. Desai et al. examine Indian emigration to the United States, which in 2000 was host to approximately 64.6% of India's skilled emigrants (and 48.9% of all Indian emigrants). They begin by producing 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 (using a Mincer wage regression). On the tax side, they calculate income tax losses by running the counterfactual income series through the Indian income tax schedule and indirect tax losses using estimates of indirect tax payments per unit of gross national income. On the spending side, they calculate expenditure savings by identifying categories for which savings would exist—which are most categories except interest payments and national defense—and then estimating savings per individual. The results suggest Indian emigration to the United States cost India net tax contributions of 0.24% of GDP in 2000, which are partially offset by the tax take on remittances of 0.1% of GDP. For India, the tax consequences of skilled emigration appear to be modest. Even tripling tertiary emigration, which would bring India in line with Mexico's emigration rate, labor outflows would still appear to have a small impact on the country's fiscal accounts.

The research discussed so far addresses the static consequences of emigration for an economy, ignoring dynamic considerations that may arise if skilled emigration raises the incentive of unskilled workers to acquire human capital. In theory, feedback effects from emigration to human-capital accumulation may change a country's rate of economic growth. 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, characterized by low investment in education and low growth, and move to an equilibrium with high investment and high growth.[39] Yet, it is entirely possible for feedback effects to work in the opposite direction. Miyagiwa (1991) develops 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 and Yip (1999), the negative effects of brain drain on the stock of human capital reduce the labor-exporting country's growth rate.

Given that plausible theoretical models offer very different predictions for the long-run consequences of skilled emigration, the effect of brain drain on an economy is ultimately an empirical question. As mentioned in Section 2.3, the literature on how emigration affects the incentive to acquire skill has yet to produce conclusive results, making it impossible to say whether the consequences of brain drain for

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growth are likely to be positive or negative. Case-study evidence is similarly inconclusive. In China, India, and Taiwan, the migration of skilled labor to Silicon Valley in the United States—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, helping foster the creation of local high-technology industries (Saxenian, 2002). The recent rise in educational attainment in China, India, and Taiwan may be partly a result of the lure of working in the United States and the domestic expansion of sectors intensive in the use of skilled technicians.[40] In Africa, however, the exodus of skilled professionals, many of whom work in health care, may adversely affect living standards. Clemens (2007) reports that in 25 out of 53 African nations at least 40% of native-born individuals practicing as physicians were living and working abroad as of 2000.[41] He finds a weak negative correlation between child mortality and the share of the stock physicians (or nurses) that has emigrated. Schiff (2006) offers further evidence that suggest pessimism about the prospects for a beneficial brain drain.

3.2 Remittances and return migration

In a static setting, where the only effect of international migration is to move labor from one country to another, welfare in the sending country would decline (Hamilton & Whalley, 1984). While the average incomes of migrants and destination-country natives would rise, average income (measured in terms of per capita GDP) in the sending country would fall (even though wages for labor would rise). Migrants, however, often remit a portion of their income to family members at home, possibly reversing the income loss in the sending country associated with the depletion of labor. In the last several years, there has been substantial academic and policy interest in the consequences of remittances for economic activity in sending countries.

Table 5 shows workers' remittances received from abroad as a share of GDP by geographic region. Remittances have increased markedly in East Asia and the Pacific, Latin America and the Caribbean, South Asia, and Sub-Saharan Africa. As of 2004, 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, Fajnzylber, & Lopez, 2007).

Reported remittances reflect those captured by the balance of payments, which Freund and Spatafora (2007) suggest may substantially understate the actual remittances. Formal remittance channels include banks and money transfer operators

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Table 5 Workers' remittances and compensation of employees as % of GDP

Region	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005
East Asia and Pacific	0.50	0.56	0.66	0.71	0.93	1.00	1.10	1.47	1.56	1.48	1.50
Europe and Central Asia	–	–	1.17	1.02	1.45	1.42	1.31	1.27	1.24	1.28	1.44
Latin America and Caribbean	0.61	0.70	0.73	0.79	0.84	1.04	1.29	1.67	1.99	2.06	1.98
Middle East and North Africa	–	8.31	5.57	3.69	3.68	3.07	3.40	3.76	4.35	4.31	4.13
South Asia	1.41	1.76	2.24	2.42	2.47	2.85	3.10	3.72	4.09	3.57	3.53
Sub-Saharan Africa	0.72	0.76	0.94	1.04	1.47	1.49	1.55	1.67	1.49	1.60	1.57

(e.g., Western Union) for which service fees average 11% of the value of remittances. Informal remittances, which are moved by couriers, relatives, or migrants themselves, tend to have lower fees, but (presumably) higher risk. Formal remittances are negatively correlated with service charges, with a 10% increase in fees being associated with a 1.5% reduction in transfers. Fees are lower in economies that are dollarized and more developed financially (as measured by the ratio of bank deposits to GDP).

Theoretical literature on migration models remittances as the outcome of a dynamic contract between migrants and their families (e.g., Lucas & Stark, 1985). A family helps finance migration costs for one of its members in return for a share of future income gains associated with having moved to a higher wage location. Remittances are the return on investments the family has made in the migrant. The prediction is that remittances would rise following an increase in emigration and decline as existing emigrants age and pay off debts to their families. Obviously, emigration also means a loss in labor supply for the household in the sending country and may result in the separation of parents from children (particularly, in the case of temporary or guest worker migration), issues that are often left unexplored in empirical work.

Having migrants abroad may also provide insurance for a family. To the extent income shocks are imperfectly correlated across countries, migration helps families smooth consumption over time by keeping remittances high when sending-country income is low relative to the destination country, and low when sending-country income is relatively

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high.[42] Yang (2008) examines changes in remittances to households in the Philippines before and after the Asian financial crisis, which he uses as a natural experiment to examine the impact of remittances on household behavior. As of 1997, 6% of Philippine households had a member that 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 countries in East Asia, whose 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. Since income shocks associated with movements in exchange rates are largely transitory in nature, the response of remittances reveals the extent to which migrants share transitory income gains with family members at home. Yang finds that a 10% depreciation of the Philippine peso is associated with a 6% increase in remittances.

Contrary to Yang's results, remittances appear to be unresponsive to changes in government transfers. In Mexico (Teruel & Davis, 2000), Honduras and Nicaragua (Nielsen & Olinto, 2007) remittances are uncorrelated with changes in rural household receipts from conditional cash transfer programs, which were introduced into communities on a randomized basis, permitting the experimental analysis of their impact on household behavior. Were remittances a vehicle for consumption smoothing among rural households, one would expect them to decline for a sending-country household, following an exogenous increase in government income support. One possible difference between the Philippine migrants in Yang's sample and the Mexican and Central American migrants in Teruel and Davis' and Olinto's samples is that the large majority of Philippine migrants (95.6%) report they have gone abroad on temporary employment visas, meaning they are likely to return to the Philippines in the near future. Though the majority of migrants from Mexico and Central America may have gone abroad initially on an unauthorized basis (Hanson, 2006), many appear to remain in their destination country for a long period of time. These results suggest consumption smoothing may be more pronounced among temporary migrants.

There is some evidence that increases in remittances are associated with increased expenditure on education and health. Alejandra and Ureta (2003) find that in El Salvador households that receive remittances are more likely to allow children to stay in school, with the effect being stronger in rural areas. Why should remittances be correlated with school attendance? One possibility is that remittances allow credit-constrained households to increase investments in productive activities that capital-market imperfections prevent them from financing through borrowing. However, an equally plausible explanation is that households that receive remittances are less credit constrained to begin with and hence, are more likely to invest in education, suggesting that the correlation between remittances and educational investments may be the byproduct of their correlation with some omitted variable, such as unobserved wealth.

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To identify the impact of remittances on education, Yang (2008) examines changes in household expenditure and labor supply in the Philippines before and after the Asian financial crisis. 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 (televisions and motor vehicles), children's school attendance, and entrepreneurship. In these households, the labor supply of 10-17 year old children fell by more, particularly for boys. Woodruff and Zenteno (2007) also find a positive correlation between migration and sending-country business formation, in their study for Mexico. For a sample of small-scale enterprises, capital investment and capital-output ratios are higher in firms where the owner was born in a state with higher rates of migration to the United States. Woodruff and Zenteno instrument for current migration rates using proximity to the railroads along which Mexico's initial migration networks became established (Durand, Massey, & Zenteno, 2001). Their results are consistent with two different mechanisms for business formation: remittances relax credit constraints on the creation of small enterprises, or return migrants—who may have accumulated valuable work experience in the United States—are more likely to launch new businesses upon returning to Mexico. Regarding the second mechanism, Dustmann and Kirchamp (2002) find that half of migrants returning to Turkey from Germany start a small business within 4 years of coming home, using labor income saved during their time as migrant workers.[43]

Remittances indicate that migrants maintain contacts with family members at home. They may do so in part because they anticipate returning home in the future, in which case return migration may depend on their foreign earning opportunities. Yang (2006) finds that an exchange rate shock that raises the peso value of foreign earnings reduces the likelihood a Philippine emigrant returns home, with 10% real appreciation being associated with a 1-year return rate that is 1.4% lower.[44]

The use of a clear empirical identification strategy in Yang (2006, 2008) and Woodruff and Zenteno (2007) is important, given the obvious concern that remittances and household expenditures are jointly determined. Many recent papers report a positive correlation between remittances and household spending on education, household spending on health, children's survival rates, or the likelihood a household is above the poverty line, among other outcomes.[45] With the absence of a natural experiment or valid instrument for remittances, such correlations are difficult to interpret. Less credit constrained households may be more likely to send migrants abroad *and* to invest in durable goods or services (Assuncao & Carvalho, 2007). Remittances are the return to households from having invested in sending a migrant abroad. Presumably, households invest in migration for the purpose of enjoying higher spending in the future, meaning remittances are evidence that a dynamic household contract has been fulfilled, not an independent causal force. One would hope that the recent enthusiasm among international financial institutions on the role

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of remittances in economic development (e.g., Inter-American Development Bank, 2004) does not lead policy makers to ignore the economics of migration in recommending policies related to labor outflows.

3.3 Information and the flow of ideas

The emigration of labor creates linkages between a country and the rest of the world, which may help reduce international transaction costs. Casella and Rauch (2002) develop a model in which membership in a group—such as common ancestry or ethnicity—helps individuals in different countries reduce barriers to international trade associated with incomplete information. Relative to purely anonymous trade, the presence of group ties increases the volume of trade and GDP in the trading countries, though individuals lacking group ties are worse off (because they lose access to their more productive potential trading partners). Migration is an obvious mechanism through which cross-national group ties may be established.

The positive correlation between bilateral trade and migration has been interpreted as evidence of a "diaspora externality," in which previous waves of migration create cross-national networks that facilitate exchange. Gould (1994) finds that the bilateral trade involving the United States is larger with countries that have larger immigrant populations in the United States. Head, Ries, and Swenson (1998) find that a 10% increase in Canada's immigrant population from a particular country is associated with a 1% increase in bilateral Canadian exports and a 3% increase in bilateral Canadian imports, with more recent immigration having a stronger correlation with trade.[46] It is difficult to draw causal inferences from these results, since immigration may be correlated with unobserved factors that also affect trade, such as the trading partners' cultural similarity or bilateral economic policies (e.g., preferential trade policies or investment treaties that raise the return to both migration and trade).

Pushing the analysis a step further, Rauch and Trindade (2002) focus specifically on networks associated with overseas Chinese populations. Successive waves of emigration from southeastern China have created communities of ethnic Chinese throughout Southeast Asia, as well as in South Asia and on the east cost of Africa. Rauch and Trindade find that bilateral trade is positively correlated with the interaction between the two countries' Chinese populations (expressed as shares of the national population), similar to the findings by Gould and Head and Ries. More interestingly, the correlation between Chinese populations and trade is stronger for differentiated products than it is for homogenous goods. To the extent differentiated products are more subject to informational problems in exchange (Rauch, 1999), these are the goods one would expect to be most sensitive to the presence of business networks.

Still unclear is whether greater trade is the outcome of increased migration or a reflection of the types of individuals who select into migration. If more skilled and more able individuals are more likely to migrate abroad and more likely to exploit

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opportunities for commercial exchange, then the correlation between trade and migration may be a byproduct of migrant self-selection. Subsequent policies to liberalize immigration in destination countries would not necessarily increase trade with sending countries, unless they allowed for the admission of individuals with a propensity to engage in trade. Head et al. (1998) find that immigrants admitted as refugees or on the basis of family ties with Canadian residents have a smaller effect on trade than immigrants admitted under a point system that values labor-market skills.

More controversial is the impact of emigration on political outcomes in sending countries. When individuals live and work in another country they are exposed to new political ideologies and alternative systems of government. This exposure may be most important for students who go abroad to obtain a university degree, as they are at an impressionable age and often travel on visas that require them to return to home after completing their studies. The US government, in part, justifies the Fulbright Program, through which it has funded 160,000 foreign students to study in the United States over the last several decades, on its contribution to spreading democracy abroad. Spilimbergo (2006) 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 finds 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 are studying (lagged 5 years). Whether the political system of a sending country influences the types of countries in which its students choose to study is unknown. Kim (1998), for instance, finds that the bilateral flow of foreign students is larger between countries that share a common religion.

3.4 Discussion

In the short run, economic theory suggests that the exodus of labor from a country would put an upward pressure on wages. Evidence from Mexico indicates that emigration has increased wages for the skill groups and regions with the highest emigration rates. Still unknown is the extent to which trade and capital accumulation offset the labor-market impacts of emigration. The preponderance of relatively highly educated individuals among emigrants suggests labor outflows may have adverse consequences on sending countries' public finances. However, in the case of India the fiscal effects of skilled emigration appear to be small. Evidence for other countries is lacking.

In the last decade, a new theoretical literature has emerged which takes a more sanguine view of brain drain. While the idea that skilled emigration raises the incentive to acquire skill in a country is plausible, the literature is missing well identified econometric estimates of how human capital accumulation and economic growth respond to labor outflows. We do know that in most countries those emigrating tend to be more educated individuals, who are in relatively scarce supply. Standard economic models would suggest that their departure adversely affects the livelihoods of the poor majority in developing countries (Benhabib & Jovanovic, 2007). At least for now, there are no

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compelling data to suggest this view to be overturned. There is some evidence that emigration may promote a country's foreign trade and democratic leanings.

While the outflow of labor associated with emigration reduces a country's GDP, migrant remittances may offset the loss in income. In Mexico, Mishra (2007) finds that remittances are larger than the reduction in GDP due to emigration. In some countries, data suggest households use remittances to raise spending, increase investment in business ventures and education, and smooth consumption over time. While remittances are positively correlated with many indicators of economic development, there are only a handful of studies in which this correlation has a meaningful econometric interpretation. Complicating inference about the development impacts of remittances is the fact that less credit constrained households are those most likely to send migrants abroad in the first place. Concluding that remittances *cause* these households to have higher spending, higher investment, or improved health outcomes for women and children may confound the effects of emigration with the effects of unobserved wealth that make emigration possible. Finding that remittances improve the livelihoods of the poor is certainly more exciting than saying wealthier households are more likely to enjoy higher standards of living, but it is not a result for which there is yet broad empirical support.

4. IMMIGRATION POLICY REGIMES

Distinct from other aspects of globalization, the policies that govern international migration are largely under the control of labor-importing countries. The closest source and destination 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.[47] There is little meaningful dialogue between countries regarding the scale or composition of migrant flows, meaning that labor-importing countries set their immigration policies unconstrained by international agreements. By varying the restrictiveness of their admission policies, developed countries directly affect the livelihood of individuals in developing countries. To understand how international migration is regulated, one must examine how destination countries choose the number of immigrants to admit, the types of immigrants to admit, and the rights to grant these individuals.

4.1 Political economy of immigration policy

Why do countries restrict immigration? Without distortions, the first-best policy for a labor-importing country would be to have open borders. Yet, most developed countries are far from such a policy. The distributional impacts of immigration may have political consequences, which give politicians an incentive to restrict labor inflows from abroad. In an economy without distortions, those hurt by immigration would

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include native workers that substitute for immigrant labor. In an economy with a progressive tax system and redistributive government transfers, some native taxpayers would also be hurt. In choosing an immigration policy, a government trades off political support from special interests against consumer welfare (which is enhanced by openness). In a context where the median voter's wages would be reduced by immigration, politicians may choose to restrict labor inflows in order to enhance their future electoral prospects (Benhabib, 1996; De Melo, Grether, & Müller, 2001).[48]

Alternatively, active lobbying by special interests may influence immigration policy. Facchini and Willmann (2005) extend the Grossman-Helpman model of the political economy of trade policy to consider international factor mobility.[49] In their setup, governments restrict factor inflows from abroad through a per-factor unit tax or quota. They assume that the receiving-country government captures factor tax revenues or quota rents, and that individuals are organized according to their factor type and lobby the government on immigration policy. The first assumption appears to be counterfactual, as few governments collect significant payments from factor inflows. The second assumption has more empirical support. In the United States, periodic attempts to increase enforcement against illegal immigration are met with political opposition (Hanson & Spilimbergo, 2001). In equilibrium, each factor lobby offers the government campaign contributions to support stronger (weaker) restrictions on inflows of factors for which its members substitute (complement) in production.

For politicians to respond to pressure from voters regarding immigration policy, voters in destination countries must perceive that immigration affects their standard of living. In the United States, Scheve and Slaughter (2001a) find that opposition to immigration is stronger among less educated workers, which appear to be the group most hurt by labor inflows from abroad (Borjas, 2003). The opposition of the less educated is greater in regions where immigrant inflows have been larger. Less-skilled labor's skepticism about immigration mirrors its opposition to globalization more generally (Scheve & Slaughter, 2001b). Mayda (2006) obtains similar results for a cross-section of countries. In economies where immigrants are less skilled than natives, opposition to immigration is stronger among less-skilled residents.[50]

Tax and transfer policies create a second motivation for a government to restrict immigration, even where the level of immigration is set by a social planner. If immigrants are primarily individuals with low income relative to natives (which may be true even if migrants are high skilled relative to nonmigrants in the source country), increased labor inflows may exacerbate distortions created by social-insurance programs or means-tested entitlement programs (Wellisch & Walz, 1998). Such policies may make a departure from free immigration the constrained social optimum.[51]

In the United States, the fiscal consequences of immigration appear to matter for immigration policy preferences. Low-skilled immigrants—who account for one-third of the US foreign-born population—tend to earn relatively low wages, pay relatively

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little in taxes, and receive subsidized health care with relatively high frequency (Borjas & Hilton, 1996; Fix & Passel, 2002). Hanson, Scheve, and Slaughter (2007) find that US natives who are more exposed to immigrant fiscal pressures—are 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 higher tax brackets. Facchini and Mayda (2006) obtain similar results for Europe, where immigrants also appear to be a fiscal drain (Sinn, and Hans-Werner, 2004). More educated individuals, who are also likely to be high income earners, are more opposed to immigration in countries where immigrants are less skilled and governments are more generous in the benefits they provide.

Pay as you go pension systems create a further incentive for politicians to manipulate the timing and level of immigration (Poutvaara, 2005; Razin & Sadka, 1999; Scholten & Thum, 1996). Governments may choose to permit immigration of young workers, in order to smooth adjustment to demographic shocks, such as the aging of the baby boom generation (Auerbach & Oreopoulos, 1999; Storesletten, 2000). Given its graying population and unfunded pension liabilities, one might expect Europe to be opening itself more aggressively to foreign labor inflows (Boeri, McCormick, & Hanson, 2002). 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; De Giorgi & Pellizzari, 2006).

Beyond the economic consequences of labor inflows, some argue that opposition to immigration is grounded in culture, with individuals preferring homogenous societies because they foster a stronger sense of national identity and civic purpose (Huntington, 2004). Consistent with this claim, the recent anti-immigration-based presidential campaigns of Pauline Hanson in Australia, Jean Marie Le Pen in France, and Tom Tancredo in the United States tout the negative cultural effects of foreign labor inflows. Using individual survey data, Dustmann and Preston (2004) suggest racist attitudes are an important component of opposition to immigration in the United Kingdom and Hainmueller and Hiscox (2004) claim that greater tolerance for immigration among the college educated reflects cosmopolitan attitudes rather than economic concerns.

4.2 The design of immigration policy regimes

Much of the academic literature treats immigration policy as though it were governed by a single instrument: the level of admissions. Yet, in practice policy makers use multiple instruments to manage entry from abroad.

Countries regulate legal immigration through a combination of numerical quotas, entry selection criteria, and restrictions on residency rights. While many countries have admission categories that allow unrestricted immigration, these are generally limited to immediate family members of citizens, as in the United States, or individuals from

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countries within an economic union, as in the EU. Other legal immigrants are subject to quotas, whose number varies according to a nation's *ex ante* selection criteria. The United States allocates the majority of permanent residence visas to relatives of US citizens and legal residents; Australia and Canada favor legal immigrants that meet designated skill criteria; and many European countries reserve a large share of visas for refugees and asylees (OECD, 2006). Visas come with limited residency rights. Temporary visas specify a time limit for residence, the types of jobs a visa holder may hold, and the set of government benefits to which the holder has access. Permanent visas provide broader residency rights, such as mobility between employers and access to more government benefits, but do not always offer a clear path to citizenship.

Regarding illegal immigration, while countries do not explicitly set unauthorized labor inflows, they do implicitly determine the ease of illegal entry through their enforcement actions. By choosing the intensity with which they police national borders and monitor domestic worksites, governments influence the smuggling fee illegal immigrants pay to enter a country (Ethier, 1986; Gathmann, 2004). Enforcement also defines an *ex post* selection criterion for illegal immigrants: individuals who are able to evade capture by avoiding the police earn the right to stay in the country (Cox and Posner, 2007). The United States, for instance, concentrates enforcement on borders rather than in the interior, allowing most illegal immigrants who do not commit crimes or maintain a high public profile to remain on US soil (Davila, Pagan, & Grau, 1999). While illegal immigrants lack official residency rights, they are not devoid of legal protections. Again in the United States, illegal immigrants may report crimes, attend public schools, seek emergency medical services, obtain bank loans, or even acquire a driver's license, with minimal risk of deportation.

Cross-country differences in policy regimes do not affect the skill mix of immigrants as much as one might think. Antecol, Cobb-Clark, and Trejo (2003) find that excluding immigrants from Latin America—who benefit from close proximity to the United States—the education, English fluency, and income of immigrants in Australia, Canada, and the United States are relatively similar. This is true despite Australia's and Canada's use of a point system that favors skilled immigrants and the US reliance on family reunification, which takes no account of skill, for the majority of its admissions. Comparing immigrants admitted on employment-based visas in Australia and the United States, Jasso and Rosenzweig (2005) suggest that it is self-selection, rather than national screening mechanisms, which accounts for differences in immigrant skills.

Even with similarities between countries, there are differences within countries in how legal and illegal inflows are regulated. As discussed above, authorized entrants tend to be subject to quantity regulation and *ex ante* selection criteria and have either expansive residency rights (for permanent immigrants) or limited residency rights (for temporary immigrants); and unauthorized entrants tend to be subject to price regulation and ex post selection criteria and have minimal residency rights.

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Why do countries permit both legal and illegal immigration? First, consider legal inflows. Quantity regulation allows a country to achieve specific goals in admissions, by assigning quotas to particular categories. The allocation of quotas may reflect a desire to maximize the immigration surplus (by admitting scarce labor types), political economy constraints on the level and type of immigrant inflows, or other objectives of government (e.g., national security, cultural homogeneity, humanitarian concerns). An *ex ante* screen has a cost in that the government foregoes the option to obtain information on an immigrant beyond observable characteristics, before offering admission (Cox and Posner, 2007). However, the cost of foregone information may be small for skilled immigrants whose abilities are verifiable in the form of educational degrees, professional awards, and past employment positions. The effective information cost may also be small where countries have strong preferences for specific types of entrants (e.g., family members), in which case any updating on immigrant quality after residence in the country would be unlikely to alter the admission decision.

Combining an *ex ante* screen with broad residency rights gives immigrants a strong incentive to assimilate. However, broad rights have a high fiscal cost, since they give immigrants access to government benefits. The cost of providing broad rights may be small for skilled immigrants, whose income-earning ability would make them net contributors to government coffers. For family-based immigrants, the perceived cost of broad rights may also be small since, as family members of residents, their well being may be an implicit component of national welfare. For refugees and asylees, a similar logic would not apply, perhaps accounting for why they tend to have narrow residency rights (Åslund, Edin, & Fredriksson, 2001; Hatton & Williamson, 2004).

Quotas do not imply as much inflexibility in immigration levels as it would seem, since countries often admit a mix of permanent and temporary entrants. Opponents to immigration may be unwilling to allow all entrants to be permanent. Temporary immigration quotas give politicians the power to rescind visas in the future, which may increase support for immigration. The cost of having temporary immigrants is a weak incentive to assimilate. Comparing the costs and benefits, we might expect the share of temporary immigrants in legal admissions to be higher when an economy is closer to a business cycle peak, at which point the option value of being able to expel current entrants in the future may be relatively high.

Constitutional rules governing citizenship may constrain legal immigration policy regimes. Countries allow individuals to acquire citizenship by birth, naturalization, or marriage. Under the *jus soli* principle, which is rooted in both civil and common law traditions, citizenship is acquired by place of birth, implying that the native-born child of an immigrant is a citizen. Under the *jus sanguinis* principle, citizenship is acquired by descent, such that the child of a citizen is also a citizen, regardless of birthplace. Current citizenship laws often embody both principles, though they tend to have emerged out of one tradition or the other. *Jus soli* was predominant in Europe through the eighteenth

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century, given feudal traditions linking citizenship to land. The French adopted *jus sanguinis* in the early nineteenth century, which then spread throughout continental Europe and its colonies. The United Kingdom, however, preserved *jus soli*, which was adopted by the United States, Canada, and Australia (Bertocchi & Strozzi, 2006a, 2006b). Under a *jus sanguinis* tradition, a country may have difficulty in granting broad residency rights to immigrants whose parents were not citizens, as appears to be the case in France.

Source country policies may also affect which immigrants become naturalized in destination countries. During the 1990s, Brazil, Colombia, Costa Rica, the Dominican Republic, and Ecuador each enacted laws permitting dual citizenship. Mazzolari (2006) finds that between 1990 and 2000 US naturalization rates for eligible immigrants from these countries increased relative to immigrants from other countries, suggesting that not having to give up citizenship in the source may speed assimilation in the destination.

For illegal immigration, entry prices and selection criteria are defined implicitly through the intensity of border and interior enforcement (Either, 1986). Entry prices serve as selection device, since an individual must value migration to be willing to incur the cost of paying a smuggler. Entry fees thus select immigrants with relatively large perceived income gains (Orrenius & Zavodny, 2005), which would include those for whom immigration would yield large gains in either pretax income (due to a productivity gain from immigration) *or* posttax income (due to tax and transfer policies in the destination). While most destination countries would prefer to attract the first type of immigrant over the second, an entry price does not select between the two.

One way to encourage immigration of more productive illegal immigrants is through granting narrow residency rights. For instance, since 1996 noncitizens in the United States have been ineligible for most types of federally funded public assistance (Fix & Passel, 2002). A second way is through ex post screening. Interior enforcement helps screen illegal immigrants who commit crimes, try to obtain government benefits illicitly, or engage in other behavior deemed objectionable. Governments that choose *not* to monitor employers that hire illegal immigrants can ensure that illegals who come to work are able to remain in the country. In the United States, greater border enforcement does not appear to have strong deterrent effects on illegal entry (Davila, Pagan, & Soydemir, 2002) or to affect wages or employment in US border cities (Hanson, Robertson, & Spilimbergo, 2001), suggesting that the primary role of enforcement is not to disrupt US labor markets.

Combining price regulation, narrow residency rights, and an *ex post* screen helps countries attract productive and motivated illegal immigrants. This selection process may be particularly important for the low-skilled, whose observable characteristics may be uninformative about their productivity. In the United States, two-thirds of immigrants with less than a high school education appear to be in the country illegally (Passel, 2006), suggesting that the majority of the least skilled immigrants are unauthorized. Relative to similarly skilled natives, low-skill immigrants have high employment rates and low rates of participation in crime (Butcher & Piehl, 1998, 2006).

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The United States and the EU have considered using expanded temporary immigration to absorb their illegal immigrant populations (Schiff, 2007; Walmsley & Winters, 2005). Large scale illegal entry in the United States began after the end of the Bracero Program (1942-1964), which admitted large numbers of seasonal laborers from Mexico and the Caribbean to work on US farms (Calavita, 1992). Could new guest worker programs end illegal inflows? Recent literature suggests that unless interior enforcement is highly effective at preventing employers from hiring illegals, a guest worker program that rations entry would not curtail the employment of unauthorized labor but simply push these workers deeper into the underground economy (Djajic, 1999; Epstein, Hillman, & Weiss, 1999; Epstein & Weiss, 2001).

4.3 Discussion

In a neoclassical economy, the optimal immigration policy would be to allow the unfettered entry of labor from abroad. Yet, labor-importing countries tightly restrict labor inflows. Barriers to immigration in part reflect domestic political opposition to open borders, with those most opposed to labor inflows being the workers and taxpayers who are most exposed to the adverse consequences of immigration on labor markets and fiscal accounts. Immigration barriers may also represent a second-best policy that governments adopt in order not to exacerbate distortions associated with domestic social-insurance programs that they are unwilling to dismantle.

The structure of immigration policy regimes suggests that destination countries also use barriers to identify individuals who appear likely to be productive workers and/or have the desire to assimilate. Reserving immigration visas for skilled workers selects high ability foreigners in a transparent manner. Restricting the residency rights of immigrants helps screen those whose primary interest is in enjoying rich-country welfare benefits. Less transparently, barriers to illegal immigration also select the more productive and more motivated workers among the low-skilled, whose ability is hard to observe. The existence of informational problems in evaluating immigrants' abilities and motivations suggests that there may be gains from coordination between labor-exporting and labor-importing countries. Were labor-importing countries to have access to better information on the employment histories of low-skilled individuals in developing countries, they might be willing to accept them in larger numbers and require fewer of them to enter their economies as illegal immigrants.

For sending countries, the vast majority of which do not restrict emigration, the most relevant policies regarding labor outflows may pertain to education. Increasing secondary and tertiary educational opportunities in low income countries may increase the likelihood that its citizens will succeed in migrating abroad. If migration is temporary, such as to obtain an education or to complete a guest worker contract, the return to the poor country may be positive. The increase in earnings (and foreign trade and investment) created by emigration may more than compensate for the cost of

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schooling. However, Rosenzweig (2006) suggests that emigration for the purpose of education from countries with very low labor productivity is unlikely to be temporary. Foreign students from countries with low skill prices are those most likely to remain in the United States following their schooling. In these contexts, subsidizing education may be tantamount to subsidizing permanent emigration. Of course, countries may choose specific educational programs that encourage the return of migrants or improve their chance of landing a guest worker visa (as the Philippines has done), which may yield a positive economic return. For a more detailed discussion of education policies in developing countries, see the chapter in this volume by Jere Behrman.

5. FINAL DISCUSSION

Despite recent advances in the theoretical and empirical analysis of international migration, there is still a great deal that we do not know about global labor movements. This is in part due to the lack of data. Only recently has information on the global stock of emigrants become available. Much of the individual level data on international migration covers Mexico and/or the United States, which are the subject of a large literature. As the largest sending and receiving country, there is still more to learn about the Mexico-US context. Yet, the highest payoff to research is likely to be in the many under-studied parts of the world. Since 1990, Central and Eastern Europe have become major sending regions; the Gulf States, Russia, and Spain have become an important receiving regions; and emigration from China, India, Indonesia, Pakistan, and the Philippines have accelerated, to name but a few of the recent developments in global labor flows. Women now account for a growing share of international migrants and migrants in general appear to have a presence in destination countries that is more permanent than in the past. None of these events is well understood. Combining data from population censuses in sending and receiving countries is one way to amass a large quantity of information on international migration from existing data sources, a strategy put to use recently but that is far from being fully exploited. Collecting panel data on the behavior of actual and potential migrants, which is a more costly but ultimately more illuminating approach, is essential for research on international migration to progress.

Given the magnitude of international wage differences, global migration is not as large as one would expect. We know little about the magnitude of international migration costs. What is the relative importance of uncertainty, credit constraints, and destination-country admission policies in keeping the poor from migrating to rich economies? Existing research is silent on this issue. While there is growing evidence that migration networks play an important role in reducing moving costs, the empirical dynamics of networks are poorly understood. Are there diminishing returns in the impact of network size on migration costs? Or does the existence of networks imply that spatial opportunities for emigration will only become more unequal over time?

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There is abundant evidence that the more educated have the highest propensity to emigrate. While theoretical literature on brain drain is well developed, empirical work is limited. Given the importance of human capital in economic development, how skilled emigration affects a country's relative supply of skill is a question of first-order policy importance. As economists, we simply do not know what to tell developing countries about how changes in their education, tax, or other policies have affected skilled emigration, the domestic supply of skill, or remittances from skilled emigrants.

Over 10 year intervals, there is a positive correlation between emigration and wage changes, suggesting that labor outflows tend to put an upward pressure on wages. Largely unknown, at least empirically, is how emigration interacts with international trade or foreign direct investment. It appears that sending and receiving countries are still far from having equal factor prices, in which case we might expect to see trade, migration, and FDI to happen concurrently, even reinforcing one another. The literature provides insufficient guidance to developing countries about how the various mechanisms for globalization interact in different settings.

The inflow of remittances has been a welcome financial boon for many labor-exporting countries. While remittances may help deepen domestic financial markets, as households use banks or other intermediaries to manage lumpy income receipts from abroad, there should be no presumption that the primary motivation for remittances is to finance new investment. As the return on previous household investments in migration, most remittances may end up supporting consumption.

Destination country restrictions on labor inflows leave the world far from a state of open borders. While quotas on legal immigration appear to bind in all or nearly all labor importing countries, opportunities for illegal immigration makes labor inflows substantially more flexible than *de jure* policy regimes would suggest. Government choices over the components of immigration policy reflect the political organization of groups that would be hurt by immigration, national preferences over who merits inclusion as a citizen, and a tradeoff between providing incentives for assimilation and obtaining information about the ability of immigrants.

Within the development policy community, there are calls for rich countries to open their economies more widely to labor inflows from poor countries (e.g., Pritchett, 2006). Completely open borders are off the table politically. Were the developed world to propose an increase in immigration quotas, should developing countries take the offer? The literature suggests the answer depends on how destination countries structured the additional labor inflows. An increase in immigration quotas that targeted workers with higher levels of skill (relative to nonemigrants in source countries) could raise global income, even as it lowered welfare for the less-skilled majority in source countries. It could also lower global welfare, under an egalitarian social welfare function that gives each individual equal weight (Benhabib & Jovanovic, 2007). While

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quotas targeted to less-skilled workers could raise global welfare (though in the presence of human capital externalities they would not maximize global income), the adoption of such a policy appears unlikely given the political opposition in destination countries to labor inflows that worsen distortions associated with social insurance and related programs.

The only feasible way to generate political support in destination countries for increased low-skilled migration would seem to require (a) insulating destination countries from immigration's fiscal effects, (b) allowing destination countries to capture more of the gains from global migration (Freeman, 2006), or (c) helping destination countries overcome informational problems in selecting less-skilled immigrants who are likely to be productive workers (Cox and Posner, 2007). So far, few democratic destination countries have been willing to try approach (a) or (b); approach (c) remains untested. Without policy experimentation, illegal entry may remain the primary means through which low-skilled workers in poor countries are able to migrate to rich ones.

End Notes

1. The more sizable migration flows into non-OECD countries are from the former Soviet Republics to Russia; Bangladesh to India; Egypt, India, Pakistan, and the Philippines to the Gulf States; Afghanistan to Iran; Iraq to Syria; other South African states to South Africa; Indonesia to Malaysia; Malaysia to Singapore; Guatemala to Mexico; and Nicaragua to Costa Rica (Ratha & Shaw, 2007).
2. The UN Universal Declaration of Human Rights (1948) states that "Everyone has a right to leave any country, including his own" (UN, 2002).
3. Topics I will not address include the age of mass migration (see, e.g., Bertocchi & Strozzi, 2006a; Hatton & Williamson, 1998), the impact of migration on receiving countries (see, e.g., Borjas, 1999b), and the emigration of retirees from rich countries (see, e.g., Williams, King, & Warnes, 1997). The first two topics have received much attention elsewhere; the third has received too little attention to merit discussion.
4. See Borjas (1999b) for a survey of the literature on immigration in the United States and the volumes in Borjas (2007) on the specific impacts of Mexican immigration.
5. See Docquier and Marfouk (2006) for further discussion of data sources on international migration.
6. Primary indicates 0-8 years of schooling, secondary indicates 9-12 years of schooling, and tertiary indicates 13 or more years of schooling.
7. OECD members in 2000 were Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.
8. In the United States, the undercounting problem does not appear to be too severe, with the US Census Bureau estimating that it misses only 5-10% of illegal immigrants (Passel, 2006).
9. Unless otherwise noted, tables and figures are based on calculations using raw data from Docquier and Marfouk (2006). In these data, the adult population is individuals aged 25 years and older.
10. As recently as 1990, the United Kingdom was the largest source country for immigrants in the OECD.
11. Other evidence suggests that Spain has also seen a large recent increase in its immigrant population.

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12. See Hanson (2006) for a review on the literature of illegal migration from Mexico.
13. The countries with the highest emigration rates to the OECD are Guyana (42.1%) and Suriname (47.4%).
14. Three clear outliers in this relationship are Guyana and Suriname, which have low population densities and high emigration rates, and Singapore, which has a high density and low emigration.
15. One limitation of this study is that "immigrants admitted" are measured by the number of individuals who receive a US legal permanent residence visa, or green card, in a given year. A substantial fraction of green-card recipients are individuals already residing in the United States, either on a temporary immigration visa or as unauthorized immigrants. Over the period 1991-1999, for instance, 50.3% of US green card recipients were current US residents (U.S. Immigration and Naturalization Service, 2000), implying there is slippage between measured and actual inflows of immigrant labor.
16. Similar distance elasticity estimates can be found in the study by Karemera, Oguledo, and Davis (2000), for bilateral migration to the United States and Canada in the 1970s and 1980s, and Pedersen, Pytlikova, and Smith (2004), for bilateral migration to OECD countries in the 1990s.
17. One concern about the estimation results in Clark et al. is that they include both source-country dummy variables and the lagged stock of emigrants in the United States as regressors. Since the current stock is the sum of past flows, the specification is close to having fixed effects and a lagged dependent variable, which creates concerns about the consistency of the coefficient estimates.
18. See, for example, Borjas (1987), Karemera et al. (2000), Volger and Rotte (2000), Hatton and Williamson (2002), Pedersen et al. (2004); and Gallardo-Sejas, Pareja, Llorca-Vivero, and Martinez-Serrano (2006).
19. Borjas (2005) reports that half of foreign doctoral students in the United States remain in the country.
20. See Docquier and Rapoport (2007) for a survey of the theoretical literature on brain drain.
21. See Beine, Docquier, and Rapoport (2001) for related work.
22. See Dahl (2002) on the application of the Roy model to internal migration.
23. Feliciano (2001), Hanson and Chiquiar (2005), Orrenius and Zavodny (2005), McKenzie and Rapoport (2006), Cuecuecha (2005), and Rubalclava *et al.* (2006) find that emigrants from Mexico are drawn from the middle of the wage or schooling distribution; Ibarraran and Lubotsky (2005) and Fernandez-Huertas (2006) find that Mexican emigrants are drawn from the lower middle of the wage or schooling distribution. No study finds that emigration rates decrease monotonically in skill, as predicted by Borjas (1987).
24. In 2000, the tertiary educated were 47.4% of emigrants and 16.5% of the population in Chile and 39.5% of emigrants and 12.4% of the population in Poland (where the population is residents plus emigrants).
25. First, he regresses source-country log wages on individual age, individual schooling, and source-country fixed effects, where the fixed effects reflect the marginal product of labor (under the assumption that the coefficients on age and schooling are constant across countries). Second, he corrects the estimated fixed effects for selectivity into migration by regressing them on source country GDP and average schooling and the inverse Mills ratio from a blocked Probit regression of migration to the United States (which takes source-country determinants of migration costs as arguments).
26. For research on networks outside of Mexico, see Du, Park, and Wang (2005) on China and Bauer and Gang (1998) on Egypt.
27. For other work on migration networks in Mexico, see Winters, de Janvry, and Sadoulet (2001).
28. For related work, see Reyes, Johnson, and Van (2002) and Angelucci (2006).
29. In the estimation of coyote prices, Gathmann (2004) instruments for border enforcement using the drug budget of the US Drug Enforcement Agency (DEA). In the estimation of the demand for coyote services, she includes both the smuggler price and the level of border enforcement as regressors, instrumenting the former with the average US prison term for smugglers (which rises over the sample period) and for the latter again with the DEA drug budget.

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30. See Lapointe and Orozco (2004) also on Mexican hometown associations in the United States and Caglar (2006) on Turkish hometown associations in Germany.
31. To interpret the wage elasticities, let labor demand be $\ln W = \eta \ln(L - M)$, where W is the wage, $\eta < 0$ is the factor price elasticity (i.e., the inverse elasticity of labor demand), L is the native employment, and M is the number of workers lost to emigration; and let domestic labor supply be given by $\ln W = \kappa \ln L$, where $\kappa > 0$ is the inverse elasticity of labor supply. The resulting reduced-form expression for wages is $\ln W = \eta\rho m$, where $m = M/L$ is the emigration rate and $\rho = (\eta/\kappa - 1)^{-1} < 0$. The elasticity of wages with respect to emigration is $\eta\rho > 0$. Since $|\rho| < 1$, the emigration wage elasticity understates the factor price elasticity.
32. Both Mishra (2007) and Aydemir and Borjas (2007) treat emigration (in schooling and labor-market experience cells) as exogenous (after controlling for schooling, experience, and year fixed effects, and their interactions). Any endogeneity of emigration to wage shocks in Mexico would tend to bias the estimated emigration wage elasticity toward zero (since emigration would be negatively correlated with wage shocks), suggesting these results may understate the impact of emigration on wages in Mexico.
33. On US-Mexico labor-market integration, see also Robertson (2000).
34. See Borjas, Grogger, and Hanson (2007) on how to estimate the wage impacts of migration when capital accumulation is endogenous.
35. See Borjas and Katz (2007) on the wage impact of Mexican immigration in the United States.
36. From the 1920s to the 1960s, the nine west-central states accounted for 44.0-56.1% of Mexican migration to the United States, but only 27.1-31.5% of Mexico's total population (Durand, Massey, & Zenteno, 2001).
37. Hanson's (2007) results imply the elasticity of wages with respect to emigration is 0.7-0.8. This elasticity reflects both the direct effects of emigration on the labor supply *and* any indirect effects of historical emigration patterns on current regional wage growth, which may account for it being larger in magnitude than the estimates in Mishra (2007) and Aydemir and Borjas (2007).
38. See also Desai, Kapur, and McHale (2004).
39. A further beneficial effect of emigration is that it may increase the incentive to invest in productive skills—which are likely to have a positive return abroad—over rent-seeking activities—which are likely to have a low return abroad (Mariani, 2007).
40. Between 1990 and 2000, the share of the adult resident population (i.e., net of brain drain) with a tertiary education rose from 2.0% to 2.7% in China, 4.1% to 4.8% in India, and 12.2% to 19.1% in Taiwan.
41. These data understate emigration rates for African physicians because (a) the emigrant stock is calculated for just nine destinations (Australia, Belgium, Canada, France, Portugal, South Africa, Spain, the United Kingdom, the United States), and (b) only individuals listing their current occupation as medical doctor are counted as physicians.
42. See Rosenzweig and Stark (1989) on internal migration and consumption smoothing.
43. See Mesnard (2004) on return migration and self-employment in Tunisia.
44. Also on return migration, see Borjas and Bratsberg (1996) and Lacuesta (2006).
45. For a discussion of work in this literature, see Ozden and Schiff (2006) and Fajnzlber and Lopez (2007).
46. Trade links associated with immigration tend not to apply in the case of refugee flows.
47. Migration under Mode IV would result from a contract between a buyer in an importing country and a supplier in an exporting country, in circumstances where consummation of trade requires the presence of the supplier's employees in the buyer's location (e.g., trade in architectural services that requires the supplier to be present in the buyer's country in order to oversee construction of a building). Given the fixed costs involved in negotiating such contracts, they would likely be limited

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to skilled labor. Mode IV migration is distinct from migration under a guest worker program, in which an employer in an importing country directly hires a worker from an exporting country under a temporary contract.

48. Or, governments may restrict immigration because they weigh the welfare of different individuals unequally, for whatever reason favoring those opposed to immigration (Foreman-Peck, 1992).
49. For related work, see Epstein and Nitzan (2006).
50. See also Kessler (2001), Hatton and Williamson (2005), and O'Rourke and Sinnott (2006).
51. In the long run, immigrants may affect voting outcomes directly through their participation in the political process (Ortega, 2004; Razin, Sadka, & Swagel, 2002).

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