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International Migration, Remittances, and the Brain Drain

A Study of 24 Labor-Exporting Countries

Richard H. Adams, Jr.

Abstract

While the level of international migration and remittances continues to grow, data on international migration remains unreliable. At the international level, there is no consistent set of statistics on the number or skill characteristics of international migrants. At the national level, most labor-exporting countries do not collect data on their migrants.

Adams tries to overcome these problems by constructing a new data set of 24 large, labor-exporting countries and using estimates of migration and educational attainment based on United States and OECD records. He uses these new data to address the key policy question: How pervasive is the brain drain from labor-exporting countries?

Three basic findings emerge:

• With respect to *legal* migration, international migration involves the movement of the educated. The vast majority of migrants to both the United States and the OECD have a secondary (high school) education or higher.

• While migrants are well-educated, international migration does *not* tend to take a very high proportion of the best educated. For 22 of the 33 countries in which educational attainment data can be estimated, less than 10 percent of the best educated (tertiary-educated) population of labor-exporting countries has migrated.

• For a handful of labor-exporting countries, international migration *does* cause brain drain. For example, for the five Latin American countries (Dominican Republic, El Salvador, Guatemala, Jamaica and Mexico) located closest to the United States, migration takes a large share of the best educated. This finding suggests that more work needs to be done on the relationship between brain drain, geographical proximity to labor-receiving countries, and the size of the (educated) population of labor-exporting countries.

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International Migration, Remittances and the Brain Drain:

A Study of 24 Labor-Exporting Countries*

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Within the last decade an increasing amount of attention has focused on the relationship between international migration, brain drain, and economic growth. Since education has often been cited as a major determinant of long-term economic growth, conventional wisdom has typically argued that the international migration of people endowed with a high level of human capital – the so-called "brain drain" – is detrimental for the country of emigration.[1] According to this argument, the large-scale departure of highly-educated workers from developing countries tends to depress income levels and long-run economic growth rates in the developing world.

This conventional view, however, has recently been challenged by the following argument. In a developing economy with a limited growth potential, the return to human capital is likely to be low. This in turn would lead to limited incentive to acquire education, which is seen as the engine of economic growth. However, since the world at large values education, allowing migration of the "best and brightest" from a developing country may actually increase the incentive to acquire education. Since only a small faction of educated people in a specific country would migrate, this would encourage the average level of education of the remaining population to rise.

Deciding which of these arguments is most accurate is difficult, given the paucity of available information on the level and characteristics of international migration. For example, at the international level, there is no consistent or reliable system of data on either the number or skill characteristics of international migrants. Moreover, at the

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[1] By "brain drain" this study does not mean the migration of engineers, physicians or other very highly skilled professions, but simply, the migration of more than 10 percent of the tertiary-educated population of a particular labor-exporting country.

national level, labor-exporting countries do not typically keep track either of the number or the skill characteristics of migrants. And while some labor-receiving countries do keep track these issues, they often use different definitions of immigration. As a result of these data problems, a host of key policy questions remain unanswered. Exactly how pervasive is the brain drain? Which countries or regions of the developing world are most affected? Does international migration deprive labor-exporting countries of a sizeable fraction of their "best and brightest," or are their numbers too small to worry about?

This paper proposes to answer these, and similar questions, by developing a new data set composed of 24 large, labor-exporting countries.[2] This data set includes all those developing countries which received more than $500 million dollars in official worker remittances in the year 2000.[3] To ensure representativeness, the data set includes countries drawn from each major region of the developing world: Latin America and the Caribbean, Middle East and North Africa, Europe and Central Asia, East Asia, South Asia and Sub-Saharan Africa.

The paper uses this new data set to do the following three tasks. First, in order to provide some perspective on the importance of international migration, the paper shows how the level of worker remittances received by these 24 labor-exporting countries has increased over time. Second, using data collected by the two main labor-receiving

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[2] The 24 study countries include: Brazil, Colombia, Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, Peru (Latin America and Caribbean); Egypt, Morocco, Tunisia (Middle East and North Africa); Albania, Armenia, Croatia, Turkey (Europe and Central Asia); China, PR, Indonesia, Philippines (East Asia); Bangladesh, India, Pakistan, Sri Lanka (South Asia); and Nigeria and the Sudan (Sub-Saharan Africa).

[3] The source of all data on official worker remittances in this study is: International Monetary Fund, Balance of Payments Statistics Yearbook.

regions in the world (United States and OECD),[4] the paper provides estimates of the total

level of migration from each of the 24 study countries. Finally, the paper uses data from

the 2000 U.S. Population Census and estimates from the 2001 OECD Continuous

Reporting System on Migration to show the stock of migrants by educational level

(primary, secondary and tertiary)[5] in the two main labor-receiving regions. These data

also show the fraction of the population in each educational category in each labor-

exporting country that has migrated to the United States or the OECD.[6] The latter

estimates, which are quite rough and in need of further refinement, provide some sense of

the magnitude of the brain drain from each of the 24 labor-exporting countries.

Results from the study show that international migrants are well-educated: 67

percent of all immigrants to the United States and 88 percent of those to the OECD have

a secondary (high school) education or higher. While these figures do not include the

large numbers of illegal (and presumably less educated) international migrants, it does

appear that uneducated individuals have limited access to legal international migration.

International migrants also tend to be much better educated that the rest of the population

of their country of origin. However, in terms of actual brain drain on their country of

origin, international migration does not seem to take a very high proportion of the best

educated (tertiary). For example, with respect to migration to the United States, for 14 of

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[4]Unfortunately, no data are available on the level of migration to the third most important labor-receiving region in the world: the Arab Gulf. The OECD includes 30 member countries : Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

[5] Primary education is defined as 0 to 8 years of schooling; secondary is 9 to 12 years; and tertiary is 13 years and above.

[6] For the OECD, estimates of the fraction of population in each educational category from each study country are taken from Carrington and Detragiache (1998).

the 20 countries for which data exist, international migration takes less than 10 percent of the population with a tertiary education. Migration to the OECD results in a slightly higher degree of brain drain, but even here international migration takes more than 10 percent of the tertiary-educated population from only 5 of 13 labor-exporting countries.

The balance of the paper is organized as follows. To provide perspective on the growing importance of international migration, Section II presents data on changes in the level of worker remittances received in the 24 countries over the last twenty years. Section III explains the methodology used for estimating the level of migration to the United States and the OECD. Section IV applies this methodology to estimate the extent of brain drain to the United States by analyzing migration rates and the educational composition of U.S. migrants. Estimates of the level of brain drain to the OECD are presented using similar methods in Section V. Section VI concludes.

II. Official Remittances from International Migration

To gain a proper perspective on the importance of international migration, it is best to begin with the most visible product of international migration: remittances received. Not only are remittances critical to the foreign exchange position of many labor-exporting countries, but they are also vital to the consumption and investment behavior of migrant households themselves. Perhaps because of their importance to both labor-exporting countries and households, remittances tend to be the best measured and recorded aspect of the migration experience. For instance, the International Monetary Fund (IMF) keeps annual records of the amount of worker remittances received by each

labor-exporting country.[7] No other organization – national or international – collects and publishes annual records on any other part of the international migration process.

It should, however, be noted that the IMF only reports data on official worker remittance flows, that is, remittance monies which are transmitted through official banking channels. Since a large (and unknown) proportion of remittance monies is transmitted through informal, unofficial channels, the level of remittances recorded by the IMF underestimates the actual flow of remittance monies returning to labor-exporting countries. For instance, a recent IMF study (El-Qorchi, Maimbo and Wilson, 2002) estimated that informal transfers of remittance monies could amount to $10 billion per annum.[8]

Despite these problems, Table 1 shows the level of official worker remittances received by each of the 24 study countries over the twenty-year period, 1981 to 2000. Total official remittances – measured in real terms – for the 24 labor-exporting countries now amount to over $36 billion per annum. Among the study countries, the three largest recipients of official worker remittances in 2000 are: India ($7,994 billion), Mexico ($5,816 billion) and Turkey ($4,035 billion). Mexico is also one of the countries recording the largest percentage rate of increase in remittances over the twenty-year period.

It is interesting to note that that each of the three largest remittance-receivers is sending migrants to a different labor-receiving region. Although data are scanty, India is

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[7] The IMF records annual flows in international remittances in its publication, Balance of Payments Statistics Yearbook.

[8] Focusing on the hawala system of informal transfer, this IMF study of 15 developing countries (2002: 64) estimated that about $35 billion per annum of remittance monies was transmitted through informal channels in the early 1980s, falling to $10 billion per annum in more recent years. The decline in the level of informal transfers was attributed to the disappearance of the black market exchange premiums in many developing countries during the 1990s.

probably sending most of its migrants to the OECD and the Arab Gulf. Because of its

proximity to the United States, Mexico is sending most of its migrants to its northern

neighbor. Turkey, the third largest remittance-receiver, is sending most of its migrants

to the OECD (especially Germany).

Table 2 provides another way of looking at the flow of official remittances. Here

the data on worker remittances for the 24 countries are disaggregated by region of the

world. Because of the importance of the United States as a labor-receiving region, Latin

America and the Caribbean is the largest recipient of official remittances. This region of

the world also recorded the highest percentage rate of increase in official worker

remittances over the last twenty years.

For the 24 study countries as a whole, Table 2 reveals that official worker

remittances have increased at a strong 3.86 percent per year in real terms. To put this

figure into perspective, Table 3 compares the annual rate of growth in official

remittances for the 24 study countries with that of gross domestic product (GDP) for

various regions of the developing world. For the twenty-year period, official remittances

grew at a faster annual rate than did GDP in 119 low and lower middle-income

developing countries (3.86 versus 1.61 percent per year). In two of the six regions of the

developing world (Latin America and the Caribbean, Sub-Saharan Africa), official

remittances also grew at a faster annual rate than did GDP.

III. Methodology for Estimating Levels of Migration

Since few, if any, of the major labor-exporting countries keep accurate records on either the number or the educational characteristics of migrants, it is necessary to estimate these variables by using data collected by the main labor-receiving countries. For the purposes of this paper, the main labor-receiving countries (regions) include two: United States and the OECD. The third large labor-receiving region – the Arab Gulf – does not publish any data on the number or characteristics of migrants, and thus will not be included in this study.

IIIa. Estimating Migration to the United States

Following the pioneering methodology of Carrington and Detragiache (1998),[9] this study employs four steps to estimate migration rates and the educational attainment of migrants to the United States.

The first step is to use data from the newly released files of the 2000 U.S. Population Census on the "place of birth for the foreign-born population." Fortunately, these data are disaggregated by country of birth for about 50 specific countries. However, it is not clear whether all of the "foreign-born" population are, in fact migrants. For example, a person born in Mexico and brought to the United States as an infant would probably not consider himself as a migrant. Moreover, it is also not clear how many of those who enter the United States illegally are, in fact, included in the "foreign-born" population figures. As some observers have suggested, the U.S. Census data may be grossly undercounting the actual migrant population that is living – legally or illegally

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[9] While the Carrington and Detragiache (1998) study is based upon data from the 1990 U.S. Population Census, this study uses newly released data from the 2000 U.S. Census.

– in the United States.[10] Since illegal migrants are likely to be less educated than legal migrants, this may in turn lead to an overestimate of the average level of migrant education. This source of bias, however, should not seriously distort our estimates of the migration rate of individuals with tertiary education, since those with higher levels of education are more likely to be in the United States on a legal basis.

The second step is to estimate from the 2000 U.S. Census data the number of "foreign born" from each country who are 25 years of age or older. This is necessary to maximize the comparability of the immigrant population from each country with the Barro and Lee (2000) data set, which measures the educational attainment of the population over the age of 25 in each country.

The third step is to calculate for each population from each labor-exporting country the number of migrants in three specific educational categories: primary or less (0-8 years of schooling), secondary (9-12 years of schooling) and tertiary (13 or more years of schooling). For the United States, this is done by using data from a special tabulation from the 2000 U.S. Census done by the U.S. Census Bureau. This special tabulation shows by county of origin the educational attainment level of the foreign born population living in the United States in the year 2000.

The final step is to use the Barro and Lee educational attainment data set to compute migration rates for each labor-exporting country for the same three educational categories mentioned above. These calculations enable us to show what fraction of each country's educational group has migrated to the United States.

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[10] In 1992 the stock of illegal immigrants in the United States was estimated at 3.4 million, or about 16 percent of the stock of the "foreign-born" population (Borjas, 1995).

Since this study relies heavily upon the educational attainment data contained in Barro and Lee (2000), it is useful to describe this data set in some detail. Barro and Lee base their estimates of the educational attainment of the population in various countries on either the most recent census data or on historical schooling enrollment figures. In cases where enrollment figures are used, estimates of the current stock of education are constructed using a perpetual inventory method. Of course, various factors (including migration) may distort estimates based on historical enrollment patterns. Nevertheless, the Barro and Lee data set represents the best available set of estimates of educational attainment for a broad cross-section of developing countries.

IIIb. Estimating Migration to the OECD

For OECD countries, data on migration flows by country are collected and published in Trends in International Migration: Annual Report (2001). Unfortunately, these data are not as comprehensive as the U.S. Census data, and they differ from the United States data in at least three key ways.

First, and most importantly, the data for OECD countries do not report the educational attainment of migrants. For example, no data are available on the educational distribution of Turkish migrants to Germany. For the lack of alternative, we will assume that the educational distribution of migrants from each labor-exporting country to the OECD is the same as that for the United States.[11] In other words, if 40 percent of Turkish migrants to the United States have a tertiary education, we will assume that the same percentage of Turkish migrants to the OECD have this level of education. This procedure is most likely to be accurate for those labor-exporting

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[11] This is the same strategy used by Carrington and Detragiache (1998) in their study of brain drain.

countries which send similar numbers of migrants to both the United States and the OECD. However, for some labor-exporting countries – like Tunisia or Turkey – which send much larger numbers of migrants to the OECD than to the United States, this procedure is likely to be quite problematic. For instance, our procedure will impute to the German Turks the same high level of education as is found in their United States counterparts. This may, in turn, lead to a gross overestimate of the brain drain from a country like Turkey.

The second problem with the OECD data lies in its different way of classifying immigrants. Since United States-born children of immigrants have US citizenship, the United States defines an immigrant as a person who was born abroad to non-US citizens. Most OECD countries, however, follow an ethnicity-based definition of immigration status. This method classifies a person on the basis of the ethnicity of the parent, rather than on place of birth. Thus, a child of Turkish parents born in Germany is typically classified as an immigrant. This different way of classifying immigrants has the net effect of increasing the stock of immigrants in any particular OECD country, and perhaps biasing our estimates of the educational status of "migrants" who were actually born, raised and educated in that OECD country.

The third difference between the OECD and the United States data has to do with the number of labor-exporting countries recorded. As noted above, the 2000 U.S. Census data can be used to count the number of migrants from about 50 different labor-exporting countries. By contrast, for each OECD country, OECD data only record the number of migrants from approximately the top fifteen-labor exporting countries. On the one hand, this might not be a significant problem for large labor-exporting countries, like Turkey.

However, for smaller labor-exporting countries, like Brazil or Sri Lanka, the actual number of migrants to any particular OECD country might not be recorded. This makes it difficult to accurately compare and contrast migration rates between different labor-exporting countries.

IV. Brain Drain to the United States: Migration Rates and Educational Levels

This section presents estimates of immigrants in the United States by educational attainment, both in absolute number and as a fraction of the individuals in the labor-exporting country with the same level of educational attainment. As explained in the previous section, following the reporting conventions of the U.S. Census Bureau, these figures consider as immigrants all "foreign-born" individuals residing in the United States. Thus, these figures may well include substantial numbers of people who are not usually regarded as either migrants or as part of the brain drain, such as individuals who migrated to the United States as children and have few ties with their original country of birth.

Table 4 presents immigration data to the United States for all 24 study countries. It is striking to note that one single country – Mexico – dominates migration to the United States. In our sample about 50 percent of all immigrants in the United States come from Mexico![12] The second largest source of immigrants is the China, PR, which supplies less than 10 percent of total migrants.

Table 4 shows the key role that education plays in migration. In the sample as a whole, about 67 percent of all immigrants have a secondary education or higher. This

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[12] According to the 2000 U.S. Population Census, of the total foreign-born population in the United States (31,107,000), Mexico accounts for 29.5 percent (9,177,000)

figure is even higher if the very large number of poorly educated immigrants from one single country (Mexico) are excluded. Excluding Mexico from the sample, 83 percent of all migrants to the United States have a secondary education or higher.

As the case of Mexico suggests, the educational attainment level of migrants varies considerably from country to country. Focusing on those immigrants with the highest level of education (tertiary), the share of immigrants to the United States with a tertiary education varies from a low of 14 percent (Mexico) to a high of 80 percent (India). In general, there is a strong tendency for the level of educational attainment to vary inversely with distance from the United States. Latin American and Caribbean countries generally produce a lower share of migrants with a tertiary education, while those countries which are more distant (particularly in South Asia) produce the highest share of tertiary-educated migrants.[13] This phenomenon may reflect the impact of migration costs (both financial and time). That is, prospective migrants with low levels of education in countries which are close to the United States are better able to afford the costs of legal (and illegal) migration than similar prospective migrants in more distant countries.

Table 5 presents estimated migration rates by educational category for each labor-exporting country. Focusing on the highest (tertiary) level of education, the results suggest that – for most countries -- migration to the United States is not causing much brain drain. For 14 of the 20 countries for which data exist, less than 10 percent of those with a tertiary education have migrated to the United States. This result even holds for China, PR, which is the third-largest source of immigrants to the United States (see Table

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[13] According to Table 4, while the share of tertiary-educated migrants from South Asia is 76.5 percent, the share of such migrants from Latin America and the Caribbean is only 19.8 percent.

4). In China, PR, only 2 percent of those with a tertiary education have migrated to the United States.

However, for a handful of countries, Table 5 reveals that migration to the United States does cause brain drain. For the five Latin American countries (Dominican Republic, El Salvador, Guatemala, Jamaica and Mexico) located closest to the United States, migration takes a large share of the best educated. While 16 percent of those with a tertiary education in Mexico migrate to the United States, over 360 percent of those with this level of education in Jamaica migrate. The very high migration rate of the best educated from Jamaica means that the number of migrants with a tertiary education from this country actually exceeds the number of local residents with this level of education. In other words, the estimated figure for tertiary-educated migrants from Jamaica must somehow overstate the true size of the brain drain from that country.

The second theme in Table 5 is that low-skilled migration to the United States is not very important for most labor-exporting countries. There are only two countries (El-Salvador and Mexico) for which the migration rate for those with a primary school or less education is greater than 10 percent. The highest figure for primary school migrants is that of El Salvador (12.4 percent), followed by Mexico (10.8 percent). While the migration data in Table 5 do not include the sizeable (and unknown) number of illegal migrants in the United States, who probably have much lower levels of education, the results for legal migration seem clear. Legal migration to the United States involves the movement of better educated people, people who are probably more educated than those who remain at home.

The final finding in Table 5 is that total migration rates to the United States are not very high for most countries. Total migration rates exceed 10 percent for only four countries: Dominican Republic, El Salvador, Jamaica and Mexico. All four of these countries are in Latin America, and three of them have fairly small populations.[14] It should come as no surprise that small, Latin American countries have high average rates of migration because this is a consequence of United States immigration policy. By setting annual limits on the numbers of migrants that can come from each labor-exporting country, regardless of size, United States policy in effect favors lightly-populated countries in the Western Hemisphere. A limit of 20,000 legal migrants per year per country is much more of a binding constraint for Pakistan than it is for Jamaica, and this is one reason why Jamaica has the highest total migration rate (33.3 percent) in the table.

V. Brain Drain to the OECD: Migration Rates and Educational Levels

Table 6 presents data for 13 of the 24 study countries for which immigration data to the OECD exist. As in the case of immigration to the United States, one country dominates: Turkey. In our sample about 40 percent of all immigrants to the OECD come from Turkey. The second largest source of immigrants in our sample is China, PR, which supplies about 15 percent of total migrants. Two North African countries -- Morocco and Tunisia -- combine together to produce about 15 percent of all migrants to the OECD.

Table 6 shows that education plays an even more important role in migration in the OECD than in the United States. While 67 percent of all immigrants to the United

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[14] The Dominican Republic, El Salvador and Jamaica each have a total (2000) population of less than 10 million.

States have a secondary education or higher, fully 88 percent of all immigrants to the OECD have this level of education. Moreover, of these secondary-educated immigrants to the OECD, over two-thirds -- 69 percent -- have a tertiary education.

However, it is important to emphasize that these estimates of the number of educated migrants probably overestimate the true extent of the brain drain to the OECD for two reasons. First, levels of educational attainment for migrants to the OECD must be estimated, rather than observed as in the United States, because the OECD does not collect data on the educational characteristics of immigrants. For example, since the educational distribution of Turkish migrants to the OECD must be estimated on the basis of U.S. data, and the educational distribution of these OECD migrants might be quite different from that of their United States-bound compatriots, the figures in Table 7 might over-estimate the extent of the brain drain. Second, as in the United States, published data on the number of immigrants to the OECD exclude the large (and unknown) number of illegal immigrants to these countries, who are likely to have lower levels of education. For instance, it is likely that a large number of illegal immigrants from North Africa to the OECD have low levels of education, simply because rates of educational attainment in these North African countries are low.[15]

Table 7 presents migration rates by educational category for each labor-exporting country. Focusing on the tertiary level of education, the available data suggest that migration to the OECD causes more of a brain drain than it does in the United States. For 5 of the 13 countries for which data exist, more than 10 percent of those with a tertiary education have migrated to the OECD. For these five countries, the rates of

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[15] For example, in Morocco and Tunisia about 76 percent of the population over age 25 has a primary school education or less.

migration for those with a tertiary education range from 16.5 percent (Sri Lanka) to 95.8

percent (Jamaica). The latter country – Jamaica – must be suffering from a particularly

high degree of brain drain, because it has the highest migration rate for tertiary-educated

people to both the OECD and the United States (see Table 5).

The data in Table 7 suggest that migration to the OECD differs from that to the

United States in another important way. While migration to the United States tends to

take a high percentage of tertiary-educated people from neighboring (Latin American)

countries, in the OECD the link between migration, education and geography is not so

obvious. While three of the countries (Morocco, Tunisia and Turkey) with the highest

rates for tertiary-educated migration are located close to the OECD, two other prominent

countries (Jamaica and Sri Lanka) are not. More work needs to be done to identify the

reasons why Jamaica and Sri Lanka send such a high proportion of their "best and

brightest" to the OECD.

The final point to be noted in Table 7 is that total migration rates to the OECD are

lower than those to the United States. While four labor-exporting countries have total

migration rates in excess of 10 percent to the United States, no country in the OECD has

a total migration rate above that mark. Jamaica has the highest overall migration rate to

the OECD, at 8.7 percent. Again, the combination of small population and a high degree

of migration abroad lead Jamaica to record a higher migration rate than such large, labor-

exporting countries, like Turkey and the Philippines.

VI. Conclusion

While the level of international migration and remittances continues to grow between countries, data on the whole process of international migration remains fragmented, scattered and unreliable. At the international level, there is no consistent set of statistics on either the number or skill characteristics of international migrants. At the national level, labor-exporting countries do not typically keep track either of the number or the skill characteristics of migrants. And while some labor-receiving countries do keep track these issues, they often miss the large numbers of migrants who enter their borders on an illegal basis.

Using a new data set of 24 large, labor-exporting countries, and employing estimates of migration and educational attainment based on United States and OECD records, this paper has tried to overcome these data problems to answer such policy questions as: How pervasive is the brain drain from labor-exporting countries? Which countries or regions of the developing world are most affected? Does international migration deprive labor-exporting countries of a sizeable fraction of their "best and brightest," or are their numbers too small to worry about?

Five conclusions to these, and similar questions, emerge from this paper. While these conclusions are often based on estimates of migration which are rough and in need of further refinement, they are still suggestive.

The first finding is that the level of international migration continues to grow annually. While no accurate, time-series data exist on changes in the total level of international migration, the International Monetary Fund (IMF) does keep annual records on the level of official remittances sent home by migrant workers. Over the last twenty

years, these records show that the official worker remittances have increased at a steady

3.86 percent per year for the 24 study countries.[16] This annual rate of increase for official

worker remittances is higher than that recorded for the annual rate of GDP growth (1.61

percent per year) in 119 low and lower middle-income developing countries over the last

twenty years.

The second finding from this study is that with respect to legal migration,

international migration definitely involves the movement of the educated. In both the

United States and the OECD, individuals with a primary education account for less than

30 percent of total immigrants. The vast majority of immigrants to both regions (67

percent in the United States and 88 percent in the OECD) have a secondary (high school)

education or higher.[17] From an educational standpoint, international migrants represent

an elite that is much better educated than the rest of the population in their country of

origin.

The third finding is that while migrants are well-educated, international migration

does not tend to take a very high proportion of the best educated (tertiary) population in

labor-exporting countries. For 22 of the 33 countries in which educational attainment

data can be estimated, [18] less than 10 percent of the tertiary-educated population of labor-

exporting countries has migrated to the United States or the OECD. Part of the reason for

this finding is that large labor-exporting countries are also typically large population

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[16] If the figures for remittance flows which occur outside of official banking channels could be included, it is likely that total remittances – official and unofficial – would have increased at an even faster rate over the last twenty years.

[17] As emphasized in the paper, these figures do not include the large numbers of illegal (and presumably less educated) immigrants to the United States or the OECD.

[18] Table 5 presents 20 countries with educational attainment data, and Table 7 presents 13 countries.

countries, which have a substantial number of tertiary-educated people. For example, one of the largest labor-exporters in this study – China, PR – has such a large pool of tertiary-educated people that international migration has a relatively small proportional impact on the domestic labor-market for the "best and brightest".[19]

The fourth result follows from the preceding. For a handful of labor-exporting countries, international migration <u>does</u> cause brain drain. For example, for the five Latin American countries (Dominican Republic, El Salvador, Guatemala, Jamaica and Mexico) located closest to the United States, migration takes a large share of the best educated. Sixteen percent of those with a tertiary education in Mexico migrate to the United States, and over 360 percent of those with this level of education in Jamaica migrate. With respect to the OECD, international migration takes more than 10 percent of those with a tertiary education from five countries: Jamaica, Morocco, Tunisia, Turkey and Sri Lanka. Three of these large brain drain countries are located close to the OECD, while two of them (Jamaica and Sri Lanka) are not.

The final finding concerns promising directions for future work on the issue of brain drain. Results from this paper suggest that there is a close relationship between brain drain, geographical proximity to labor-receiving countries, and the size of the population (especially the educated population) of labor-exporting countries. In many cases lightly-populated countries located close to either the United States or the OECD suffer the highest rates of brain drain for tertiary-educated people. Good examples of this phenomenon include Jamaica, El Salvador and Tunisia, each of which have populations of less than ten million. More work needs to be done to clarify the relationship between

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[19] For example, China, PR has an estimated number of 20,562,000 people who have completed a tertiary education. Of this pool of highly-educated people, about 2.2 percent are immigrants in the United States and about 1.4 percent are immigrants in the OECD.

brain drain, geography and population, and to identify possible policy programs for ameliorating the possibly adverse impact of brain drain on these countries.

References

Barro, Robert and Lee, Jong-Wha. 2000. Data Set on Educational Attainment of the Total Population Aged 25 and Over. Available on the web site of the Center for International Development at Harvard University (www.ksg.harvard.edu/CID).

Borjas, George. 1995. "The Economic Benefits from Immigration," Journal of Economic Perspectives, No. 9, pp. 3-22.

Carrington, William and Detragiache, Enrica. 1998. "How Big is the Brain Drain?," IMF Working Paper WP/98/102, International Monetary Fund, Washington, DC, July 1998.

International Monetary Fund (IMF). (Various). Balance of Payments Statistics Yearbook. Washington, DC.

Organization for Economic Cooperation and Development (OECD). 2001. Trends in International Migration: Annual Report. Paris, France.

El-Qorchi, Mohammed, Maimbo, Samuel and Wilson, John. 2002. "The Hawala Informal Funds Transfer System: An Economic and Regulatory Analysis." Unpublished paper, August 2002.

United States, Census Bureau. 2000. Population Census. Washington, DC.

United States, Census Bureau. 2003. Special Tabulation on Educational Attainment of Foreign-Born Population in the U.S. Based on 2000 Population Census. Washington, DC.

World Bank. 2000. World Development Report, 2000/01. Washington, DC.

Table 1. Official Worker Remittances Received in 24 Selected Labor-Exporting Countries, 1981 – 2000
(in millions of US Dollars; Real Terms)

	Albania	Armenia	Bangladesh	Brazil	China, PR	Colombia	Croatia	Dom. Republic	Guatemala	Egypt	El Salvador	India
1981	--	--	549	409	--	140	--	259	129	3101	70	3260
1982	--	--	552	204	774	101	--	271	90	3885	123	3742
1983	--	--	982	167	638	90	--	278	42	5608	142	4066
1984	--	--	733	195	465	104	--	300	40	5812	167	3361
1985	--	--	711	164	255	149	--	342	27	4548	178	3494
1986	--	--	800	140	289	546	--	312	44	3484	193	3110
1987	--	--	1002	157	222	825	--	366	51	4830	224	3568
1988	--	--	984	117	166	577	--	372	55	4857	250	2975
1989	--	--	931	261	93	564	--	368	85	5229	250	3176
1990	--	--	908	833	145	569	--	367	125	6446	417	2743
1991	--	--	860	1414	232	906	--	368	155	4536	522	3664
1992	163	--	990	2278	282	684	--.	375	203	6629	746	3140
1993	290	--	1062	1846	327	791	--	381	216	5974	833	3686
1994	272	--	1183	1885	406	993	349	778	270	3775	994	5944
1995	385	12	1202	2891	350	739	506	795	358	3226	1061	6139
1996	485	11	1306	1813	1624	617	585	888	364	3018	1053	8212
1997	253	8	1448	1257	4198	624	497	1033	387	3509	1138	9775
1998	422	9	1495	900	230	451	486	1239	427	3150	1250	8837
1999	326	14	1643	1088	351	839	415	1389	426	2959	1256	10064
2000	470	14	1732	985	492	989	470	1494	498	2523	1549	7994
Annual Percent Change, 1981/83 1998/00	--	--	5.1	8.2	(-3.9)	12.0	--	10.1	10.1	(-2.2)	15.8	5.4

-- Table continued on next page --

Table 1 (contd) Official Worker Remittances Received in 24 Selected Labor-Exporting Countries, 1981 – 2000
(in millions of US Dollars; Real Terms)

	Indonesia	Jamaica	Mexico	Morocco	Nigeria	Pakistan	Peru	Philippines	Sri Lanka	Sudan	Tunisia	Turkey
1981	--	89	183	1440	11	2923	231	360	469	--	507	3540
1982	--	106	155	1214	19	3690	240	342	456	208	532	3060
1983	15	59	169	1311	12	4476	315	257	449	420	514	2165
1984	78	38	259	1278	10	3768	231	86	441	418	465	2650
1985	86	130	245	1369	14	,3575	189	157	415	369	383	2427
1986	98	75	250	1943	7	3385	208	226	453	157	502	2271
1987	115	79	277	2127	4	2908	241	282	469	185	651	2708
1988	127	87	269	1678	3	2400	203	500	461	279	701	2288
1989	205	144	2180	1642	12	2468	290	442	440	512	600	3726
1990	194	159	2906	2339	12	2329	288	305	467	72	642	3785
1991	145	152	2701	2226	74	1724	353	368	494	50	587	3154
1992	248	171	3334	2356	61	1700	267	342	595	135	576	3266
1993	365	197	3514	2006	836	1518	332	328	666	79	470	3079
1994	461	470	3572	1878	565	1798	485	455	735	110	646	2700
1995	651	582	3673	1970	804	1712	600	432	790	346	680	3327
1996	773	618	4103	2103	920	1247	579	552	808	214	715	3441
1997	688	609	4618	1797	1822	1620	603	1003	875	394	650	3984
1998	896	618	5260	1879	1471	1095	605	190	936	642	671	5007
1999	1014	627	5405	1772	1198	911	614	93	962	607	696	4143
2000	1053	698	5816	1912	--	951	635	111	1010	564	619	4035
Annual Percent Change, 1981/83 1998/00	27.9	12.7	22.7	2.0	30.7	-7.5	5.2	(-130.0)	4.5	3.9	1.5	2.4

Note: Real figures calculated by deflating nominal figures by US Consumer Price Index (1995 = 100). Data record only those worker remittances which enter the official banking system.

Sources: International Monetary Fund, Balance of Payments Statistics Yearbook (various issues).

Table 2. Official Worker Remittances Received in 24 Selected Labor-Exporting Countries, Classified by Region of the World, 1981 - 2000 (in millions of US Dollars; Real Terms)

	East Asia	Eastern Europe and Central Asia	Latin America and Caribbean	Middle East and North Africa	South Asia	Sub-Saharan Africa	World
1981	360	3540	1510	5048	7201	11	17,670
1982	1116	3060	1290	5631	8440	227	19,764
1983	910	2165	1262	7433	9973	432	22,175
1984	629	2650	1334	7555	8303	428	20,899
1985	498	2427	1424	6300	8195	383	19,227
1986	613	2271	1768	5929	7748	164	18,493
1987	619	2708	2220	7608	7947	189	21,291
1988	793	2288	1930	7236	6820	282	19,349
1989	740	3736	4142	7471	7015	524	23,628
1990	644	3785	5664	9427	6447	84	26,051
1991	745	3154	6571	7349	6742	124	24,685
1992	872	3429	8058	9561	6425	196	28,541
1993	1020	3369	8110	8450	6932	915	28,796
1994	1322	3321	9447	6299	9660	675	30,724
1995	1433	4230	10,699	5876	9843	1150	33,231
1996	2949	4522	10,035	5836	11,573	1134	36,049
1997	5889	4742	10,269	5956	13,718	2216	42,790
1998	1316	5924	10,750	5700	12,363	2113	38,166
1999	1458	4898	11,644	5427	13,580	1805	38,812
2000	1656	4988	12,664	5054	11,687	564	36,613
Annual Percent Change, 1981/83 1998/00	3.7	3.5	13.5	(-0.7)	2.3	11.8	3.86

Note: Real figures calculated by deflating nominal figures by US Consumer Price Index (1995 = 100). Data record only those worker remittances which enter the official banking system. The 24 countries included in the table are listed in Table 1.

Sources: International Monetary Fund, Balance of Payments Statistics Yearbook (various issues).

Table 3. Comparing Annual Rates of Growth of Official Worker Remittances and Gross Domestic Product (GDP) by Region of the World, 1981/83 to 1998/00

Region	Annual Percent Change, 1981/83 to 1998/00	
	Official Worker Remittances [1]	Gross Domestic Product (GDP)[2]
East Asia	3.7	6.0
Eastern Europe and Central Asia	3.5	--
Latin America and Caribbean	13.5	0.8
Middle East and North Africa	(-0.7)	0.2
South Asia	2.3	3.3
Sub-Saharan Africa	11.8	(-0.8)
Low and Lower Middle Income Developing Countries[3]	3.86	1.61

Notes:

[1]Official worker remittances are measured in real terms by deflating nominal figures by US Consumer Price Index (1995 = 100). Official worker remittances include remittances received by the 24 study countries, and include only remittances which enter the official banking system. The 24 study countries are listed in Table 1.

[2]Gross domestic product is measured on a per capita basis using constant 1995 US dollars. No GDP data are available for Eastern Europe and Central Asia in 1981/83.

[3]For official worker remittances, the category "low and lower middle-income developing countries" includes the 24 study countries; for gross domestic product, the category "low and lower middle-income developing countries" includes 119 countries, which are classified by the World Bank (2000) as falling into this category.

Sources:
    Remittance data: International Monetary Fund, Balance of Payments Statistics Yearbook (various issues).
    GDP data: World Bank, World Development Indicators database (2002).

Table 4. Number of Immigrants (Age 25 and older) to the United States by Level of Educational
Attainment, 2000

Country	Total Immigrants	Educational Level		
		Primary or less	Secondary	Tertiary
East Asia				
China, PR	846,780	173,545	217,185	456,050
Indonesia	53,170	1,460	12,065	39,645
Philippines	1,163,555	90,200	228,955	844,400
Eastern Europe, Central Asia				
Albania	25,785	3,540	12,400	9,845
Armenia	44,380	3,815	17,975	22,590
Croatia	35,455	6,725	14,350	14,380
Turkey	64,780	8,905	18,090	37,785
Latin America, Caribbean				
Brazil	154,250	14,005	56,010	84,235
Colombia	402,935	53,485	163,415	186,035
Dom. Republic	527,520	155,685	226,270	145,565
El Salvador	619,185	255,170	257,455	106,560
Guatemala	341,590	146,515	127,860	67,215
Jamaica	449,795	36,430	209,710	203,655
Mexico	6,374,825	3,081,310	2,398,000	895,515
Peru	220,815	16,965	87,085	116,765
Middle East, North Africa				
Egypt	96,660	3,480	18,010	75,170
Morocco	29,670	1,625	8,900	19,145
Tunisia	5,555	390	1,625	3,540
South Asia				
Bangladesh	69,180	6,000	20,095	43,085
India	836,780	41,185	127,540	668,055
Pakistan	165,425	11,630	43,365	110,430
Sri Lanka	21,820	495	5,695	15,630
Sub-Saharan Africa				
Nigeria	109,160	2,630	15,910	90,620
Sudan	12,730	960	3,715	8,055
Total	12,671,800	4,116,150	4,291,680	4,263,970

Notes: Immigrants defined as foreign born population in the United States age 25 years or
over. Primary education or less corresponds to 0-8 years of schooling ; secondary to
9-12 years of schooling, and tertiary to more than 12 years of schooling

Source: Special tabulation from U.S. Census Bureau based on 2000 U.S. Population Census.

Table 5. Migration Rates to the United States by Level of Educational Attainment, 2000

Country	Total	Educational Level Primary or less	Secondary	Tertiary
East Asia				
China, PR	0.1	0.1	0.2	2.2
Indonesia	0.1	0.1	0.1	0.7
Philippines	3.6	0.6	2.2	11.7
Eastern Europe, Central Asia				
Croatia	1.2	0.4	1.2	4.7
Turkey	0.2	0.1	0.4	1.3
Latin America, Caribbean				
Brazil	0.2	0.1	0.5	1.1
Colombia	2.1	0.4	4.0	9.9
Dom. Republic	12.9	5.3	42.4	24.8
El Salvador	24.3	12.4	114.8	39.5
Guatemala	7.6	3.8	29.9	25.8
Jamaica	33.3	4.7	40.9	367.6
Mexico	13.3	10.8	17.2	16.5
Peru	1.8	0.3	2.5	4.2
Middle East, North Africa				
Egypt	0.3	0.1	0.2	2.3
Tunisia	0.1	0.1	0.2	1.3
South Asia				
Bangladesh	0.1	0.1	0.3	2.3
India	0.2	0.1	0.2	2.8
Pakistan	0.3	0.1	0.5	6.4
Sri Lanka	0.2	0.1	0.1	5.6
Sub-Saharan Africa				
Sudan	0.1	0.1	0.3	3.4

Notes: No educational attainment data available on: Albania, Armenia, Morocco and Nigeria. Immigrants defined as foreign born population in the United States, age 25 years or over. Primary education or less corresponds to 0-8 years of schooling ; secondary to 9-12 years of schooling, and tertiary to more than 12 years of schooling.

Source: Author's calculations using data from special tabulation from U.S. Census Bureau based on 2000 U.S. Population Census, and the Barro-Lee data set (2000) on educational attainment.

Table 6. Number of Immigrants (Age 25 and older) to the OECD by Level of Educational Attainment, 2000

Country	Total Immigrants	Educational Level		
		Primary or less	Secondary	Tertiary
East Asia				
China, PR	722,400	148,029	185,295	389,076
Indonesia	142,540	3,910	32,347	106,283
Philippines	356,134	27,604	70,079	258,451
Eastern Europe, Central Asia				
Turkey	1,913,782	263,078	534,429	1,116,275
Latin America, Caribbean				
Brazil	176,519	16,026	64,097	96,396
Jamaica	117,199	9,483	54,647	53,069
Middle East, North Africa				
Morocco	560,658	30,706	168,179	361,773
Tunisia	142,828	10,027	41,782	91,019
Egypt	20,373	733	3,796	15,844
South Asia				
Bangladesh	44,417	3,852	12,902	27,663
India	375,283	18,471	57,199	299,613
Pakistan	85,668	6,022	22,458	57,188
Sri Lanka	64,143	1,455	16,741	45,947
Total	4,721,944	539,396	1,263,951	2,918,597

Notes: No data available on number of immigrants from: Albania, Armenia, Colombia, Croatia, Dom. Republic, El Salvador, Guatemala, Mexico, Nigeria, Peru and Sudan. Immigrants defined as immigrant or foreign born population by individual countries in the OECD, age 25 years or over. Primary education or less corresponds to 0-8 years of schooling ; secondary to 9-12 years of schooling, and tertiary to more than 12 years of schooling. For a list of OECD countries, see footnote (4).

Source: Author's calculations from OECD, Trends in International Migration: Annual Report (2001).

Table 7. Migration Rates to the OECD by Level of Educational Attainment, 2000

| Country | Total | Educational Level | | |
		Primary or less	Secondary	Tertiary
East Asia				
China, PR	0.1	0.1	0.1	1.9
Indonesia	0.1	0.1	0.2	2.0
Philippines	1.1	0.2	0.7	3.6
Eastern Europe, Central Asia				
Turkey	5.7	1.0	11.5	39.1
Latin America, Caribbean				
Brazil	0.2	0.1	0.6	1.3
Jamaica	8.7	1.2	10.6	95.8
Middle East, North Africa				
Morocco	4.0	0.3	6.9	43.5
Tunisia	3.1	0.3	5.2	33.3
Egypt	0.1	0.1	0.1	0.5
South Asia				
Bangladesh	0.1	0.1	0.2	1.5
India	0.1	0.1	0.1	1.3
Pakistan	0.1	0.1	0.3	3.3
Sri Lanka	0.7	0.1	0.4	16.5

Notes: Immigrants defined as immigrant or foreign born population by individual countries in
the OECD, age 25 years or over. Primary education or less corresponds to 0-8 years of schooling ;
secondary to 9-12 years of schooling, and tertiary to more than 12 years of schooling. For a list of
OECD countries, see footnote (4).

Source: Author's calculations from OECD, Trends in International Migration: Annual Report (2001),
and the Barro-Lee data set (2000) on educational attainment.

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