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KNOMAD Working Paper 16

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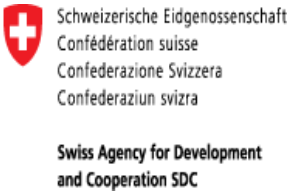
October 2016



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KNOMAD is supported by a multi-donor trust fund established by the World Bank. Germany's Federal Ministry of Economic Cooperation and Development (BMZ), Sweden's Ministry of Justice, Migration and Asylum Policy, and the Swiss Agency for Development and Cooperation (SDC) are the contributors to the trust fund.

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International Migration to the OECD in the Twenty-First Century*

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Abstract

Detailed and comparable international migration statistics are vital for policy makers and academics alike. This paper presents the full picture of international bilateral migrant stock data for OECD destination countries from the 2010 census round. It analyzes the data along a number of critical dimensions (origin, age, education, gender) in historical context, highlighting the most important patterns. These patterns include the continued surge in migration to the OECD (an increase of 40 percent between 2000 and 2010), the meteoric rise in high-skilled migration (an increase of 76 percent), and the inexorable increase in female migration, especially the migration of high-skilled females (an increase of 88 percent). Given their reliability, it is hoped that the data presented in the paper will set the standard for data collection and dissemination in the years to come.

Key words: International Migration, Demography, Labor Mobility, Labor Markets. Brain Drain

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* This study was produced in the framework of KNOMAD's Thematic Working Group (TWG) on Labor Migration. KNOMAD is headed by Dilip Ratha; this TWG is chaired by Manolo Abella (COMPAS), Manuela Tomei (ILO), and Çağlar Özden (World Bank): This paper is the result of joint work between the OECD, the International Migration Institute at the University of Oxford and the Development Research Group of the World Bank. The work of the OECD is the result of a longstanding cooperation between the OECD and the French Development Agency (AFD) which has been also supported by the Swiss Agency for Development and Cooperation. This paper should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the authors. The authors wish to thank attendees of the 7th and 8th International Conferences on Migration and Development, respectively convened at the Oxford Martin School, University of Oxford, June 2014, and the World Bank, Washington DC, June 2015.

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1. Introduction

The need for timely, detailed, and accurate migration statistics has arguably never been as salient as it is today. The economic, social, and cultural impact of migration is among the dominant topics of the political debate in almost every origin and destination country, whether they are high-income Organisation for Economic Co-operation and Development (OECD) or low-income developing countries. One of the most common complaints is that the quality and coverage of the available data and empirical analysis to guide these debates are inadequate. Even though significant progress has been made in data collection, dissemination, and analysis, especially during the past decade, the efforts have been somewhat uneven and fragmented. For example, the statistical offices of most high-income destination countries individually collect and publish data on the numbers and characteristics of their immigrant populations. Numerous origin countries implement policies to map and connect with their diasporas. Yet, without a coordinated effort, a complete picture of global population movements will not emerge and full benefits of the data efforts will not be realized.

The compilation, harmonization, and dissemination of publicly available data sets require significant resources given the sheer quantity of data involved and the heterogeneity of recording and dissemination practices across countries. The OECD and the World Bank have been at the vanguard of previous global data collection and dissemination projects. Their efforts have been instrumental in catalyzing a new wave of research on international migration and provision of data sets that have been widely used and cited.[1] These projects have not only brought fragmented national databases together for easier comparison and analysis but also established certain quality standards. This paper presents analyses along a number of dimensions of interest, based on the latest collection of decennial bilateral migrant stock data for the OECD countries during the 2010 census round.

Ernst Georg Ravenstein (1876, 235), the first to systematically scrutinize census data in the modern era, recognized the need for good quality primary data for analysis, stating, "We are fully aware of the imperfections of this work…To some extent, however, these imperfections are due to a deficiency of information on certain points…" Since then, successive international institutions have made recommendations for the standardization of international migration data, but these pleas have frequently fallen on deaf ears. Broadly speaking, today's publicly available migration statistics are quite primitive when compared with international statistics on trade, capital flows, and investment (Clemens 2011). Nevertheless, the available migration data for the OECD countries are of the highest quality globally. Furthermore, as shown by Artuç et al. (2015), a few OECD destinations host the majority of worldwide migrants, especially the highly skilled. The data for the OECD countries offer a unique and detailed snapshot of the prevailing demographic situation in some of the world's most important, and at times, "in-the-spotlight" migrant destinations.

[1] Aside from being instrumental in furthering the understanding of global human capital mobility, the availability of these databases has led to the development of the literature on the determinants of international migration (Beine, Docquier, and Özden 2011; Grogger and Hanson 2011; Beine and Parsons 2015), the labor market impact of immigration and emigration (Docquier, Özden, and Peri 2014), diaspora externalities (Beine, Docquier, and Schiff 2013), the potential of international migration for global welfare (Walmsley, Winters, and Ahmed 2011), the long-run development of historical colonies (Chanda, Cook, and Putterman 2014), differing measurements of economic development (Clemens and Pritchett 2008), examinations of migration transition theory (Clemens 2014), the links between linguistics and trade (Melitz and Toubal 2014), migrant selection (Belot and Hatton 2012), diversity and economic development (Alessina, Harnoss, and Rapoport 2013), health worker migration (OECD 2007 and 2015a), and gender dimension of the brain drain (Dumont, Martin, Spielvogel 2007).

Two broad categories emerge when looking at databases of international bilateral migration stocks. The first group, focusing both on OECD and non-OECD destination countries, produce and disseminate more comparable, detailed, and homogeneous migration data of a high quality. These efforts have been spearheaded by the World Bank and the OECD (Dumont and Lemaître 2005; Docquier and Marfouk 2006; Beine, Docquier, and Rapoport 2007; Docquier, Lowell, and Marfouk 2009; Dumont, Spielvogel, and Widmaier 2010; OECD 2012; and more recently Arslan et al. 2014 and OECD 2015b). [2] The second group of databases builds on the previous ones and implement a number of assumptions and estimation techniques to provide an overall global picture of international migration stocks (mostly headcounts) while acknowledging the inherent differences in recording practices across national statistical agencies (examples are Artuç et al. 2015; Özden et al. 2011; Parsons et al. 2007). Finally, KNOMAD publishes the International Migration and Remittances Factbook (World Bank, 2016) which brings together various migration related data and numerous development indicators.

This paper presents a detailed analysis of several key dimensions of bilateral migrant stock data from primary national statistical sources for OECD destination countries from the 2010 census round. This data set and the analyses have several strengths in addition to providing an analytical overview of the main patterns and trends in international migration during the first decade of the twenty-first century. First, it captures some of the most important destinations and bilateral corridors, especially for permanent migration. Hence, it allows migration patterns out of many origin developing countries to be analyzed—a task that is not possible with data from a single destination country. Second, the data include numerous critical dimensions of interest such as age, education, and gender. These dimensions influence migration patterns and are important determinants of the economic, social, and cultural impact of migration. Third, patterns over time can be compared since the data collection and construction have been harmonized with those from the preceding decade.

For the sake of brevity, the analysis in this paper focuses on a few key trends, although the data are provided as a public good, and it should set the standard in international migration research in the years to come. Indeed the bilateral nature of the data set, along with the various dimensions it covers (personal characteristics, over-time evolution), provides the foundation for many additional comparisons and analyses. We expect (and hope) other researchers and policy makers will take full advantage of the data.

Among the main results, migration from all parts of the world to the OECD has increased, despite the recent financial crisis with it severe negative impacts on many OECD labor markets. These larger migrant stocks are highly educated, to the extent that the share of the tertiary educated is higher among migrants relative to the native populations in these mostly high-income destination countries. Furthermore, the number of female migrants increased faster than the number of male migrants, and the number of tertiary-educated female migrants increased even more. Migrants are also overrepresented in the working-age populations, which is to be expected, although they start to demonstrate signs of aging. We should note that the data and the analysis do not capture the recent refugee inflows into Europe since the data are from the 2010 censuses. It is hoped that the 2020 round of the data will address this important and sensitive issue.

[2] Between the two types of databases arguably lies the database on OECD and non-OECD countries–extended (DIOC-E) database of the OECD, which comprises primary data from both OECD and non-OECD countries. Data collection for the 2010 round of the DIOC-E database has been completed.

We observe increasingly wide variation in migrants' origins. Emigrants from all geographic regions (as well as different groups of countries defined by income level) have become more educated. The increase in emigration, however, is inversely related to income, with poorer regions experiencing higher emigration growth rates, possibly due to declining transportation and communication costs. Many small-island and poorer developing countries continue to have the highest tertiary-educated emigration rates. However, we do not observe a parallel increase in brain drain rates for other countries, most likely because of the increased educational attainment in many origin countries. The following section provides an overview of the data collection strategy, after which the report discusses the harmonization of the data. Analyses of the data are then presented before the paper concludes.

2. Data Collection

The original Database on Immigrants in OECD Countries (DIOC) project was based on the highly standardized population census and register data from OECD member countries from the 2000/01 census round. The goal was to produce "a detailed, comparable and reliable picture of immigrant populations within OECD countries…and …additional information on the educational attainment of migrants, [and] the cumulative impact of flows of human capital…" in close collaboration with member states' National Statistical Offices (Dumont and Lemaître 2005, 4). The original project was subsequently updated in 2005, most of the data for which were drawn from labor force surveys because of the absence of census-based data in many OECD countries. This paper presents the corresponding data from the 2010 census round in addition to further analyzing these data in historical perspective.

Migration data almost exclusively derive from destination countries since it is easier to collect population-related data from where people reside as opposed to from where they originate. The 2010 data in this paper draw upon three types of primary sources: national censuses (22 countries); population registers (5 countries); and surveys, where necessary (7 countries). In all, bilateral migrant stock data are presented for 33 destination countries, the sources for which can be found in table A1 in the appendix.

Censuses survey an entire population (or in some cases a representative but large subsample, such as a micro-census, as in Germany) at a single time. Censuses are comprehensive in that they aim to enumerate the resident population, both regular and irregular (Bilsborrow et al. 1997, 55). The universal coverage of censuses is a great strength, one that is frequently used to calibrate or correct population-register data or used as sampling frames for nationally representative surveys, such as labor force or household expenditure surveys. National censuses are generally conducted decennially,[3] often over several months, within "rounds" that last 10 years from the middle of each decade (for example, 2005–14). All of those interviewed respond to the same questionnaire. Questions posed, especially those relating to individuals' places of birth and nationality, are fairly homogeneous in most countries.

Particularly widespread in Scandinavia, population registers are continuous reporting systems used to enumerate the resident population of a specific area, such as a municipality or parish. There is typically a legal requirement to register with the local government and an obligation to notify the authorities

[3] See, for example, the 2020 World Population and Housing Census Programme (http://unstats.un.org/unsd/demographic/sources/census/censusdates.htm).

of any change in status, such as change of address. Therefore, they may be used to record migration, both internal and international, and provide scope for collating detailed, up-to-date demographic and socioeconomic information of all those registered. Population registers are therefore a potentially far richer source of migration data than censuses, able to describe migrant stocks and (in and out) flows with much higher frequency observations that potentially capture many migrant characteristics, such as education and occupation. This makes population registers far more appropriate than data obtained from censuses for examining many facets of research. The Nordic countries typically implement impressively accurate registers that assign each citizen a permanent reference number that is used across government departments to streamline administrative procedures.

When neither census nor population register data are available, migration data are obtained from nationally representative surveys, such as labor force or household surveys. Such surveys provide a rich source of data and prove essential for identifying microeconomic links between migration and other facets of development that other surveys and censuses may fail to capture. They are also useful in that they may capture undocumented migration, which population registers, for example, cannot. However, the sample size of surveys is typically smaller, such that they might not adequately capture smaller emigrant groups sufficiently well.

3. Harmonizing the Data

In general, the issues of harmonizing international migration are dualistic in nature. The first set of issues pertains to the different surveying practices used by different countries when enumerating migrants and the degree to which national governments are effective in implementing these practices. Data collectors can take little remedial action.

Countries record migration numbers using a wide array of definitions and statistical tools, each of which is different with respect to coverage, omissions, and frequency of observation. For example, censuses typically use two competing classifications of “resident” in enumerating the resident population. A “de jure” census aims to capture all of those “usually resident” at the census moment, while a “de facto” census instead refers to all those physically present at the time of the census. In the case of population registers, the laws under which individuals are classified as migrants and the conditions under which individuals are inscribed or deregistered vary considerably across nations (Bilsborrow et al. 1997, 83). The criteria for registration—duration of residence, for example—may also differ between countries. Some registers capture temporary migrants, others asylum seekers in private residences, and still others international students or dependents. Arguably the largest drawbacks affecting the accuracy of population registers, however, are failures or delays in individuals reporting changes to their addresses or removing their names from the register, and duplicate entries (Redfern 1989). In particular, departures tend to be significantly underreported since many people avoid deregistering to retain rights in the country of residence in case they wish to return. With regard to surveys, aside from the huge variety in practices used when implementing them, their comparatively small sample sizes militate against identifying ethnic and national minorities in the data, which are therefore often underrepresented. Similarly, micro-censuses also undercount minority populations because of their reduced coverage. Finally, there is no globally accepted standard as to when a census (or a survey) needs to be taken. This variation over time can introduce significant heterogeneity.

The second set of issues, while no less significant, differs in the fact that some remedial actions can be taken, both ex ante and ex post, leading to more precise harmonization. The DIOC 2010 data collection was therefore based on individual requests for customized cross-tabulations of data sent by the OECD to the relevant national agencies of all 33 destination countries (currently the only OECD member not covered by the data is the Republic of Korea). The official letter provided precise details of the data needed for the project. In responding to these requests, national statistical authorities compiled special tables by aggregating the available micro (individual-level) data to the national level. In other words, any deviations from the first-best definitions in the data that remain are simply due to the data collection or aggregation methodology used in a specific destination country. When determining which variables to request, it was important to specify the required degree of disaggregation for each variable for the sake of future harmonization. Please refer to tables A1 and A2 in the appendix for details.

Chief among this second set of concerns is the degree to which countries classify individuals as migrants. The United Nations defines a migrant as "any person that changes his or her country of usual residence" (United Nations Statistics Division 1998, 6). The essence of this broad definition is a movement from one geographic location to another, which is the concept underpinning the economic analysis of migration. In practice, however, migration manifests itself in myriad guises including individual's country of birth, country of citizenship, purpose of visit or visa type, place of last permanent residence, duration of stay, and even ethnicity. The two definitions of migrants most commonly used are the first two criteria—being foreign born or a foreign citizen.[4] The data are prioritized by country of birth since birth country is superior for determining physical movement across national borders and for identifying first-generation migrants. Definitions based on nationality might be skewed for two reasons. First, second-generation family members who were born in a destination country but were never granted citizenship in this country may be included in the data. Second, first-generation migrants who obtained citizenship after a certain period of residency might be excluded. Because of vast differences in citizenship and naturalization laws and rates across countries, one or both of these factors might significantly bias migration numbers. The data were requested at the lowest possible level of aggregation and later harmonized to a comprehensive list of 223 origin countries and territories, as detailed in the online methodological note.[5]

Data by gender and labor force status were also requested. The data for neither of these variables resulted in any harmonization issues. Similarly, data on individuals' age distribution were solicited. Data on age or "duration of stay" could not be obtained in yearly increments, however, both for reasons of privacy and because many destination countries do not record age data in this way. Therefore, we opted for broader age and duration-of-stay categories for which the majority of the data from the 33 destination countries could be harmonized.

The education variable required the highest degree of harmonization because education systems differ significantly in the 33 destination countries. This issue was overcome in two ways. First, we include broad education categories, for example, primary school, lower secondary, and so on, which enabled easier harmonization of the data. Second, by drawing upon the available international

[4] It should be noted that a number of OECD destination countries have also provided information on citizenship crossed with information on country of birth. More details can be found on the DIOC website and in the methodology note at http://www.oecd.org/els/mig/methodology-DIOC-2010-11.pdf.
[5] http://www.oecd.org/els/mig/methodology_DIOC_2010_11.pdf.

concordances as produced by UNESCO,[6] we were able to achieve a close matching of the data. A few exceptions to our harmonized definitions exist, and readers should refer to the online technical appendix for further information on these differences.[7]

4. Analysis of Human Capital Mobility in the Twenty-First Century

This section presents analyses of the data obtained from individual national statistical agencies and harmonized after careful efforts. The section first discusses key patterns from the perspective of OECD receiving nations, specifically the skill profile of migrants relative to native-born populations, as well as their gender and age distributions. It then turns to the resulting patterns from the perspective of sending countries, focusing on the gender and educational attainment dimensions and how these dimensions have changed between 2000 and 2010.

4.1 Destination-Country Perspective

Between 2000 and 2010 the total population of the 33 OECD countries with available data increased by more than 105 million persons (or 12 percent) to slightly less than 960 million (see table 1). Within this total, the size of foreign-born populations rose to 106 million from 76 million, for an increase of 30 million, equivalent to an almost 40 percent increase of the migrant stock from 2000. With regard to the broad educational distribution, the share of migrants was larger at both the primary and tertiary education levels but was significantly lower at the secondary level in 2000. The shares of natives and migrants became equal for the primary educated, the gap stayed relatively stable for the secondary educated, and increased for the tertiary educated in 2010. In other words, while the intervening decade saw a noticeable increase in the proportions of both natives and the foreign born that have tertiary education, the improvement was much larger for migrants—from 23.6 percent to 29.7 percent. This demonstrates, on average, a continued positive selection on education for the incoming foreign-born population in the OECD countries.

In 2010, the foreign born represented 11.1 percent of the total population (the sum of the foreign born and natives), an increase from 8.9 percent of the total in 2000. The number of high-skilled migrants—using tertiary education as the measure of human capital—rose from 18 million in 2000 to 31 million in 2010, a rise of 76 percent over the decade. Put differently, the share of the foreign born among the total number of individuals with a tertiary education rose from 11 percent to 14 percent. This statistic is another indicator of the rapidly increasing human capital levels of the migrant populations in OECD countries.

These averages mask fairly significant heterogeneity across destination countries, the disaggregation of which can be found in table A3 in the appendix.[8] In 2010, the OECD destination countries with the highest shares of migrants (expressed as the stock of migrants as a fraction of the total population) were Luxembourg (44 percent), New Zealand (33 percent), Israel (32 percent), Australia (29 percent), Switzerland (28 percent), and Canada (25 percent). Those OECD countries that hosted the lowest concentrations of migrants are Mexico (0.5 percent), Japan (1 percent), Turkey (1 percent), Chile (2

[6] See http://www.uis.unesco.org/Education/ISCEDMappings/Pages/default.aspx.
[7] http://www.oecd.org/els/mig/methodology_DIOC_2010_11.pdf.
[8] In some cases, the educational categories do not sum to 100 percent because of the unknown education category.

percent), Poland (2 percent), and the Slovak Republic (3 percent).[9] The OECD countries that hosted the most-educated migrant populations (as measured by the share of the tertiary educated among all migrants) were Canada (52 percent), the United Kingdom (47 percent), Israel (45 percent), Estonia (39 percent), and Ireland (37 percent). Conversely, the countries with the lowest share of tertiary educated among migrants were Slovenia (11 percent), Italy (13 percent), the Czech Republic (14 percent), Belgium (15 percent), Germany (17 percent), and Poland (17 percent).

Table 1. Education Distribution of Natives and Foreign Born Ages 15 Years and Older, in OECD Countries, 2000 and 2010

	2000			2010		
	Natives	Foreign born	Unknown	Natives	Foreign born	Unknown
Total stock (thousands)	768,321.51	75,715.87	7,758.75	849,352.04	105,722.80	2,502.52
Primary educated (%)	38.3	40.7	23.1	33.5	33.2	38.1
Secondary educated (%)	38.6	32.9	35.3	40.9	34.9	12.5
Tertiary educated (%)	19.1	23.6	12.0	23.4	29.7	10.8
Education unknown (%)	3.9	2.8	29.6	2.2	2.3	38.5

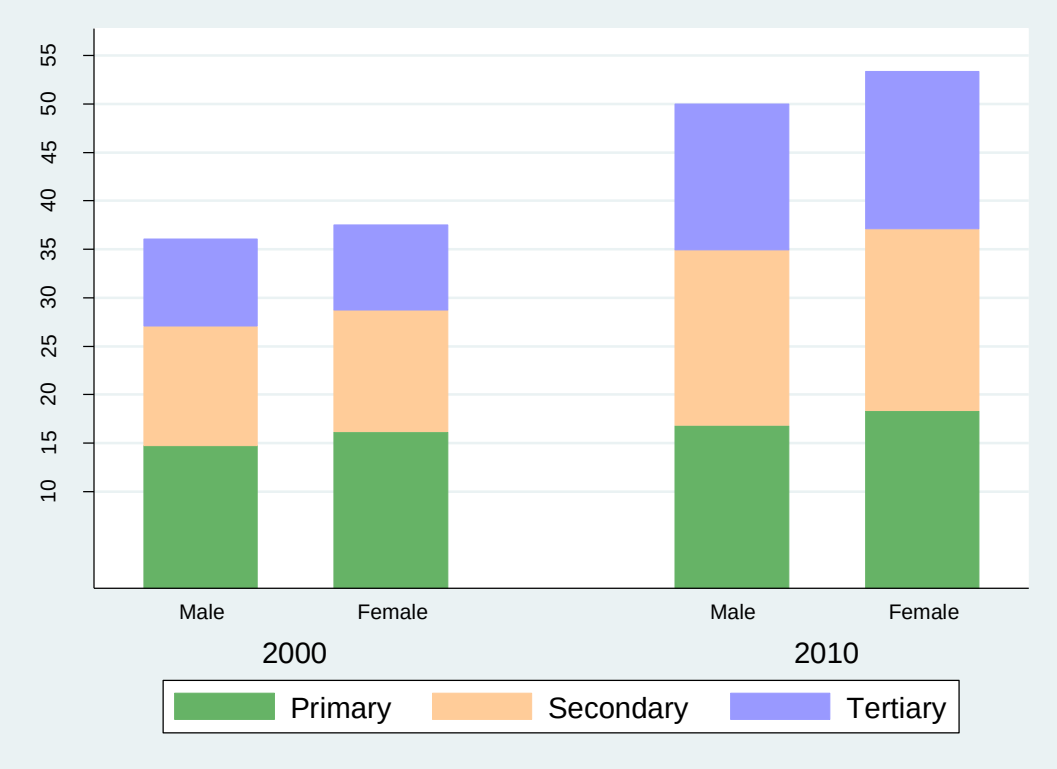
Source: DIOC 2010/11.

Note: Chile, Estonia, Israel, and Slovenia became OECD members in 2000. In addition, data were not collected for Iceland in 2000. These five countries were not included in the 2000 data. To provide a holistic picture of migration to OECD countries, they were included in 2010, even though they do not have many migrants. If interested, all data can be accessed at http://www.oecd.org/els/mig/dioc.htm.

Figure 1 focuses solely on migrants and introduces the gender dimension. Between 2000 and 2010, the overall number of female immigrants rose by 16.5 million, compared with 13.5 million for men—a 43 percent increase for women as compared with 36 percent for men. Over the decade, as discussed earlier, the largest increases are for both male and female tertiary-educated migrants. The increase in the number of tertiary-educated women, however, is much greater than that for men. More specifically, tertiary-educated female migrants in OECD countries increased by 7.6 million (88 percent) while the parallel increase was 5.9 million for men (64 percent). These patterns are also borne out in the relative figures. The share of tertiary educated among all women migrants increased by 7 percentage points while the increase was 5 percentage points for men. Similarly, the shares of primary educated fell for both genders between 2000 and 2010, but the share fell more for women (by 8 percentage points) than for men (by 7 percentage points). The shares of both male and female migrants with secondary education rose over the decade (2 percentage points).

[9] Interestingly enough, within four years, Turkey will be the destination for more than 2 million Syrian refugees and will become the largest refugee-host country.

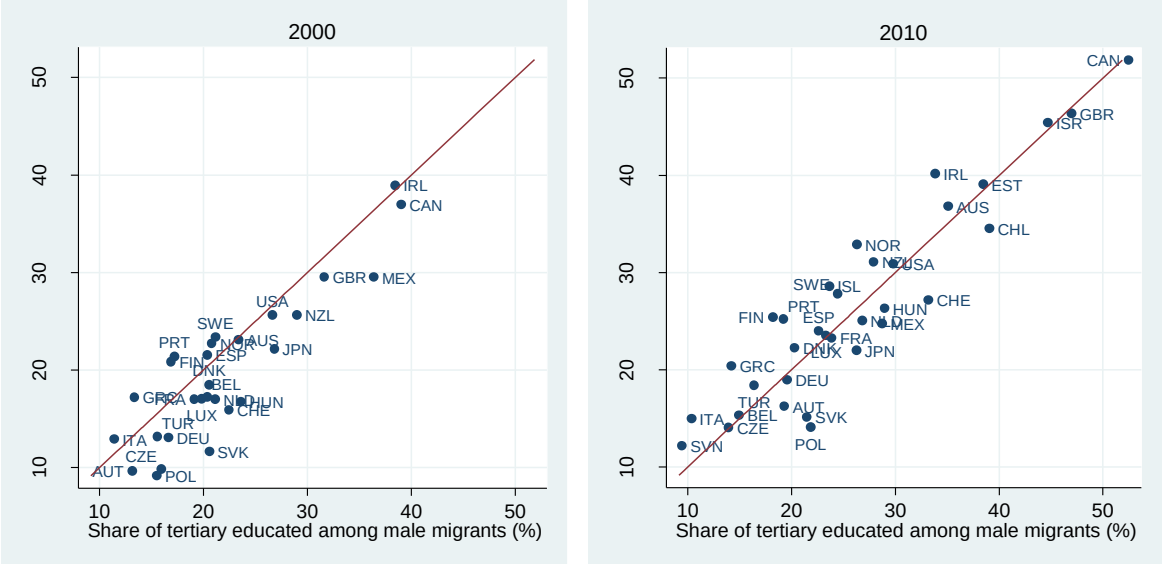
Figure 1. Male and Female Migrants by Education Level, 2000 and 2010



Source: DIOC 2010/11.

The change in the gender balance of skills is most evident in figure 2, which shows the share of tertiary educated among all male migrants on the x-axis and the share of tertiary educated among all female migrants on the y-axis for 2000 (panel a of figure 2) and 2010 (panel b of figure 2). A 45° line is imposed on both figures, which represents a gender balance of tertiary education, that is, where the shares are equal. Two points are evident. Most obviously, many of the countries moved to the upper right in 2010 relative to where they were located in 2000, demonstrating an overall improvement in the shares of both female and male tertiary-educated migrants. In 2000 (panel a of figure 2), however, a far greater number of countries lie below the 45° line, indicating that a higher share of the total stock of foreign-born males had attained a tertiary education relative to their female counterparts. Over the next decade, the share of tertiary educated rose faster for females than for males, and the gender balance of tertiary education became far more equal. As a result, many destination countries shifted their positions to the left, moving above the 45° line.

Figure 2. Shares of Tertiary-Educated Males and Females, 2000 and 2010

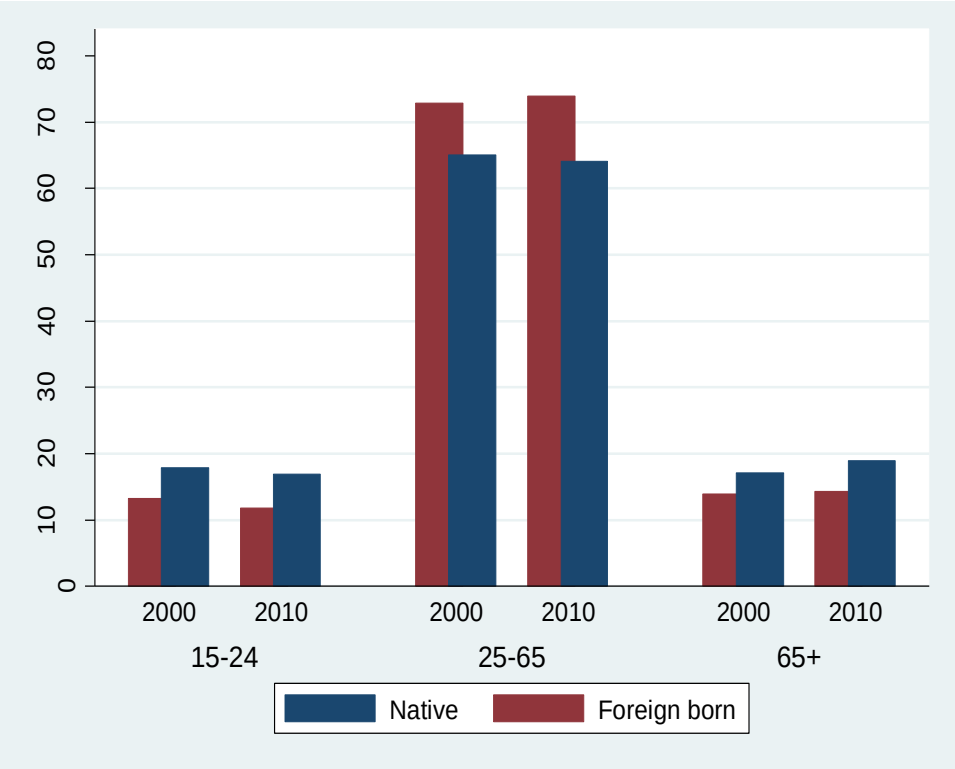


Source: DIOC 2010/11.

Note: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (PRT), Slovakia (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR), and the United States (USA).

Figure 3 explores the changing age profile of natives and immigrants across the OECD destination countries between 2000 and 2010. We adopt three broad age categories: those between ages 15 and 24 (school leavers and young workers), those between ages 25 and 64 (typically considered the working-age population), and those ages 65 and older (those of retirement age).

Figure 3. Share of Natives and Foreign Born, by Broad Age Category, 2000 and 2010



Source: DIOC 2010/11.

Simply comparing natives with migrants across the age categories, it is clear that there are more natives in the younger (ages 15–24) and older (65 and older) age groups when compared with immigrants in both 2000 and 2010, whereas proportionally more foreign born are of working age (ages 25–64). Similarly, although barely discernible from figure 3, the proportions of natives ages 15–24 and 25–64 actually fell (by 1 percentage point and 0.65 percentage point, respectively) between 2000 and 2010, while the share of natives ages 65 and older rose (1.9 percentage points), demonstrating aging across the OECD destinations. The proportion of migrants between ages 15 and 24 fell between 2000 and 2010 (1.48 percentage points), but this drop was compensated for by a large rise in the proportion of the working age group (1.1 percentage points), as well as an increase in the share of the 65 and older group (0.24 percentage point).

These aggregate figures for the OECD again conceal a wide variety of country-specific experiences, which are detailed in table A4 in the appendix. Comparing the shares of natives and migrants by age category—wherein a positive number indicates a higher share of natives—reveals some interesting patterns. For example, the shares of the native born ages 65 and older are far higher than the corresponding share of migrants in Italy (19 percentage points), Japan (19 percentage points), Greece (17 percentage points), and Finland (16 percentage points). On the opposite side of the aging profile are Poland, Estonia, the Slovak Republic, and Hungary, each of which hosts far higher proportions of older migrants (ages 65 and older), when compared with natives, with differences of 60 percentage points, 23 percentage points, 14 percentage points, and 7 percentage points respectively. Indeed,

more than 75 percent of all migrants in Poland fall into the 65 and older age bracket, whereas the figures are 40 percent for Estonia, 28 percent for the Slovak Republic, and 27 percent for Hungary. These statistics might be indicative of large historical migrations.

4.2 Origin-Country Perspective

This section takes full advantage of the bilateral nature of the migration data and examines the flipside of the migration coin by focusing on the characteristics of sending-region characteristics, as shown in table 2. The top panel of table 2 displays the educational distribution for sending geographical regions, while the bottom panel provides the educational distribution of regions as defined by their income levels. Emigration to the OECD rose from all regions of the world between 2000 and 2010, although the greatest proportional increases were experienced in Asia (56 percent) and Africa (55 percent). Perhaps more important, table 2 demonstrates the increasing positive selection of immigrants (by education level) to the OECD. The proportion of migrants with only a primary education fell for every sending region between 2000 and 2010, and the fraction of those having attained tertiary education increased for every region over the same period. The starkest migration trend in the first decade of the twenty-first century, therefore, is the rise (76 percent) in the total numbers of incoming tertiary-educated migrants over the period. Of the net increase of 13.5 million tertiary-educated migrants, 37 percent came from Asia, 35 percent from Europe, 16 percent from Latin America and the Caribbean, and 10 percent from Africa.

Table 2. Sending-Region Characteristics, for Migrants Ages 15 and Older (thousands)

Region of birth	**Primary**		**Secondary**		**Tertiary**		**Unknown**	
	2000	*2010*	*2000*	*2010*	*2000*	*2010*	*2000*	*2010*
Africa	3,044.2	4,223.1	1,988.5	3,162.1	1,658.5	3,039.0	161.9	214.8
Asia	4,598.3	5,877.6	5,025.5	7,696.1	5,991.4	11,027.7	530.4	635.1
Europe	11,777.1	12,384.5	10,181.2	14,398.7	6,177.0	10,848.6	1,104.0	1,116.5
North America	360.8	373.2	682.1	784.6	811.3	1,157.1	55.0	44.1
Oceania	294.8	292.6	428.0	551.4	303.6	465.5	80.7	79.2
Latin America and the Caribbean	10,191.8	11,918.9	6,091.0	10,291.4	2,642.9	4,807.0	109.8	121.1
Unknown	559.6	18.9	493.4	6.4	269.1	7.1	104.3	180.6

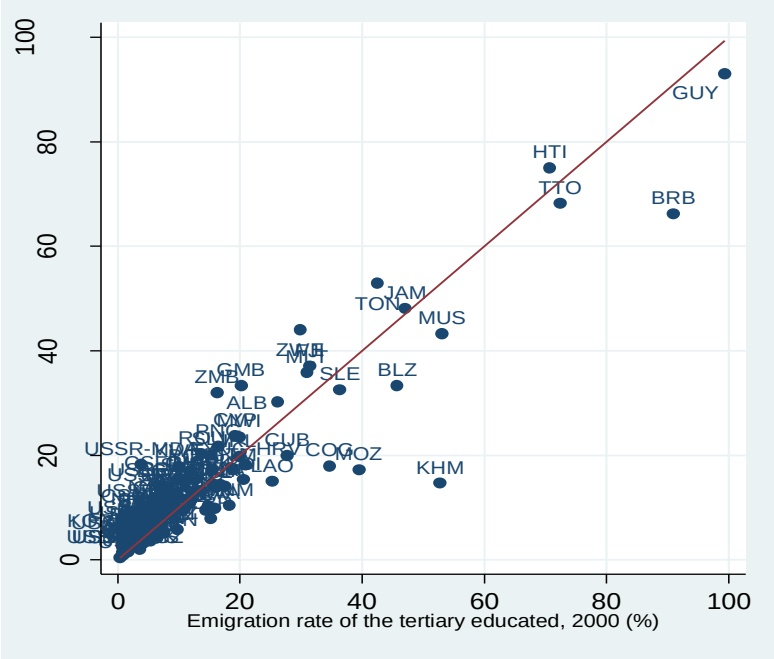
Income group	**Primary**		**Secondary**		**Tertiary**		**Unknown**	
	2000	*2010*	*2000*	*2010*	*2000*	*2010*	*2000*	*2010*
High income: OECD	7,880.12	7,183.92	8,602.00	10,389.72	6,384.12	9,854.92	996.47	871.16
High income: non-OECD	1,841.78	1,763.09	1,927.42	2,735.35	1,194.97	2,276.43	85.23	113.53
Upper middle income	14,189.85	17,193.28	8,756.57	15,043.23	5,184.14	9,505.35	557.63	660.77
Lower middle income	5,235.36	7,233.10	4,127.12	6,994.24	4,076.30	8,188.57	297.72	441.38
Low income	1,083.83	1,633.27	957.55	1,655.64	725.99	1,472.79	93.73	117.19
Unknown	595.56	82.15	519.08	72.42	288.16	53.98	115.18	187.31

Source: DIOC 2010/11.

The OECD experienced increasing numbers of migrants from all regions (as defined by income level) across the world. The largest absolute increases were experienced by upper-middle-income origin countries (13.7 million), lower-middle-income countries (9.1 million), and high-income OECD countries (4.4 million). Relatively speaking, however, the greatest increases were from low-income countries (71 percent), and it is interesting to note that these proportions fall monotonically with income (lower-middle income, 61 percent; upper-middle income, 48 percent; high-income non-OECD, 36 percent; high-income OECD, 19 percent). Focusing upon tertiary-educated migrants, all regions (by income) sent more highly skilled migrants to the OECD between 2000 and 2010. In absolute terms, the greatest increases came from upper-middle-income countries (4.4 million), lower-middle-income countries (4.1 million), and high-income OECD countries (3.5 million). As measured by the growth rates of emigration from these regions, however, the greatest increase was experienced by the low-income

countries (103 percent), and these percentage changes fall almost monotonically with income thereafter: lower-middle-income countries (101 percent), high-income non-OECD countries (91 percent), upper-middle-income countries (83 percent), and high-income OECD countries (54 percent).

Figure 4. Changing Skill Selection from Origin Countries to OECD, 2000 and 2010



Source: DIOC 2010/11.

Note: Barbados (BRB), Belize (BLZ), Cambodia (KHM), Guyana (GUY), Haiti (HTI), Jamaica (JAM), Mauritius (MUS), Sierra Leone (SLE), Tonga (TON), and Trinidad and Tobago (TTO) are the clearly visible countries.

Figure 4 illustrates the analysis of the changing educational composition of emigrants at the origin-country level, taking those that have completed tertiary education as the measure of being highly skilled. The x-axis in figure 4 displays emigration rates of tertiary-educated migrants in 2000, while the corresponding emigration rates for 2010 are shown on the y-axis (please refer to the discussion preceding figure A1 in the appendix for details of the calculations of these emigration rates). Similar to figure 2, a 45° line is imposed, showing unchanged emigration rates of sending countries. Of the 142 countries in figure 4, 51 countries lie below the 45° line, meaning that the emigration rates of tertiary-educated migrants actually fell between 2000 and 2010. Such a trend might have a number of explanations. Rising educational attainment in the origin country seems to be the most plausible. The countries that experienced the greatest decline in their tertiary-educated emigration rates include Cambodia (38 percent), Barbados (25 percent), Mozambique (23 percent), and the Republic of Congo (17 percent). The other 91 countries in figure 4, however, all experienced rising emigration rates of their tertiary-educated citizens. The countries that experienced the greatest acceleration in their tertiary-educated emigration rates include Zambia (16 percent), Moldova (14 percent), Zimbabwe (14 percent), The Gambia (13 percent), and Tonga (10 percent). (Please refer to table A5 in the appendix for the country-level emigration rates of the highly educated). Of the world's most populous countries

for which education data are available, Pakistan (3.1 percent), Bangladesh (1 percent), Brazil (0.7 percent), Russia (0.6 percent), India (0.5 percent), and the United States (0.1 percent) all experienced increasing emigration of highly skilled migrants, while Indonesia (−1.1 percent), China (−0.1 percent), and Japan (−0.02 percent) saw declining emigration rates. For all these countries, with the key exception of Pakistan, changes in the emigration rate of the highly educated were relatively small.

Table 3. Gendered Total and High-Skill Emigration Rates by Sending Region, 2000 and 2010

	2000				2010			
	Female emigrants (thousands)		Female emigration rate (%)		Female emigrants (thousands)		Female emigration rate (%)	
	Total	High-skilled	Total	High-skilled	Total	High-skilled	Total	High-skilled
Africa	3,184.0	688.4	1.9	15.4	5,088.5	1,365.3	2.5	13.6
Asia	8,378.0	2,913.7	0.7	4.1	13,246.2	5,651.7	0.9	4.4
Europe	15,395.2	3,076.7	4.7	4.3	20,481.2	5,779.5	6.0	6.3
North America	1,036.3	421.6	0.8	0.7	1,253.8	611.1	0.9	0.8
Oceania	568.3	157.9	5.2	6.3	705.2	247.2	5.5	6.7
Latin America and the Caribbean	9,389.9	1,421.1	5.2	8.2	13,667.5	2,668.7	6.3	9.1
Unknown	715.1	132.8	–	–	107.3	4.1	–	–
	2000				**2010**			
	Female emigrants (thousands)		**Female emigration rate (%)**		**Female emigrants (thousands)**		**Female emigration rate (%)**	
	Total	High-skilled	Total	High–skilled	Total	High–skilled	Total	High–skilled
High income: OECD	12,811.3	3,229.1	3.1	2.9	14,966.9	5,134.1	3.4	3.6
High income: non OECD	2,711.6	642.3	3.3	1.9	3,788.1	1,313.7	4.5	3.2
Low income	1,378.6	304.0	0.9	11.1	2,414.3	667.4	1.3	12.3
Lower middle income	6,904.1	1,952.9	1.1	5.9	11,605.0	4,137.7	1.5	7.1
Upper middle income	14,099.8	2,542.2	1.8	5.6	21,572.8	5,046.6	2.4	5.7
Unknown	761.5	141.6	–	–	202.6	28.0	–	–

Source: DIOC 2010/11.

Note: – = not applicable

Table 3 continues the analysis by examining the total and high-skill emigration rates by gender from regions defined geographically and according to their income levels in 2000 and 2010. The upper portion of table 3 shows, in absolute terms, that Europe (20.5 million), Latin America and the Caribbean (13.7 million), and Asia (13.2 million) had the highest number of female emigrants in the OECD countries in 2010. These regions were also the regions of origin of the highest number of high-skilled female migrants to the OECD in 2010. The specific numbers are 5.7 million for Asia, 5.8 million for Europe, and 2.7 million for Latin America and the Caribbean. North America (49 percent), Asia (43 percent), and Oceania (35 percent) had the highest shares of the highly skilled among their female emigrants in 2010. The greatest increases in total female emigration to the OECD between 2000 and 2010 were experienced by Africa (60 percent), Asia (58 percent), and Latin America and the Caribbean (46 percent). The growth in the absolute numbers of high-skilled female migration outstripped the growth in the total number of female emigrants from all sending regions, with the highest increases being experienced for Africa (98 percent), Asia (94 percent), and Latin America and the Caribbean (88 percent).

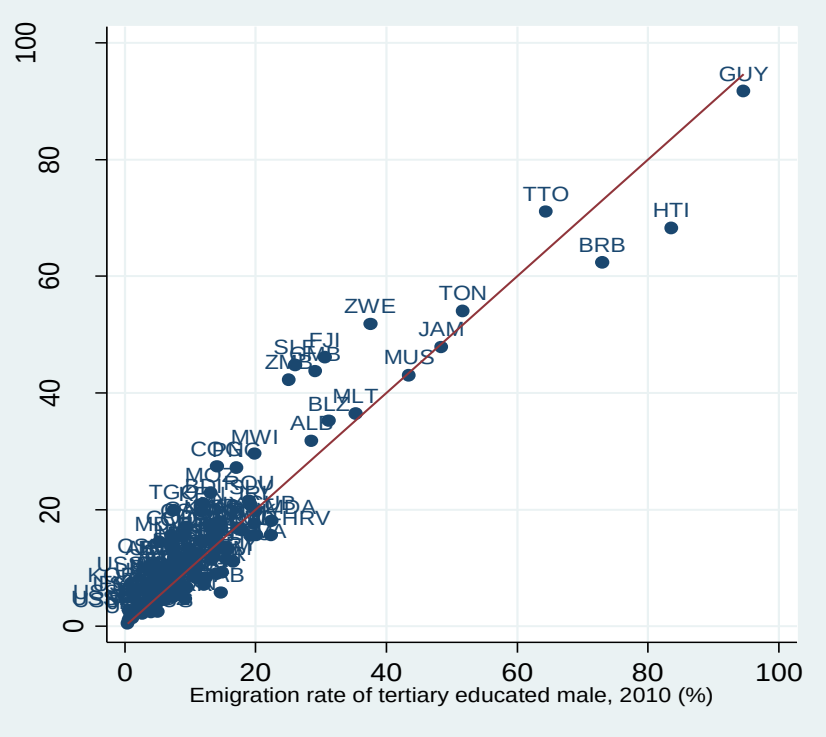
To contextualize these absolute figures, however, it is important to also examine the corresponding emigration rates that additionally account for the total stock of females, in aggregate and by skill level, across the regions of origin. In 2010, Latin America and the Caribbean (6.3 percent), Europe (6 percent), and Oceania (5.5 percent) had the highest emigration rates of women to the OECD. The corresponding emigration rates for high-skilled females are higher for all regions with the exception of North America. The emigration rates of high-skilled females are highest for Africa (13.6 percent),

Latin America and the Caribbean (9.1 percent), and Oceania (6.7 percent). Interestingly, however, despite this persisting differential, the high-skill emigration rate of females from Africa actually fell (1.8 percentage points) between 2000 and 2010, which is an exception, since these rates increased for all other regions of the world, most notably from Europe (2 percentage points), Latin America and the Caribbean (0.9 percentage points), and Oceania (0.4 percentage points).

Next, the analysis focuses on different groups of countries defined on the basis of income level. Countries that are defined as upper-middle income had the highest absolute numbers of female emigrants to the OECD in 2010 (21.6 million), followed by the high-income countries of the OECD (15 million) and lower-middle-income countries (11.6 million). These three regions also had the highest absolute numbers of high-skilled females abroad in 2010: upper-middle income (5 million), high-income countries of the OECD (5.1 million), and lower-middle-income countries (4.1 million). All groups of countries (by income) sent higher numbers of females and high-skilled females to the OECD between 2000 and 2010. In terms of total female emigration, the largest growth was from the low-income countries (75 percent), followed by lower-middle income (68 percent), upper-middle income (53 percent), high-income non-OECD (40 percent), and high-income OECD (17 percent). The corresponding emigration rates of tertiary-educated females decline almost monotonically with regional income: low-income countries (12.3 percent) and the lower-middle-income countries (7.1 percent), upper-middle income (5.6 percent), high-income OECD (3.6 percent), and high-income non-OECD (3.2 percent).

Many small island and developing nations (the detailed country list can be found in table A6 in the appendix) have the highest male and female tertiary-educated emigration rates, as shown in figure 5. These countries include Guyana (male emigration rate 95 percent, female emigration rate 92 percent), Barbados (73 percent, 62 percent), Trinidad and Tobago (64 percent, 71 percent), Tonga (52 percent, 54 percent), and Mauritius (43 percent, 43 percent). Larger and more populous countries (more than 2 million persons) that experienced relatively high emigration rates of both highly educated men and women include Haiti (84 percent male, 68 percent female), Jamaica (48 percent, 48 percent), Zimbabwe (38 percent, 52 percent), Albania (29 percent, 32 percent), and Sierra Leone (26 percent, 49 percent). As before, a 45° line is imposed and its position signifies identical male and female emigration rates of the tertiary educated. To the left side of the line lie 89 countries (out of 142), indicating that the emigration rates of tertiary-educated females outstrip the equivalent rates for males for those countries. Haiti, Barbados, and Gabon demonstrate the most male-dominated human capital flows with 15, 11, and 9 percentage point differences between males and females, respectively. Conversely, Sierra Leone, Zambia, and Fiji sent the most female-dominated human capital flows with 19, 17, and 16 percentage point differences between females and males, respectively.

Figure 5. Emigration Rates of the Highly Educated, by Country of Origin and Gender, 2010



Source: DIOC 2010/11.

Note: The countries that are visible on the figure are Albania (ALB), Barbados (BRB), Belize (BLZ), Guyana (GUY), Haiti (HTI), Jamaica (JAM), Malta (MLT), Mauritius (MUS), Tonga (TON), Trinidad and Tobago (TTO), and Zimbabwe (ZWE).

5. Conclusion

Recent years have witnessed the publication, predominantly by international organizations, of a number of databases of international bilateral migrant stocks, which have catalyzed a new wave of migration research. This paper presents and analyzes, for the first time, data from the most recent such effort from the 2010 census round. This was the result of a collaborative effort between the OECD, the World Bank, and the International Migration Institute of the University of Oxford. Analyses of bilateral migrant stocks recorded for 33 destination OECD countries from some 223 origin countries are presented in historical perspective along a number of critical dimensions, including migrants' skills (education level), age, and gender. We believe that the analysis in this paper provides the best available snapshot of South-to-North migration in an era of rapidly increasing public and political interest in the topic. Given the comprehensiveness and detail of the data provided, it is hoped that the data introduced in this paper will constitute a valuable source and set the standard for international migration research in the years to come.

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Appendix

Table A1. OECD Destinations Featured in Data Set, Underlying Data Sources and Cross-Tabulations of Data Requested

Reference population	
Australia	Census, 2011
Austria	European Labour Force Survey 2010/11
Belgium	Census, 2011
Canada	National Household Survey (NHS) 2011
Chile	The National Socio-Economic Survey, 2011
Czech Republic	Census, 2011
Denmark	Population Register 2011
Estonia	Census, 2011
Spain	Census, 2011
Finland	Population Register 2010
France	Census, 2011
Germany	Micro Census, 2011
Greece	Census, 2011
Hungary	Census, 2011
Iceland	Census, 2011
Ireland	Census, 2011
Israel	Labour Force Survey 2011
Italy	Census, 2011
Japan	Census, 2010
Luxembourg	Census, 2011
Mexico	Census 2010
Netherlands	Census, 2011
New Zealand	Census, 2013
Norway	Population Register 2011
Poland	Census, 2011
Portugal	Census, 2011
Slovak Republic	Census, 2011
Slovenia	Census, 2011
Sweden	Population Register 2010
Switzerland	European Labour Force Survey 2010/11
Turkey	European Labour Force Survey 2010/11
United Kingdom	Census, 2011
United States	American Community Survey 2007-2011

Table A2. Classification and Variables in Accompanying Data Files

File A: Reference Population: All Persons

variable name	explanation	categories / classification
country	country of residence	ISO 3166-1 (alpha 3)
coub	country of birth	ISO 3166-1 (alpha 3)
regionb	region of birth	AFRI = Africa ASIA = Asia EURO = Europe NOAM = Northern America OCEA = Oceania SCAC = South and Central America and the Caribbean UNK = Unknown
sex		1 = Male 2 = Female
age	age groups	1 = 0-14 2 = 15-24 3 = 25-34 4 = 35-44 5 = 45-54 6 = 55-64 7 = 65+ 99 = Unknown
edu_detailed	educational attainment (detailed)	1 = ISCED 0/1 Pre-primary/Primary education or first stage of basic education 2 = ISCED 2 Lower secondary or second stage of basic education 3 = ISCED 3 (Upper) secondary education 4 = ISCED 4 Post-secondary non-tertiary education 5 = ISCED 5A/5B First stage of tertiary education (Bachelor and Master) 6 = ISCED 6 Second stage of tertiary education (PhD) 12 = ISCED 0/1/2 Pre-primary/Primary/Lower secondary education 56 = ISCED 5A/5B/6 Tertiary education 99 = Unknown
edu_lfs	educational attainment (broad)	1 = ISCED 0/1/2 low 2 = ISCED 3/4 medium 3 = ISCED 5A/5B/6 high 99 = Unknown
nationality	nationality (detailed)	1 = National at birth 2 = National by acquisition (foreigner at birth) 3 = Foreigner with the country of birth as the country of nationality 4 = Foreigner with other nationality 99 = Unknown
national	indicates whether national	0 = Foreigner 1 = National 99 = Unknown
fborn	indicates whether foreign-born	0 = Native-born 1 = Foreign-born 99 = Unknown

File B: Reference Population: Persons Ages 15 and Older

variable name	explanation	categories / classification
country	country of residence	ISO 3166-1 (alpha 3)
coub	country of birth	ISO 3166-1 (alpha 3)
regionb	region of birth	AFRI = Africa ASIA = Asia EURO = Europe NOAM = Northern America OCEA = Oceania SCAC = South and Central America and the Caribbean UNK = Unknown
sex		1 = Male 2 = Female
edu_cen	educational attainment	1 = ISCED 0/1/2 Pre-primary/Primary/Lower secondary education 2 = ISCED 3/4 (Upper) secondary/Post-secondary non-tertiary education 3 = ISCED 5A/5B First stage of tertiary education (Bachelor and Master) 4 = ISCED 6 Second stage of tertiary education (PhD) 99 = Unknown
edu_lfs	educational attainment (broad)	1 = ISCED 0/1/2 low 2 = ISCED 3/4 medium 3 = ISCED 5A/5B/6 high 99 = Unknown
dos_cen	duration of stay (detailed)	0 = native-born 1 = one year or less 2 = one to five years 3 = five to ten years 4 = ten to twenty years 5 = more than twenty years 99 = unknown
dos_lfs	duration of stay (broad)	0 = native-born 1 = five years or less 2 = five to ten years 3 = more than ten years 23 = more than 5 years 99 = unknown
fborn	indicates whether foreign-born	0 = Native-born 1 = Foreign-born 99 = Unknown

File C: Reference Population: Labor Force Status of Persons Ages 15 and Older

variable name	explanation	categories / classification
country	country of residence	ISO 3166-1 (alpha 3)
coub	country of birth	ISO 3166-1 (alpha 3)
regionb	region of birth	AFRI = Africa ASIA = Asia EURO = Europe NOAM = Northern America OCEA = Oceania SCAC = South and Central America and the Caribbean UNK = Unknown
sex		1 = Male 2 = Female
age	age groups (broad)	1 = 15-24 2 = 25-64 3 = 65+ 1564 = 15-64 99 = Unknown
edu_cen	educational attainment	1 = ISCED 0/1/2 Pre-primary/Primary/Lower secondary education 2 = ISCED 3/4 (Upper) secondary/Post-secondary non-tertiary education 3 = ISCED 5A/5B First stage of tertiary education (Bachelor and Master) 4 = ISCED 6 Second stage of tertiary education (PhD) 99 = Unknown
edu_lfs	educational attainment (broad)	1 = ISCED 0/1/2 low 2 = ISCED 3/4 medium 3 = ISCED 5A/5B/6 high 99 = Unknown
lfs	labour force status	1 = employed 2 = unemployed 3 = inactive 99 = Unknown
fborn	indicates whether foreign-born	0 = Native-born 1 = Foreign-born 99 = Unknown

Table A3. Educational Distribution by OECD Receiving Country, Natives and Foreign Born, 2010

	Nativity			*Education by nativity*							
				Primary		*Secondary*		*Tertiary*		*Unknown*	
	Natives	**Foreign-born**	**Unknown**	**Natives**	**Foreign-born**	**Natives**	**Foreign-born**	**Natives**	**Foreign-born**	**Natives**	**Foreign-born**
AUS	11,378	4,973	1,013	26.51%	20.26%	41.49%	35.13%	24.93%	35.96%	7.08%	8.65%
AUT	5,865	1,177	-	25.73%	33.68%	59.27%	48.65%	14.99%	17.67%	-	-
BEL	7,633	1,500	0	38.40%	33.48%	32.05%	15.98%	25.13%	15.13%	4.43%	35.41%
CAN	20,482	6,726	6	20.92%	17.69%	38.42%	30.17%	40.67%	52.14%	-	-
CHE	4,787	1,861	2	19.49%	31.40%	54.04%	37.61%	26.22%	30.06%	0.25%	0.93%
CHL	13,183	208	1	28.36%	10.65%	48.47%	52.87%	23.17%	36.48%	-	-
CZE	8,225	674	49	17.81%	21.10%	65.15%	37.57%	13.80%	13.99%	3.24%	27.34%
DEU	60,804	10,363	-	18.24%	38.13%	56.54%	40.85%	22.47%	19.26%	2.75%	1.76%
DNK	4,111	455	0	33.19%	23.69%	40.46%	27.34%	24.55%	21.32%	1.80%	27.65%
ESP	34,404	5,101	3	54.97%	45.99%	18.19%	29.34%	25.81%	23.30%	1.03%	1.37%
EST	900	194	0	20.98%	17.93%	48.02%	41.66%	29.64%	38.83%	1.35%	1.58%
FIN	4,263	220	4	32.09%	51.14%	39.81%	27.08%	28.10%	21.78%	-	-
FRA	45,593	6,807	-	35.61%	47.55%	40.82%	28.89%	23.57%	23.56%	-	-
GBR	44,699	7,383	-	38.48%	29.11%	34.84%	24.23%	26.68%	46.66%	-	-
GRC	8,030	1,216	0	45.44%	41.15%	34.67%	41.46%	19.89%	17.40%	-	-
HUN	8,005	362	11	31.13%	23.36%	51.54%	49.14%	17.33%	27.50%	-	-
IRL	2,878	673	-	36.14%	18.49%	33.64%	38.88%	25.35%	37.04%	4.86%	5.58%
ISL	221	28	0	42.19%	33.20%	33.68%	40.57%	24.13%	26.23%	-	-
ISR	3,687	1,719	2	24.22%	22.95%	42.75%	31.35%	32.89%	45.09%	0.14%	0.61%
ITA	46,646	4,461	-	52.95%	47.73%	34.84%	39.33%	12.21%	12.94%	-	-
JPN	108,220	1,320	86	15.40%	18.31%	44.58%	36.61%	28.49%	23.86%	11.53%	21.22%
LUX	233	188	3	28.76%	30.41%	40.66%	22.72%	15.90%	23.43%	14.68%	23.43%
MEX	78,939	423	-	70.98%	41.53%	19.05%	30.76%	9.45%	26.76%	0.52%	0.96%
NLD	11,866	1,522	99	35.24%	39.88%	38.76%	33.61%	25.67%	25.89%	0.34%	0.62%
NOR	3,488	511	-	29.08%	29.67%	42.98%	25.60%	27.56%	29.51%	0.38%	15.22%
NZL	2,251	1,126	-	55.92%	23.69%	13.82%	25.31%	24.29%	29.55%	5.97%	21.45%
POL	31,983	570	3	22.63%	36.31%	55.00%	42.68%	17.50%	17.18%	4.88%	3.83%
PRT	8,183	807	-	71.60%	47.82%	15.40%	29.73%	13.00%	22.45%	0.00%	0.00%
SVK	4,435	136	0	45.21%	49.51%	35.07%	30.51%	16.31%	18.00%	3.40%	1.97%
SVN	1,540	219	-	27.57%	40.34%	53.96%	49.05%	18.47%	10.60%	-	-
SWE	6,558	1,209	5	24.35%	24.34%	49.28%	39.75%	24.20%	26.19%	2.17%	9.73%
TUR	51,120	730	1,214	72.85%	54.18%	17.26%	28.32%	9.89%	17.50%	-	-
USA	204,741	40,862	-	16.69%	32.12%	52.11%	37.53%	31.20%	30.34%	-	-

Source: DIOC 2010/11.

Note: – = not applicable. Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (PRT), Slovakia (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR), and the United States (USA).

Table A4. Age Distribution by OECD Receiving Country, Natives and Foreign Born, 2010

	Nativity			*Age distribution by nativity*					
				15-24		*25-64*		*65+*	
	Natives	Foreign-born	Unknown	Natives	Foreign-born	Natives	Foreign-born	Natives	Foreign-born
AUS	11,377.55	4,973.15	1,013	19.39%	10.24%	64.91%	69.56%	15.71%	20.20%
AUT	5,864.56	1,177.07	-	14.65%	10.93%	63.99%	75.11%	21.36%	13.96%
BEL	7,633.02	1,499.86	0.47	15.13%	11.86%	62.93%	74.21%	21.93%	13.93%
CAN	20,481.99	6,726.25	6.48	17.87%	9.74%	66.60%	69.98%	15.52%	20.28%
CHE	4,787.32	1,861.43	2.31	16.08%	8.30%	61.84%	76.61%	22.09%	15.08%
CHL	13,183.29	208.39	1.43	23.20%	23.13%	62.42%	71.15%	14.38%	5.72%
CZE	8,224.84	674.29	48.50	14.27%	10.29%	67.19%	69.33%	18.29%	20.19%
DEU	60,803.94	10,363.00	-	13.42%	9.25%	60.85%	76.51%	25.73%	14.24%
DNK	4,110.50	454.64	0.40	15.06%	16.47%	63.17%	75.01%	21.77%	8.52%
ESP	34,404.13	5,100.87	2.52	11.47%	15.11%	66.52%	77.81%	22.01%	7.07%
EST	899.87	194.48	0.21	17.59%	1.85%	65.55%	58.20%	16.86%	39.95%
FIN	4,263.34	220.48	3.78	14.63%	16.16%	63.60%	78.36%	21.76%	5.48%
FRA	45,592.87	6,806.66	-	16.34%	8.59%	63.25%	70.92%	20.41%	20.48%
GBR	44,699.41	7,382.87	-	16.25%	13.94%	62.58%	73.67%	21.17%	12.39%
GRC	8,030.48	1,216.41	0.13	12.53%	14.35%	62.43%	77.62%	25.04%	8.03%
HUN	8,004.65	361.76	11.10	13.29%	9.58%	67.02%	63.55%	19.70%	26.86%
IRL	2,878.34	672.91	-	16.02%	15.51%	66.87%	79.09%	17.11%	5.40%
ISL	221.33	28.06	0.45	18.45%	19.35%	63.95%	75.89%	17.60%	4.75%
ISR	3,686.89	1,718.79	1.88	26.49%	7.33%	68.42%	60.71%	5.09%	31.96%
ITA	46,646.39	4,461.48	-	11.41%	13.42%	62.67%	79.99%	25.92%	6.59%
JPN	108,220.37	1,319.61	86.00	11.21%	19.71%	61.97%	72.61%	26.82%	7.68%
LUX	233.09	187.82	2.80	18.34%	9.88%	59.72%	79.42%	21.94%	10.69%
MEX	78,938.95	422.61	-	26.37%	32.40%	64.36%	57.20%	9.18%	10.29%
NLD	11,865.69	1,521.60	98.55	15.39%	9.31%	64.96%	80.87%	19.65%	9.83%
NOR	3,487.85	510.75	-	16.27%	14.75%	63.37%	78.97%	20.36%	6.28%
NZL	2,250.79	1,125.67	-	18.38%	15.36%	63.30%	67.35%	18.32%	17.30%
POL	31,983.17	570.41	3.19	15.84%	4.74%	69.01%	19.99%	15.15%	75.28%
PRT	8,183.30	806.54	-	12.69%	13.50%	63.45%	79.36%	23.86%	7.14%
SVK	4,434.86	135.61	0.04	16.62%	5.78%	68.82%	66.04%	14.54%	28.16%
SVN	1,540.19	219.14	-	13.95%	6.84%	66.21%	77.92%	19.84%	15.24%
SWE	6,558.14	1,208.58	5.37	16.72%	11.92%	59.86%	72.74%	23.42%	15.34%
TUR	51,119.70	729.72	1,213.94	22.36%	9.12%	68.50%	71.24%	9.14%	19.64%
USA	204,741.23	40,861.91	-	18.78%	12.29%	64.41%	75.01%	16.81%	12.71%

Source: DIOC 2010/11.

Note: – = not applicable. Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Chile (CHL), Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Germany (DEU), Greece (GRC), Hungary (HUN), Iceland (ISL), Ireland (IRL), Israel (ISR), Italy (ITA), Japan (JPN), Luxembourg (LUX), Mexico (MEX), Netherlands (NLD), New Zealand (NZL), Norway (NOR), Poland (POL), Portugal (PRT), Slovakia (SVK), Slovenia (SVN), Spain (ESP), Sweden (SWE), Switzerland (CHE), Turkey (TUR), United Kingdom (GBR), United States (USA).

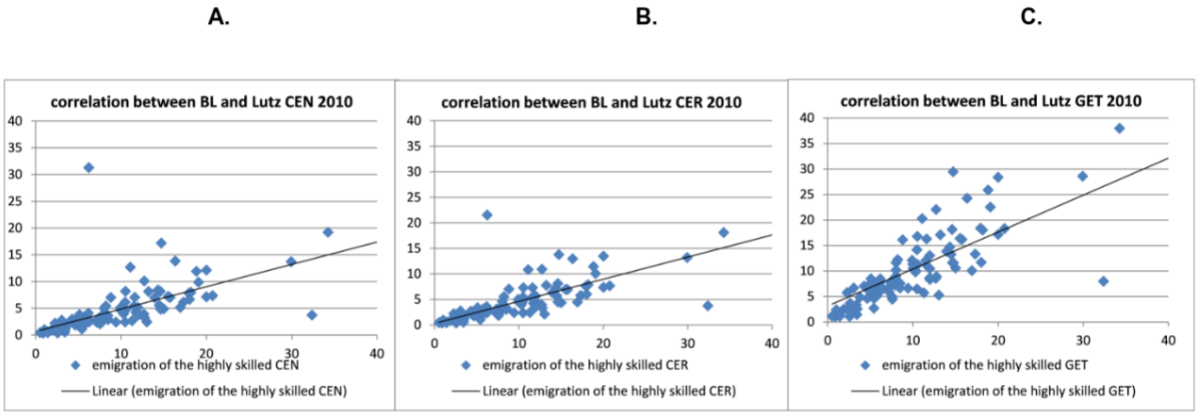
Figure A1 Discussion. Calculating Emigration Rates by Education Level and Country of Origin

This section presents our calculations for emigration rates to OECD countries. The emigration rate of a given origin country in a given year is defined as the share of the native population of the country residing abroad at the year in question. Similarly, the emigration rate of the highly skilled is the number of highly educated natives of the country living abroad as a share of the total highly educated native-born population of the country.

To calculate these rates, information is required on the total and tertiary-educated persons. Two potential sources exist. The Barro and Lee (2013) data set (BL) covers some 146 countries from 1950 to 2010 at five-year intervals. Lutz et al. (2007) (L) report on 120 countries between 1970 and 2000, again at five-year intervals. The underlying sources of educational attainment data differ between the two sources. While the BL data set is primarily based upon UNESCO data, L draw upon a broader array of sources that includes labor force and demographic and health surveys. Both BL and L adopt educational classifications based on International Standard Classification of Education levels of educational attainment. Additionally, while BL collect primary data for each period, L rely on data from 2000, and earlier years are constructed with projections with five-year lags applied to differing age groups. While this latter methodology is consistent over time, this approach might well yield imperfect estimates.

Despite these methodological differences, the two series are highly correlated, as shown in figure A1. Panel a refers to the constant enrollment ratio projections from L, while panels b and c refer to projections with constant enrollment number and global education trend, respectively (see Lutz et al. 2007). For the sake of consistency, we use the data from BL as the denominator in our emigration rate calculations.

Figure A1. Correlation between BL and L Data Sets



Notably, the denominator implemented should include natives while excluding immigrants. Although this ideal was attainable for OECD countries using data from DIOC, this correction was not feasible for non-OECD countries because of the paucity of available data.

Table A5. Total High-Skilled Emigration Rates to OECD, 2000 and 2010 (in percentage)

	2000	2010		2000	2010		2000	2010		2000	2010
AFG	3.20	4.89	ECU	6.30	7.54	LKA	4.10	6.62	SGP	9.90	9.47
ALB	26.00	30.20	EGY	4.70	3.53	LSO	4.30	5.97	SLE	36.00	32.50
ARE	0.87	3.06	ESP	2.00	2.31	LUX	12.00	16.19	SLV	15.00	20.02
ARG	4.30	6.19	FIN	5.80	6.30	MAR	13.00	15.47	SWE	4.30	6.02
AUS	2.70	2.99	FJI	31.00	37.02	MDV	6.90	8.14	SWZ	4.00	8.46
AUT	12.00	10.68	FRA	4.10	5.39	MEX	6.10	6.15	SYR	11.00	15.10
BDI	21.00	15.37	FYUG-HRV	21.00	18.15	MLI	9.80	5.78	TGO	10.00	9.36
BEL	5.30	6.75	FYUG-SVN	4.00	4.59	MLT	31.00	35.86	THA	2.80	2.60
BEN	7.50	5.03	GAB	4.90	8.10	MMR	1.50	1.48	TON	43.00	52.96
BGD	2.60	3.58	GBR	12.00	11.52	MNG	1.30	3.03	TTO	72.00	68.23
BGR	6.80	14.04	GHA	12.00	15.49	MOZ	40.00	17.20	TUN	15.00	10.36
BHR	6.20	9.51	GMB	20.00	33.38	MRT	8.60	11.54	TUR	3.20	3.67
BLZ	46.00	33.37	GRC	7.60	5.28	MUS	53.00	43.24	TWN	6.00	4.40
BOL	3.40	5.59	GTM	19.00	17.15	MWI	20.00	23.52	TZA	18.00	14.07
BRA	1.80	2.50	GUY	99.00	93.03	MYS	6.30	5.18	UGA	7.20	8.19
BRB	91.00	66.22	HND	14.00	13.23	NAM	5.50	10.85	URY	7.30	13.22
BRN	15.00	17.00	HTI	71.00	75.04	NER	3.60	5.22	USA	0.36	0.45
BWA	4.00	8.24	HUN	8.90	10.50	NIC	9.60	9.89	USSR-ARM	5.80	10.18
CAF	8.80	11.68	IDN	3.60	2.46	NLD	6.20	7.48	USSR-EST	3.90	6.86
CAN	6.10	5.21	IND	3.00	3.45	NOR	4.60	4.97	USSR-KAZ	4.20	5.99
CHE	9.40	11.45	IRL	20.00	19.83	NPL	2.20	8.68	USSR-KGZ	1.60	1.40
CHL	2.70	2.85	IRN	6.40	4.24	NZL	8.10	9.31	USSR-LTU	7.00	13.29
CHN	1.80	1.68	IRQ	7.30	6.85	PAK	3.30	6.37	USSR-LVA	7.40	14.23
CIV	4.30	5.58	ISL	16.00	13.92	PAN	11.00	9.75	USSR-MDA	3.80	18.25
CMR	16.00	14.25	ISR	4.70	6.06	PER	3.40	5.42	USSR-RUS	0.73	1.32
COD	11.00	9.38	ITA	6.20	8.03	PHL	6.80	8.04	USSR-TJK	0.99	1.26
COG	35.00	17.94	JAM	47.00	48.06	PNG	16.00	21.73	USSR-UKR	1.50	4.16
COL	6.00	10.75	JOR	5.90	5.68	POL	12.00	16.90	VEN	3.60	4.21
CRI	4.40	4.80	JPN	0.85	0.83	PRT	8.00	13.19	VNM	18.00	10.43
CSFR-CZE	6.10	9.18	KEN	15.00	14.58	PRY	2.20	5.63	YEM	3.60	2.02
CSFR-SVK	9.90	15.56	KHM	53.00	14.63	QAT	2.10	4.39	ZAF	6.70	12.28
CUB	28.00	19.92	KOREA-NS	0.81	4.40	ROU	14.00	20.29	ZMB	16.00	31.98
DEU	6.60	8.65	KWT	10.00	17.84	RWA	16.00	9.87	ZWE	30.00	44.01
DNK	7.20	7.64	LAO	25.00	14.96	SAU	0.75	2.40			
DOM	10.00	11.81	LBR	15.00	7.94	SDN	5.30	3.59			
DZA	14.00	9.49	LBY	4.10	3.12	SEN	17.00	14.44			

Source: Barro and Lee 2013.

Note: See table A6 for expansion of country codes.

Table A6. Emigration Rates by Skill and Gender, 2010

		2010				
		Emigration rate (%)	*Female emigration rate (%)*	*Male emigration rate (%)*	*Tertiary educated female emigration rate (%)*	*Tertiary educated male emigration rate (%)*
AFG	Afghanistan	1.636	1.383	1.872	10.298	3.690
ALB	Albania	27.325	25.886	28.777	31.729	28.583
ARE	United Arab Emirates	1.269	1.889	1.016	3.750	2.638
ARG	Argentina	2.055	2.003	2.112	4.759	9.274
AUS	Australia	1.990	2.019	1.959	3.267	2.737
AUT	Austria	4.777	5.080	4.460	10.665	10.695
BDI	Burundi	0.557	0.579	0.534	21.026	12.050
BEL	Belgium	4.244	4.411	4.068	6.398	7.148
BEN	Benin	0.479	0.427	0.529	7.124	4.339
BGD	Bangladesh	0.506	0.440	0.570	3.597	3.574
BGR	Bulgaria	9.703	9.932	9.451	13.596	14.730
BHR	Bahrain	2.502	2.729	2.339	8.132	11.062
BLZ	Belize	20.174	22.489	17.768	35.165	31.178
BOL	Bolivia	4.261	4.665	3.841	6.184	5.037
BRA	Brazil	0.670	0.737	0.598	2.590	2.375
BRB	Barbados	27.469	28.375	26.424	62.398	73.006
BRN	Brunei Darussalam	4.296	4.588	4.023	16.825	17.190
BWA	Botswana	1.066	1.241	0.885	10.365	6.124
CAF	Central African Rep.	0.679	0.672	0.686	17.021	9.514
CAN	Canada	3.858	4.149	3.555	5.177	5.256
CHE	Switzerland	7.059	7.064	7.053	15.394	9.027
CHL	Chile	2.150	2.169	2.130	2.901	2.806
CHN	China	0.325	0.363	0.288	2.103	1.358
CIV	Ivory Coast	1.186	1.221	1.153	7.625	4.611
CMR	Cameroon	1.417	1.539	1.292	15.341	13.422
COD	Dem. Rep of Congo	0.764	0.785	0.744	15.548	7.098
COG	Congo	1.626	1.702	1.548	27.401	14.061
COL	Colombia	3.254	3.603	2.885	11.864	9.507
CRI	Costa Rica	2.781	2.952	2.613	5.182	4.384
CSFR-CZE	Czech Republic	3.373	3.877	2.827	10.677	7.727
CSFR-SVK	Slovak Republic	9.418	10.042	8.731	16.760	14.288
CUB	Cuba	11.324	11.577	11.068	18.021	22.415
DEU	Germany	4.474	4.774	4.153	10.479	7.244
DNK	Denmark	3.683	3.696	3.669	7.506	7.779
DOM	Dominican Republic	12.433	14.105	10.674	12.758	10.567
DZA	Algeria	5.537	5.430	5.642	8.359	10.715
ECU	Ecuador	8.344	8.473	8.213	8.254	6.811
EGY	Egypt	0.761	0.611	0.913	3.080	3.870
ESP	Spain	1.909	2.041	1.769	2.368	2.254
FIN	Finland	5.341	6.317	4.291	7.552	4.598
FJI	Fiji	22.207	23.526	20.873	46.111	30.570

		2010				
		Emigration rate (%)	*Female emigration rate (%)*	*Male emigration rate (%)*	*Tertiary educated female emigration rate (%)*	*Tertiary educated male emigration rate (%)*
FRA	France	2.568	2.661	2.468	5.245	5.561
FYUG-HRV	Croatia	12.209	12.426	11.969	15.589	22.289
FYUG-SVN	Slovenia	3.912	4.621	3.151	4.294	5.043
GAB	Gabon	2.234	2.534	1.926	5.748	14.687
GBR	United Kingdom	6.759	6.595	6.932	9.235	14.843
GHA	Ghana	1.937	1.793	2.078	16.733	14.717
GMB	Gambia	4.317	3.234	5.407	43.722	29.128
GRC	Greece	6.110	5.699	6.534	4.479	6.072
GTM	Guatemala	8.764	7.013	10.645	16.438	17.871
GUY	Guyana	39.919	41.146	38.503	91.753	94.674
HND	Croatia	9.228	9.055	9.399	14.435	11.761
HTI	Haiti	10.652	11.203	10.062	68.330	83.645
HUN	Hungary	4.475	4.369	4.595	10.074	11.051
IDN	Indonesia	0.197	0.215	0.178	2.822	2.161
IND	India	0.429	0.412	0.446	4.075	3.073
IRL	Ireland	17.194	18.001	16.350	19.685	20.007
IRN	Iran, Islamic Rep. of	1.551	1.451	1.650	4.022	4.431
IRQ	Iraq	2.941	2.639	3.237	7.554	6.429
ISL	Iceland	11.034	11.436	10.631	14.062	13.752
ISR	Israel	3.863	3.349	4.394	5.064	7.294
ITA	Italy	4.126	3.667	4.617	6.628	9.554
JAM	Jamaica	32.641	34.809	30.206	47.851	48.451
JOR	Jordan	2.278	2.074	2.464	5.086	6.159
JPN	Japan	0.566	0.694	0.428	1.065	0.607
KEN	Kenya	1.185	1.235	1.135	19.583	11.757
KHM	Cambodia	2.634	2.712	2.548	17.442	12.856
KOREA-NS	Korea	4.098	4.628	3.553	5.738	3.431
KWT	Kuwait	2.412	2.718	2.221	15.546	20.139
LAO	Lao People's Dem. Rep	6.116	6.210	6.021	16.574	13.805
LBR	Liberia	3.987	3.887	4.088	7.819	8.023
LBY	Libya	2.129	2.063	2.191	2.343	4.036
LKA	Sri Lanka	3.199	3.075	3.319	5.514	7.961
LSO	Lesotho	0.224	0.275	0.161	6.018	5.869
LUX	Luxembourg	8.241	8.826	7.606	17.894	14.614
MAR	Morocco	9.567	8.758	10.389	17.264	14.375
MDV	Maldives	0.338	0.335	0.340	14.480	5.306
MEX	Mexico	12.179	10.952	13.471	6.746	5.621
MLI	Mali	1.011	0.717	1.314	8.091	4.959
MLT	Malta	21.701	21.513	21.895	36.494	35.289
MMR	Myanmar	0.317	0.310	0.325	1.817	1.262
MNG	Mongolia	1.216	1.510	0.918	3.914	2.081
MOZ	Mozambique	0.732	0.749	0.715	22.916	13.148
MRT	Mauritania	1.393	0.740	2.062	12.302	11.329

		2010				
		Emigration rate (%)	*Female emigration rate (%)*	*Male emigration rate (%)*	*Tertiary educated female emigration rate (%)*	*Tertiary educated male emigration rate (%)*
MUS	Mauritius	11.950	12.771	11.095	43.008	43.452
MWI	Malawi	0.313	0.318	0.308	29.523	19.888
MYS	Malaysia	1.478	1.636	1.322	5.277	5.069
NAM	Namibia	0.675	0.756	0.593	8.979	13.951
NER	Niger	0.141	0.123	0.159	7.244	4.326
NIC	Nicaragua	6.662	7.116	6.192	13.562	7.405
NLD	Netherlands	4.789	4.718	4.862	6.988	7.914
NOR	Norway	3.296	3.621	2.960	4.580	5.469
NPL	Nepal	0.761	0.626	0.904	11.647	7.468
NZL	New Zealnad	14.075	13.613	14.555	9.991	8.628
PAK	Pakistan	1.010	0.913	1.100	6.935	6.026
PAN	Panama	5.854	7.016	4.668	9.663	9.882
PER	Peru	3.920	4.322	3.513	5.302	5.573
PHL	Philippines	4.672	5.737	3.579	9.639	6.206
PNG	Papua New Guinea	0.849	0.991	0.714	27.222	17.126
POL	Poland	8.955	9.436	8.427	15.509	19.219
PRT	Portugal	13.702	12.884	14.575	11.558	15.504
PRY	Paraguay	2.106	2.589	1.620	5.752	5.430
QAT	Qatar	1.552	1.966	1.374	4.454	4.355
ROU	Romania	12.617	13.199	11.981	21.451	18.957
RWA	Rwanda	0.620	0.657	0.579	11.693	8.531
SAU	Saudi Arabia	0.592	0.514	0.656	2.125	2.642
SDN	Sudan	0.412	0.338	0.486	2.438	5.063
SEN	Senegal	3.001	2.015	4.031	15.408	13.870
SGP	Singapore	3.368	3.736	2.997	10.859	8.195
SLE	Sierra Leone	2.017	1.959	2.078	44.810	26.052
SLV	El Salvador	19.449	18.589	20.349	20.780	19.242
SWE	Sweden	2.995	3.319	2.661	6.059	5.970
SWZ	Swaziland	0.715	0.861	0.558	7.164	12.168
SYR	Syria	1.310	1.211	1.408	17.579	13.903
TGO	Togo	1.056	0.903	1.213	19.865	7.458
THA	Thailand	0.947	1.318	0.550	3.105	1.953
TON	Tonga	42.289	41.142	43.424	54.099	51.723
TTO	Trinidad and Tobago	23.200	25.038	21.166	71.101	64.388
TUN	Tunisia	6.220	5.467	6.962	8.341	12.390
TUR	Turkey	4.338	4.187	4.489	3.766	3.604
TWN	Taiwan	2.390	2.546	2.211	4.857	3.940
TZA	Tanzania	0.337	0.335	0.339	14.161	14.004
UGA	Uganda	0.581	0.598	0.564	8.878	7.647
URY	Uruguay	5.668	5.513	5.837	11.157	16.564
USA	United States	0.457	0.462	0.451	0.457	0.439
USSR-ARM	Armenia	5.476	5.328	5.658	10.379	9.903
USSR-EST	Estonia	5.614	5.995	5.145	6.657	7.329

		2010				
		Emigration rate (%)	*Female emigration rate (%)*	*Male emigration rate (%)*	*Tertiary educated female emigration rate (%)*	*Tertiary educated male emigration rate (%)*
USSR-KAZ	Kazakhstan	7.613	7.702	7.513	7.606	4.541
USSR-KGZ	Kyrgyzstan	0.390	0.527	0.243	1.793	0.851
USSR-LTU	Lithuania	9.088	9.642	8.421	13.000	13.745
USSR-LVA	Latvia	6.601	6.840	6.305	13.317	15.813
USSR-MDA	Moldova	8.518	9.824	6.990	17.481	19.754
USSR-RUS	Russian Federation	1.959	2.091	1.799	1.435	1.163
USSR-TJK	Tajikistan	0.236	0.298	0.170	2.766	0.552
USSR-UKR	Ukraine	3.977	4.344	3.518	4.136	4.199
VEN	Venezuela	2.073	2.230	1.915	3.796	4.861
VNM	Vietnam	2.802	2.906	2.696	10.856	10.074
YEM	Yemen	0.623	0.568	0.676	2.374	1.889
ZAF	South Africa	1.682	1.703	1.660	11.424	13.337
ZMB	Zambia	0.868	0.953	0.784	42.256	25.079
ZWE	Zimbabwe	2.135	2.256	2.013	51.805	37.578

Source: Barro and Lee 2013.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