43 International migration and the brain drain

Francisco L. Rivera-Batiz

Introduction

International migration flows have expanded by historical proportions in recent years. In 1960, there was a stock of slightly over 75 million people residing in countries other than their country of birth. By 2005, this number had grown to 190 million. For many developing countries, international labor flows have become a natural outcome of the globalization process, as much as trade and investment flows. The money the migrants send back home has become a major source of income for families in developing countries. In 2005, migrant remittances amounted to $600 billion. For some countries, the income received from the services of workers abroad is now a major item of the balance of payments.

But international migration flows are not without their costs. For many years, the issue of the brain drain has been studied by international economists. From software engineers in India to doctors in the Philippines and nurses in sub-Saharan Africa, the exodus of skilled migrants has been a policy concern for many developing countries. The impact on the skilled labor forces of some countries has been substantial, especially in sub-Saharan Africa. In Ghana, for example, over 40 percent of persons with a college degree or more have migrated to other countries. In Gambia, the corresponding proportion is close to 65 percent, and in Somalia it is 59 percent. What are the consequences of these labor outflows? What benefits or costs do they impose in the sending nations?

This chapter provides an analysis and survey of the key recent trends in international migration, their determinants and major consequences. The next section presents data on the growth of global migration flows since the mid-1950s. The section after that proceeds to examine the causes of these migration flows, focusing on the main economic factors involved. The subsequent section analyses of the consequences of international migration for source countries. The concluding section discusses implications for future research.

Trends in international migration flows

International migration refers to the movement of people across national borders. Data on migration are available directly from national immigration

authorities in recipient countries. However, the data available for many countries are sketchy and difficult to compare with data for other countries due to differences in migration policies, definitions of what constitutes immigrants, the presence of undocumented migration, and so on. Some international organizations gather cross-country data on migration and seek to provide more uniform, comparable statistics. The Organisation for Economic Co-operation and Development (OECD) has for many years collected information on the migration of OECD countries and has an extensive database for these countries (see, for example, OECD, 2006). The United Nations has the most comprehensive worldwide database on the number of migrants residing in different countries (United Nations, 2007). There are also data collection efforts supported by the World Bank (Docquier and Marfouk, 2006), the International Monetary Fund (Carrington and Detragiache, 1998), and other institutions such as the Development Research Centre on Migration, Globalisation and Poverty at the University of Sussex (see Parsons et al., 2007).

Table 43.1 shows the massive growth in the estimated number of international migrants between 1960 and 2005. In 2005, there were 190 million people residing in countries other than their country of birth, up from 75 million in 1960. Most of these migrants originated in developing countries: it is estimated that 123 million migrants, or 65 percent of the total, were born in developing countries. Mexico had the highest number of persons residing abroad, equal to over 10 million in 2000, largely in the United States. This was followed by India, which had close to 9 million persons residing abroad in 2000, with the country's diaspora spread all over the world. Other countries with mass emigration include Bangladesh (6.6 million emigrants), the Philippines (3.4 million), Pakistan (3.4 million), Turkey (3.0 million), Afghanistan (2.7 million), Morocco (2.6 million), Egypt (2.5 million) and Algeria (2.1 million), among others.

The destination of emigrants from developing countries is evenly split between high-income and developing countries. In 2005, close to 62 million people born in developing countries were residing in high-income economies, but 61 million resided in other developing nations. Among high-income countries, those with the largest number of immigrants included the United States (38.4 million), Germany (10.1 million), France (6.4 million) and Canada (6.1 million). Developing countries with the highest immigrant populations included Russia (12.1 million, who moved mostly from elsewhere in the former Soviet Union), Ukraine (6.8 million), Saudi Arabia (6.4 million), India (3.3 million) and the United Arab Emirates (3.2 million).

The emigration of skilled workers is one of the major concerns relating to migration flows in developing countries. To measure the magnitude of

Table 43.1 Estimates of the Stock of International Migrants in the World, 1960–2005

Year	Stock of migrants		Change between years
1960	75 463 352		
		]	2 980 581
1965	78 443 933		
		]	2 891 846
1970	81 335 779		
		]	5 453 525
1975	86 789 304		
		]	12 486 594
1980	99 275 898		
		]	11 737 332
1985	111 013 230		
		]	43 932 103
1990	154 945 333		
		]	10 134 902
1995	165 080 235		
		]	11 655 537
2000	176 735 772		
		]	13 897 792
2005	190 633 564		

Source: United Nations (2007).

skilled emigration or brain drain, a country's labor force is divided into those who are skilled – generally considered to be those who have some tertiary education, that is, 13 years of schooling or more – and those who are less skilled, who have achieved less than tertiary education. The emigration of the skilled has been rising, just as global migration flows have increased in general. In OECD countries, for example, there were 12.5 million skilled immigrants of working age in 1990, but by 2000 the number had risen to 20.4 million, equal to 34.6 percent of the total number of immigrants in these countries.

The skilled emigration rate is defined as the stock of skilled migrants from a country (all persons with tertiary education living abroad) calculated as a percentage of the total skilled labor force in the source country augmented by the skilled migrants themselves. This shows the percentage of workers with tertiary education who were born in a country but are residing outside its borders. Hence, it is a measure of the relative impact of the emigration on the sending country's skilled labor market. The highest skilled emigration rates in the world prevail in the Caribbean, where in 2001

as much as 42.8 percent of the region's tertiary labor force resided outside its borders (Docquier and Marfouk, 2006). Skilled emigration has also been enormous for a number of countries in Africa. In East Africa, the skilled emigration rate was close to 20 percent in 2001.

The determinants of international migration flows

What has caused the mass migration documented in the previous section? There is a massive literature examining the determinants of migration flows. This section presents the main forces and conceptual approaches that seek to explain migration flows.

The economic approach to migration: costs and benefits

At the level of theory, the classical economic model of the decision to migrate was formalized by Sjaastad (1962) and has been extended in a number of directions (see, for example, Lucas, 1985; Borjas, 1999). In this approach, the decision to migrate is seen as an investment decision that depends on individual assessments of the net balance of the present and future costs and benefits of migration. For a worker i, the net gain from migration, G_i, is equal to the present discounted value of the benefits minus the costs of migrating:

$$G_i = \sum_{t=1}^{T} [B_{it}/(1+r)^t - C_{it}/(1+r)^t] \tag{43.1}$$

where T is the lifespan of the worker, r is a discount rate, B_{it} are the benefits at any given time t, generally in the form of higher wages or improved employment opportunities in the destination country, and the costs, C_{it}, include the direct costs of the move (transportation costs), the foregone earnings when the individual migrates, and any utility losses associated with leaving the homeland.

Note that different individuals will face varying costs and benefits, and the probability of a person migrating from an origin to a destination area will vary. Older workers, for example, may suffer the greatest net losses in foregone earnings and may also face higher psychic costs of leaving the source country. As a result, the likelihood of migration declines with age. Location also matters. Indeed, most migration flows occur among geographically close, often neighboring, countries, where the costs of migration are lower. Empirically, the role of geographical and cultural proximity in determining migration movements has been emphasized by the so-called 'gravity model of migration flows', for which there is ample supporting evidence (see Karemera et al., 2000; Hatton and Williamson, 2005).

Labor markets and the returns to international migration

Due to the difficulties of estimating future costs and benefits, most studies examining the decision to migrate focus on the current labor market gains from migrating, I_i, given by:

$$I_i = \log W_{iD} - \log W_{iO} \tag{43.2}$$

where W_{iD} is the wage rate that individual i can obtain in the destination and W_{iO} is the equivalent wage at home. These wage rates are influenced by the various characteristics of workers, including their schooling, Ed_i, their on-the-job experience, Ex_i, their motivation, M_i, health, marital status, number of children, and so on. Suppose, for simplicity, that the following characterizes the wages of individual i in the destination and origin regions:

$$\log W_{iD} = \alpha_D + \alpha_{1D} Ed_i + \alpha_{2D} Ex_i + \alpha_{3D} M_i \tag{43.3}$$

$$\log W_{iO} = \alpha_O + \alpha_{1O} Ed_i + \alpha_{2O} Ex_i + \alpha_{3O} M_i \tag{43.4}$$

where the α's represent how the various individual characteristics (education, experience, and so on) are rewarded in each country. The net gain from migration is thus:

$$\begin{aligned} I_i = \log W_{iD} - \log W_{iO} &= (\alpha_D - \alpha_O) + (\alpha_{1D} - \alpha_{1O}) Ed_i \\ &+ (\alpha_{2D} - \alpha_{2O}) Ex_i + (\alpha_{3D} - \alpha_{3O}) M_i \end{aligned} \tag{43.5}$$

For any individual, the incentive to migrate will vary on the basis of the skills (education, experience, and so on) that the worker is endowed with, his or her motivation, and how skills as well as motivation are rewarded in relative terms in the source and destination countries.

A large body of research has now accumulated studying the labor market outcomes of developing-country emigrants in their destinations (see, for example, the collection of research in Zimmermann and Constant, 2004, as well as the surveys by Borjas, 1999 and Hanson, 2006). This literature suggests that the economic returns to migrating are substantial for most workers. But the economic progress of migrants varies according to the characteristics of the migrants themselves (age, schooling, immigration status, and so on), the timing of the migration, and the country of destination. In some European countries, for instance, immigrants have substantially lower rates of labor force participation as well as higher unemployment rates than the native-born population. The relatively poor labor market outcomes of some immigrants are partly related to lack of skills, but they also depend on labor market conditions in – and

time spent in – recipient countries (Fertig and Schmidt, 2002; Rivera-Batiz, 2007).

Migrant selectivity

One of the most discussed issues in the international migration literature is whether emigrants are the most qualified, skilled workers in the origin economy or not. If migrants are positively selected, then they will be more likely to succeed abroad, but their exit from the source country will drain the most capable, most skilled population from the nation, with a potentially negative impact on its economy and society.

What determines whether migrants are positively or negatively selected? There are forces that favor a positive selectivity and others that encourage a negative selectivity. The best-known hypothesis is that emigrants tend to be positively selected because in order to compensate for the substantial costs of migration, only those who have the strongest drive and motivation – and the expectations of great rewards – will actually undertake the migration process (see Chiswick, 1978, 1999). Of course, if costs of migration decline, then this aspect of selectivity will tend to become less significant. In addition, as equation (43.5) suggests, the impact of motivation on migration depends on whether motivational skills are more strongly rewarded in the destination region. Indeed, one suspects that holding constant the distribution of motivational skills in a population, if these skills are poorly rewarded at home but richly rewarded abroad, the incentives to migrate from source to destination regions will increase.

A second hypothesis (referred in the literature as the 'Roy model') is that, if those with greater skills or abilities are rewarded more highly compared to the less-skilled in the origin area when compared to the destination region, this will generate less incentives for those at the top of the skills or ability distribution to emigrate compared to those at the bottom of the distribution, causing a negative selectivity of migrants. Therefore, the emigrant contingent will be positively or negatively selected depending on the relative inequality of the distribution of income at home and abroad. For instance, the more unequal the income distribution in the origin area as compared to the destination, the lower the incentives for the highly skilled to emigrate relative to the less skilled. This result is easily obtained from equation (43.4). Since $\partial I_i/\partial Ed_i = (\alpha_{1D} - \alpha_{1O})$, if greater inequality in the source country is associated with a rate of return to education in the origin area that exceeds the rate of return in the destination country, then $(\alpha_{1D} - \alpha_{1O}) < 0$. This implies that, as the education of the prospective migrant rises, the incentives to migrate tend to decline. Note also that under asymmetric information, employers in the destination region may not be able accurately to assess the skills of the migrants and they may offer lower

wages to the highly skilled migrants, when compared to employers in the source country, that are able to assess more accurately the potential migrants' skills and pay them wages more consonant with their skills. This will again reduce the rate of return to education received by the emigrants in the destination region relative to the source country ($(\alpha_{1D} - \alpha_{1O})$will decline), shrinking the incentive to migrate of the highly skilled relative to the unskilled (see Stark and Taylor, 1991).

Some evidence appears to support the implications of the Roy model (see Borjas, 1987, 2006). For instance, recent research finds a negative selectivity in the migrant contingent from Mexico to the United States (that is, the emigrant group tends to have lower average skills than the population left behind), as would be expected from the relatively more unequal distribution of income in Mexico relative to the United States (see Fernandez-Huertas Moraga, 2007, for this analysis and Chiquiar and Hanson, 2005, for alternative results).

Income differences and international migration

Overall, the evidence on the importance of economic factors in motivating migration flows, as presented in equations (43.1)–(43.4) is extensive. Both documented and undocumented migration flows have been found to be strongly correlated to the relative economic conditions in recipient and source countries (see, for example, Adams, 1993; Hanson and Spillimbergo, 1999; Drinkwater, 2003; Castaldo et al., 2005).

But despite the widespread support for the hypothesis that increased income differentials between recipient and source countries stimulates migration, there is also ample support for the view that this connection does not always work and may actually hold in reverse (see Hatton and Williamson, 1998, and the review by Waddington and Sabates-Wheeler, 2003). For instance, in recent research seeking to determine the impact of differences in income per capita on migration flows in the world, Hatton and Williamson (2005, p. 240) find that in sub-Saharan Africa, increases in income at home increase migration. Indeed, the evidence suggests that the relationship between income per capita in source countries and emigration has an inverted-U shape. For poor countries, as income rises, migration actually increases. But as the wealth of a country grows, at some point, further increases in income per capita actually reduce emigration.

One explanation for this behavior is the fact that, at low levels of income per capita, a large part of the population just simply cannot afford the monetary costs of migrating. However, as per capita income in a country rises, this allows some people to save enough to pay for the transport and other costs of migration, thus increasing migration flows (see Hatton and

Williamson, 2005). An additional explanation is that the massive structural changes occurring in the early industrialization of an economy (the shift from agriculture to industry and services, from urban to rural areas, and so on) leads to a dislocation of the population that fosters international migration. As the economic development process matures, however, these changes diminish and migration declines. A third hypothesis for the paradoxical rise of migration flows as income increases in many economies is based on 'relative deprivation theory'. It suggests that, as inequality rises in the early years of economic development (a trend first noted by economist Simon Kuznets), those who become relatively poor will become increasingly dissatisfied with their relative standing in the community. This will stimulate them to emigrate in order to improve their standard of living (see Stark and Taylor, 1991).

Families and the decision to migrate

Despite its powerful role in explaining migration flows, another problem of using a simple economic approach based on income differences across countries is that it cannot explain temporary migration. If there is a significant and persistent wage and employment differential between origin and destination regions, why do so many migrants wish to stay in the destination only for short periods of time?

One explanation is offered by the so-called new economics of labor migration (see Stark and Bloom, 1985). In this approach, it is understood that migration decisions are often made by families and households, not individuals. In contrast to the analysis in equations (43.1)–(43.4), the decision-making is not in the hands of an individual who maximizes his or her utility. Rather, migration decisions are made by families or households that maximize household utility over time. This utility, U, is derived from a stream of consumption by family members located in the home and/or destination regions, C_D and C_O, added all the way up to the time horizon of the family, T, and discounted to the present time, t:

$$U = \int_t^T \exp[-\rho(\tau - t)] \log U[C_D(\tau), C_O(\tau)]\, d\tau \qquad (43.6)$$

where ρ is a rate of discount. Equation (43.6) is maximized subject to a budget constraint establishing that the present discounted value of income earned in the source and destination areas is equal to or greater than the present discounted value of family consumption spending.

Visualizing migration as an intertemporal family or household decision can help understand that the migration of some household members may be part of the savings and investment decisions of a family. The idea is that, if low-income households encounter capital market imperfections at home,

which exclude them from access to the financing of investments in housing, durable goods or in self-employed businesses, migration abroad may lead to the accumulation of remittances that can then be used to finance those purchases and investments. Migration becomes a short-term activity needed by households to raise funds in the absence of local financing. Another application of this approach is that the migration of one household member may reduce the costs of migration for other household members. This is what 'network or chain migration theory' suggests (see Piore, 1979; Bauer et al., 2000).

The political economy of immigration policy

The discussion so far has described the wide array of forces that may generate a supply of potential migrants. However, in an international context, destination-country governments exert an enormous force in restricting immigration flows. As a result, the volume of migration between developing countries and high-income economies is often determined by the immigration policies imposed by the latter.

Research on the determinants of immigration policies follows a growing literature in political economy that seeks to answer the question of how the policies of a country are generated through the interaction of economic, political and social forces (Mayda and Patel, 2006). A wide array of economic forces may lie behind the setting of immigration policies. For instance, if immigration reduces wages and raises the profits of employers and owners of capital, then persons who own firms or farms or own relatively large amounts of capital will be in favor of immigration, but those who do not have wealth and only have their labor will be against immigration (see Benhabib, 1996). But if the distribution of capital in a country is highly concentrated, with a great part of the workforce laboring at low wages, then there may be very few persons supporting immigration and many opposing it. If immigration policy is determined by influence of voters, immigration policy restrictions may be high. This force is magnified if the immigrants are unskilled since in this case the immigrants may be perceived as competing with the poor, generating stronger cries for immigration restrictions (Hatton and Williamson, 2005).

The available evidence confirms the role that economic forces play in affecting the immigration attitudes of natives in recipient countries (see Gang et al., 2002, 1999; Scheve and Slaughter, 2001; Mayda, 2006). But economic factors are not the only ones affecting attitudes towards immigrants. Social phenomena, such as xenophobia and bias against foreigners, can have a major influence on immigration policies (see Gang and Rivera-Batiz, 1994; and Gang et al., 2002, for analyses of the determinants of attitudes towards immigrants).

International migration and economic development

What are the economic consequences of mass migration for the developing world? What changes in the source countries are generated by migrants? This section examines the existing theory and evidence on how emigration affects developing nations.

The distributional and welfare impact of emigration

The simplest theoretical framework that can be used to examine the effects of international migration is one that focuses on the aggregate economy, within a simplified setting where there are only two inputs: capital and labor (see Bhagwati and Rodriguez, 1975; Borjas, 1999; Mishra, 2006). Figure 43.1 shows the labor market in the source country before and after emigration. The demand for labor (the economy's marginal value product curve) is L^D and the supply of labor before emigration is depicted by L^S, where it is assumed that there is an inelastic supply of labor given by the country's labor force. Under the assumption that the labor market is perfectly competitive and generates full-employment, the equilibrium before emigration is at point A, with a wage rate equal to W^* and employment E^*. If the number of emigrant workers is given by M, the labor force declines, shifting the aggregate supply of labor to the left, to $L^S - M$. The equilibrium after migration occurs at point B. The shortage of labor induced by emigration reduces employment from E^* to E^{**}, and raises

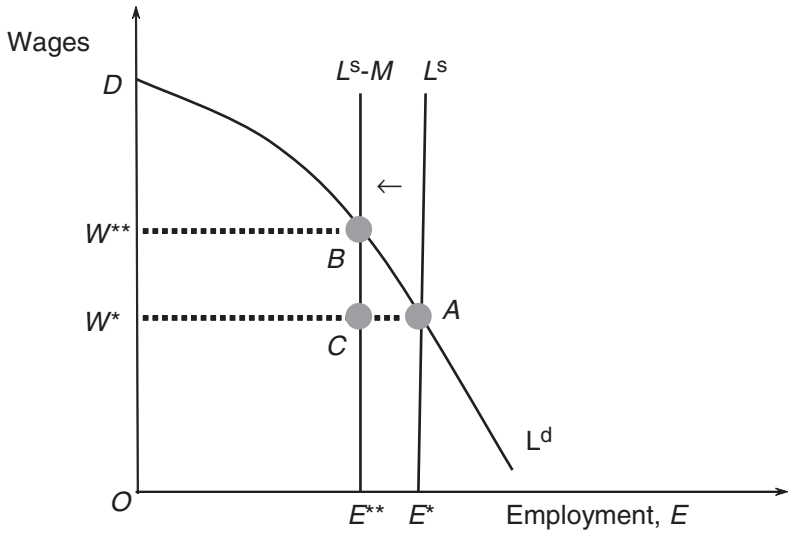

Figure 43.1 The effects of emigration on the source country

wages rates from W^* to W^{**} (this assumes that the domestic capital stock is unaffected by emigration).

The impact of emigration can be depicted in Figure 43.1 by noting first that national income is given by $Y = WL + rK$, with K equal to the economy's capital stock and r the rate of return to capital. Diagrammatically, after emigration, the income received by the workers that remain in the economy is equal to $W^{**}E^{**}$, as represented by the rectangle $W^{**}BCW^*$. This rises compared to the situation before emigration, when the income of these workers was W^*E^{**}. The gain in income by labor is $(W^{**} - W)E^{**}$. But although labor gains by emigration, capital is hurt by it. The income received by capital is given by $Y - WL$. Diagrammatically, the value of national income, Y, is equal to the area below the demand for labor curve up to the level of employment. After emigration, the value of national income is $DBCE^{**}O$. As a result, after emigration, the income received by capital is $Y - WL = DBCE^{**}O - W^{**}E^{**} = DBW^{**}$. The income derived by capital before the emigration was $DBACW^*$. Hence, the income of capital declines by $DBACW^* - DBW^{**} = W^{**}BAW^*$.

In this context, emigration results in a redistribution of income from capital to labor. But the emigration has also a net, overall negative impact on the income of those left behind. Adding the loss of capital and the gain to labor leaves a net loss represented diagrammatically by the area BAC. Algebraically, this loss can be approximated by:

$$(\Delta Y)/Y = (1/2)(\Delta W)M = -(1/2)S_L\eta_{LL}(M/L)^2 \qquad (43.7)$$

where ΔW is the change in wages($\Delta W = W^{**} - W^*$), M is the loss of labor($M = -\Delta E = E^* - E^{**}$), and where $\eta_{LL} = -(\partial W/\partial E)(E/W)$ is the negative of the elasticity of the labor demand curve with respect to wages. The effects on the income of labor and capital are then: $(\Delta WE)/Y) = S_L\eta_{LL}(M/L)(1-(M/L)) > 0$ and $(\Delta rK)/Y) = -S_L\eta_{LL}(M/L)(1-(M/2L)) < 0$.

Although in this simplified setting emigration results in a gain to labor (the mobile factor), a loss to capital (the fixed factor) and a net loss to the overall economy, these conclusions can be reversed in more complex frameworks. First of all, the model is a partial-equilibrium, closed-economy model but most modern economies are both highly diversified and engage in substantial international trade. In a general equilibrium framework with trade, such as the Hecksher–Ohlin–Samuelson (HOS) model, emigration has no lasting impact on the source country, whether on income distribution or in terms of the net impact on economic welfare. The explanation is that the emigrants themselves induce a reduction in the demand for labor in the source country. As the migrants leave, they do place upward pressure on wages, as noted in the earlier model. But this makes employment in

capital-intensive sectors, such as heavy manufacturing, more profitable. As production shifts away from labor-intensive products and into capital-intensive sectors, the overall demand for labor in the economy shrinks. This puts downward pressure on wages, reversing the initial impact of the emigration. This result, where an outflow of labor leads to no change in wages, is based on the Rybczyinski effect in the trade literature (see Bhagwati and Rodriguez, 1975; Rivera-Batiz, 1983).

But the assumptions of the HOS model under which this result is derived are stringent. Besides the assumptions of perfect competition and no distortions, the framework assumes the absence of externalities and increasing returns. In addition, the model does not distinguish between skilled and unskilled labor emigration. Once these assumptions are relaxed, the theoretical analysis may yield complex and ambiguous effects of emigration (see, for example, Dutt, 2005). Furthermore, when considering costs and benefits from migration one should consider as well the overall, global impact of migration flows. If there are net world gains, there are then strong reasons for governments in recipient and destination areas to coordinate their migration policies, so that both developing countries and high-income economies can profit from the migration flows (see Pritchett, 2006; Kapur and McHale, 2005).

The empirical evidence on the welfare and distributional effects of emigration on source countries is scant (the analysis of the impact of immigration has been more extensive). Recently, however, some studies have utilized Census data over time to examine the issue. Mishra (2006) examines emigration from Mexico to the US, concluding that the outflow of Mexican workers to the United States between 1970 and 2000 has increased worker earnings in Mexico worker by 5.9 percent of GDP and has reduced the income of the owners of fixed factors by 6.4 percent of GDP, with a small, negative net impact on overall economic welfare of those left behind (see also Borjas, 2006). On the other hand, there are other potential impacts of emigration to consider that are not examined in this literature, as discussed next.

Remittances and the impact of emigration

One of the most visible impacts of the migrants on source countries is connected to the remittances that they send back home. These flows of resources have grown exponentially in recent decades. Measured in 2000 international purchasing power parity (PPP) dollars, developing countries received $50 billion in migrant remittances in 1980, but by 2005 this had multiplied to $605 billion (World Bank, 2007). The regions receiving the most remittances were East Asia and the Pacific, and South Asia (each receiving about $171 billion in 2005), followed by Latin America and the

Table 43.2 Migrant remittances in developing countries, largest recipients, 2005

Country/region	Remittances in current $	Remittances in PPP-adjusted $	Remittances as % of merchandise exports
Developing countries	179 425	605 678	6.0
Mexico	21 772	32 222	10.3
India	19 843	105 564	26.2
Philippines	11 634	45 605	29.2
Lebanon	5 722	5 493	335.3
Morocco	4 221	12 325	42.5
Serbia/Montenegro	4 129	9 868	103.8
Pakistan	3 955	14 277	29.5
Bangladesh	3 583	15 407	43.1
Brazil	3 540	7 682	3.0
Colombia	3 345	10 704	15.8
Egypt	3 341	8 018	43.5
Guatemala	2 592	5 962	88.2
El Salvador	2 564	5 718	77.8
Dominican Republic	2 471	6 671	43.0
Algeria	2 460	7 577	7.9
Jordan	2 288	5 010	58.9

Source: Data for remittances in current dollars are taken from World Bank (2007); other indicators are author's calculations using PPP adjustments and exports from World Bank (2007).

Caribbean (with $86 billion), Europe and Central Asia ($78 billion), the Middle East and North Africa ($75 billion) and sub-Saharan Africa ($24 billion).

The significance of remittances in many developing countries can be seen by comparing the value of remittances with the value of the merchandise goods exported by the source countries. Table 43.2 shows how significant migrant remittances can be, rising in some countries to over 100 or 300 percent of exports.

Remittances clearly constitute an improvement in the standard of living for family members who are recipients of such income. And recent evidence suggests that remittances are connected to lower poverty levels (see Acosta et al., 2006; Adams, 2007). Some questions have been raised as to the extent to which the remittances simply raise current consumption instead of stimulating investment and future economic growth. Recently, however, a number of studies have documented that, first, a significant portion of so-called consumption spending consists of household investments in

housing, automobiles and durable goods, whose long-term wealth-raising capacities are substantial; second, the use of remittances for community investment projects is not insignificant and also acts to stimulate local development; and, third, the multiplier effects of the increased consumption spending in generating local economic activity may be substantial (see, for example, de la Garza and Lowell, 2002; Adams, 2007).

On the other hand, remittances do tend to be spent largely on internationally non-tradable goods, which can result in rising prices of these goods compared to internationally traded goods, generating an appreciation in the value of the domestic currency, which adversely affects domestic export sectors (Rivera-Batiz, 1986). Evidence of this Dutch disease-type effect has emerged recently (see Amuedo-Orantes and Pozo, 2004; Acosta et al., 2007). A vicious cycle may develop, where emigration leads to remittances that then deteriorate domestic competitiveness and growth, leading to further emigration, and so on.

The impact of the brain drain

The contribution of migrant remittances for economic development must be weighted against any externalities generated by the migration flows. In countries where emigration leads to the loss of the most talented and skilled, the so-called brain drain, migration could result in significant negative externalities (see Bhagwati, 1979; Bhagwati and Rodriguez, 1975).

If the emigration of skilled labor is substantial and these workers are employed in local service sectors, the result can be acute shortages in the supply of essential services, from school teachers to professors and nurses. Note that the emigration of workers employed in sectors that produce exports and imports is not subject to these effects because local consumers can import these products from abroad when the laborers leave the country. But when the workers are employed in service sectors that produce internationally non-traded goods, the impact of emigration is more significant and potentially disastrous, because domestic consumers can only obtain those services locally (see Rivera-Batiz, 1982). If doctors and nurses emigrate, the supply of health services can collapse, resulting in higher prices and acute shortages. A brain drain can therefore reduce sharply the economic welfare of those left behind.

On the other hand, there may be positive externalities of skilled emigration on source countries. First of all, some researchers have recently suggested that a brain drain may actually raise the level of schooling of the population in the source country, at least in the long run. There are several reasons for this. One hypothesis is that the brain drain will raise the rate of return to education and, as a result, more young people in the country will decide to pursue higher education, thus raising educational attainment.

Indeed, the point that the emigration of skilled workers may lie behind the rising relative wages of skilled labor in many developing countries has frequently been made. However, evidence that these changes have stimulated local investments in human capital has not been produced yet (see Schiff, 2005).

Another possible positive externality associated with the brain drain relates to the fact that emigrants may generate international networks that could enhance the scientific and technological capacities at home. One example is the role that has been played by the Indian diaspora in Silicon Valley and elsewhere in the growth of India's information technology sector. By generating greater flow of skills and information among countries, and by raising the reputation of a domestic sector internationally, this type of emigration can have significantly positive effects at home (see Kapur and McHale, 2005).

Implications for future research

Both the theory and empirical evidence on the determinants and consequences of international migration have grown enormously in recent years. This research matches the growing importance of migratory flows. But despite the progress, the literature so far has generally failed to consider the dynamic effects of emigration, focusing instead on analyzing – and estimating – static models. This is an especially relevant issue to discuss in relation to the brain drain since there are a number of possible mechanisms through which the emigration of the skilled can affect a country's economic growth.

First of all, the mainstream analysis of economic growth, as developed by Solow and Swan, suggests that a drop in population growth should lead to an economic expansion for those left behind since the steady-state amount of capital per worker in the economy would rise, increasing per capita income. But there are a number of caveats to this story. First, the emigration of working-age people means that the dependency rate in the economy rises, which tends to absorb resources that would otherwise be dedicated to the accumulation of capital and economic growth. The working-age skilled emigrants are also more likely to have higher savings rates than the rest of the population. Indeed, the empirical evidence available is consistent with a negative impact of a brain drain due to these demographic effects (Bloom and Williamson, 1998).

Another issue is that the emigration of skilled labor may reduce the human capital available to those left behind. This can potentially have a devastating effect on economic growth. One of the main sources of economic growth is technological change, which depends to a large extent on human capital (Romer, 1990). But if human capital flees a country, then the

ability of those left behind to sustain innovation and technical change may be compromised, thus reducing an economy's economic growth (Rivera-Batiz, 1996).

On the other hand, a growing literature suggests that in countries where the quality of the public sector governance is low, many educated workers tend to be employed in activities that are not necessarily high-productivity activities. In other words, in economies where the government is highly bureaucratic, where corruption is rampant, and the rule of law does not apply, many highly educated workers will not be able to be gainfully employed (see Rivera-Batiz, 2002). In this case, the potentially negative impact of the brain drain on technological change and, therefore, on economic growth diminishes. It is a matter for future research to examine theoretically and empirically in greater detail how emigration is connected to technical change and economic growth.

References

Acosta, P., C. Calderón, P. Fajnzylber and H. Lopez (2006), 'Remittances and Development in Latin America', *World Economy*, 30: 957–87.

Acosta, P., E. Lartey and F. Mandelman (2007), 'Remittances and the Dutch Disease', Working Paper No. 2007-8, Atlanta: Federal Reserve Bank of Atlanta.

Adams, R.H. (1993), 'The Economic and Demographic Determinants of International Migration in Rural Egypt', *Journal of Development Studies*, 30 (1): 146–67.

Adams, R. (2007), 'International Remittances and the Household: Analysis and Review of Global Evidence', Policy Research Working Paper No. 4116, Washington, DC: World Bank.

Amuedo-Dorantes, C. and S. Pozo (2004), 'Workers' Remittances and the Real Exchange Rate: A Paradox of Gifts', *World Development*, 32: 1407–17.

Bauer, T.K., G.S. Epstein and I.N. Gang (2000), 'What are Migration Networks?', IZA Discussion Paper No. 200, Bonn: Institute for the Study of Labor.

Benhabib, J. (1996), 'On the Political Economy of Immigration', *Economic European Review*, 40 (9): 1737–43.

Bhagwati, Jagdish N. (1979), 'International Migration of the Highly Skilled: Economics, Ethics and Taxes', *Third World Quarterly*, 1 (3): 17–30.

Bhagwati, Jagdish N. and Carlos Rodriguez (1975), 'Welfare-Theoretical Analyses of the Brain Drain', *Journal of Development Economics*, 2: 195–221.

Bloom, David E. and Jeffrey Williamson (1998), 'Demographic Transitions and Economic Miracles in Emerging Asia', *World Bank Economic Review*, 12 (3): 419–55.

Borjas, G. (1987), 'Self-Selection and the Earnings of Immigrants', *American Economic Review*, 77: 531–53.

Borjas, G. (1999), 'The Economic Analysis of Immigration', in O. Ashenfelter and R. Freeman (eds), *Handbook of Labor Economics*, Amsterdam: North Holland, pp. 1697–760.

Borjas, G. (2006), 'Labor Outflows and Labor Inflows in Puerto Rico', Working Paper, Cambridge, MA: Harvard University.

Carrington, W. and E. Detragiache (1998), 'How Big is the Brain Drain?', IMF Working Paper No. 98/102, Washington, DC: International Monetary Fund.

Castaldo, A., J. Litchfield and B. Reilly (2005), 'Who is Most Likely to Migrate from Albania? Evidence from the Albania Living Standards Measurement Study', Working Paper No. T-11, Sussex: Sussex Centre for Migration Research.

Chiquiar, D. and G. Hanson (2005), 'International Migration, Self-Selection and the Distribution of Wages: Evidence from Mexico and the United States', *Journal of Political Economy*, 113 (2): 239–81.

Chiswick, B. (1978), 'The Effects of Americanization on the Earnings of the Foreign-Born', *Journal of Political Economy*, 86: 897–922.
Chiswick, B. (1999), 'Are Immigrants Favorably Selected?', *American Economic Review*, 89: 181–5.
de la Garza, R. and B. Lindsay Lowell (2002), *Sending Money Home: Hispanic Remittances and Community Development*, London: Rowman & Littlefield.
Docquier, Frederic and Abdeslam Marfouk (2006), 'International Migration by Educational Attainment: 1990–2000', in Caglar Ozden and Maurice Schiff (eds), *International Migration, Remittances and the Brain Drain*, Washington, DC: World Bank, pp. 151–99.
Drinkwater, S. (2003), 'Estimating the Willingness to Move from Central and Eastern European Countries', Working Paper, Surrey: University of Surrey Department of Economics.
Dutt, A.K. (2005), 'Globalization, South–North Migration and Uneven Development', in P. Gangopadhay and M. Chatterji (eds), *Economics of Globalization*, Aldershot: Ashgate, 115–29.
Fernandez-Huertas Moraga, Jesus (2007), 'New Evidence on Emigrant Selection', PhD dissertation, Department of Economics, Columbia University, New York.
Fertig, Michael and Christoph Schmidt (2002), 'First and Second-Generation Migrants in Germany: What Do We Know and What Do People Think?', in R. Rotte and P. Stein (eds), *Migration Policy and the Economy: International Experiences*, Muenchen, Germany: Hanns-Seidel Foundation, pp. 179–218.
Gang, Ira N. and Francisco L. Rivera-Batiz (1994), 'Unemployment and Attitudes Towards Foreigners in Germany', in Gunter Steinmann and Ralf Ulrich (eds), *The Economics of Immigration in Germany*, Berlin: Springer-Verlag, pp. 121–54.
Gang, Ira N., Francisco L. Rivera-Batiz and Myeong-Su Yun (1999), 'Immigrants and Unemployment in the European Community: From the Eyes of Natives', IZA Discussion Paper No. 70, Bonn: Institute for the Study of Labor.
Gang, Ira N., Francisco L. Rivera-Batiz and Myeong-Su Yun (2002), 'Economic Strain, Ethnic Concentration and Attitudes Towards Foreigners in the European Union', IZA Discussion paper No. 578, Bonn: Institute for the Study of Labor.
Hanson, Gordon (2005), 'Emigration, Labor Supply and Earnings in Mexico', Working Paper No. 11412, Cambridge, MA: National Bureau of Economic Research.
Hanson, Gordon (2006), 'Illegal Migration from Mexico to the United States', *Journal of Economic Literature*, 44: 869–924.
Hanson, Gordon and Antonio Spilimbergo (1999), 'Illegal Immigration, Border Enforcement, and Relative Wages: Evidence from Apprehensions at the US–Mexico Border', *American Economic Review*, 89: 1337–57.
Hatton, Timothy and Jeffrey G. Williamson (1998), *The Age of Mass Migration: Causes and Economic Impact*, New York: Oxford University Press.
Hatton, Timothy and Jeffrey Williamson (2005), Global *Migration and the World Economy: Two Centuries of Policy and Performance*, Cambridge, MA: MIT Press.
Karemera, D., V.I. Oguledo and B. Davis (2000), 'A Gravity Model Analysis of International Migration to North America', *Applied Economics*, 32 (13): 1745–55.
Kapur, D. and J. McHale (2005), *Give Us Your Best and Brightest: The Global Hunt for Talent and its Impact on the Developing World*, Washington, DC: Brookings.
Lucas, R.E.B. (1985), 'Migration among the Batswana', *Economic Journal*, 95 (June): 358–82.
Mayda, Anna Maria (2006), 'Who Is Against Immigration? A Cross Country Investigation of Individual Attitudes towards Immigrants', *Review of Economics and Statistics*, 88 (3): 510–30.
Mayda, Anna Maria and Krishna Patel (2006), 'International Migration Flows: The Role of Destination Countries' Migration Policies', Working Paper, Washington, DC: Center for Strategic and International Studies.
McKenzie, David J. (2006), 'A Profile of the World's Young Developing Country Migrants', Policy Research Working paper 4021, Washington, DC: World Bank.
Mishra, P. (2006), 'Emigration and Wages in Source Countries: Evidence from Mexico', Working Paper No. WP/86/06, Washington, DC: International Monetary Fund.

Organisation for Economic Co-operation and Development (OECD) (2006), *Trends in International Migration*, Paris: OECD.
Ortega, F. (2005), 'Immigration Quotas and Skill Upgrading', *Journal of Public Economics*, 89 (9–10): 1841–63.
Parsons, Christopher, R. Skeldon, T. Walmsley and L. Alan Winters (2007), 'Quantifying the International Migration: A Database of Bilateral Movements of Migrant Stocks', World Bank Policy Research Working Paper 4165, Washington, DC: The World Bank.
Piore, Michael J. (1979), *Birds of Passage: Migrant Labor and Industrial Societies*, New York: Cambridge University Press.
Pritchett, Lant (2006), *Let Their People Come: Breaking the Gridlock on Global Labor Mobility*, Washington, DC: Center for Global Development.
Rivera-Batiz, Francisco L. (1982), 'International Migration, Nontraded Goods and Economic Welfare in the Source Country', *Journal of Development Economics*, 11: 81–90.
Rivera-Batiz, Francisco L. (1983), 'Trade Theory, Distribution of Income, and Immigration', *American Economic Review*, 73 (2): 183–7.
Rivera-Batiz, Francisco L. (1986), 'International Migration, Remittances and Economic Welfare in the Source Country', *Journal of Economic Studies*, 13 (3): 3–19.
Rivera-Batiz, Francisco L. (1996), 'The Economics of Technological Progress and Endogenous Growth in Open Economies', in H. Scharrer (ed.), *The Economics of High Technology Competition and Cooperation in Global Markets*, Hamburg: Institut für Wirtschaftsforschung, pp. 31–62.
Rivera-Batiz, Francisco L. (2002), 'Democracy, Governance and Economic Growth: Theory and Evidence', *Review of Development Economics*, 6 (2): 225–47.
Rivera-Batiz, Francisco L. (2007), 'How Do Migrants from Latin America and the Caribbean Fare in the US Labor Market?', *World Economy*, 30 (9): 1399–1429.
Romer, P. (1990), 'Endogenous Technical Change', *Journal of Political Economy*, 98 (5): S71–102.
Scheve, K. and M. Slaughter (2001), 'Labor Market Competition and Individual Preferences Over Immigration Policy', *Review of Economics and Statistics*, 83 (1): 133–45.
Schiff, Maurice (2005), 'Brain Gain: Claims about its Size and Impact on Welfare and Growth are Greatly Exaggerated', in C. Ozden and M. Schiff, *International Migration, Remittances and the Brain Drain*, Washington, DC: World Bank, pp. 201–26.
Sjaastad, Larry (1962), 'The Costs and Returns of Human Migration', *Journal of Political Economy*, 70 (5, Part 2): S80–S93.
Stark, Oded and David E. Bloom (1985), 'The New Economics of Labor Migration', *American Economic Review*, 75 (2): 173–8.
Stark, Oded and J. Edward Taylor (1991), 'Migration Incentives, Migration Types: The Role of Relative Deprivation', *Economic Journal*, 101 (408): 1163–78.
United Nations (2007), 'International Migration Estimates', Demographic Estimates, Population Division, Department of Economic and Social Affairs, New York: United Nations.
Waddington, Hugh and R. Sabates-Wheeler (2003), 'How Does Poverty Affect Migration Choice?', Development Research Centre on Migration, Globalization and Poverty Working Paper, Sussex: University of Sussex.
World Bank (2007), *World Development Indicators*, Washington, DC: World Bank.
Zimmermann, K. and A. Constant (eds) (2004), *How Labor Migrants Fare*, Berlin: Springer-Verlag.