# The Evolution of Global Bilateral Migration 1960-2000[*]

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## Abstract

This paper presents global matrices of bilateral migrant stocks spanning the period 1960-2000, disaggregated by gender and based primarily on the foreign-born concept. Over one thousand separate census and population register records are combined to *construct* decennial matrices corresponding to census rounds for the entire period. In doing so, we provide for the first time, a complete picture of bilateral global migration over the last half of the twentieth century. The data reveal that the global migrant stock more than doubled from 76 to 159 million between 1960 and 2000. Quantitatively, South-South migration dominates the global migrant stock, constituting half of all international migration in 2000. In part, this is an artifact of the data, since millions of migrants were created overnight during the dissolution of India and Soviet Union. South-North migration is the fastest growing component of international migration however, and over our period the emigrant stock from Latin America surpassed those of both Europe and South Asia. The United States remains the most important migrant destination in the world, home to one fifth of the world's migrants and the recipient of no less than fifty of the top migrant corridors in the world. Migration in Western Europe remains largely from elsewhere in Europe and the oil-rich Persian Gulf countries emerge as important destinations for migrants from the Middle East and South Asia. Finally, although the global migrant stock is still predominantly male, the percentage of females rose significantly between 1960 and 2000.

## 1. Introduction

International migration, movement of people across international borders, has important economic, social and political implications. Despite the emergence of a recent and dynamic literature, the empirical analysis of migration flows and their impact lags behind the policy debate and the theoretical literature. The main reason is the absence of comprehensive and reliable data on international migration patterns and migrant characteristics at either the aggregate or the household level. The data problems are especially acute when compared to high-frequency data on international trade and finance flows.

The objective of this paper is to utilize over one thousand national censuses and population registers to estimate a complete global origin-destination migration matrix for each decade of the period 1960-2000. These 226*226 matrices, comprising every nation state, major territory and dependency from across the globe, are divided into periods that correspond to the last five completed census rounds. Additionally, given the frequency of data disaggregated by gender, we aim to provide as accurate a picture of the evolution of gendered migration over this period as is possible.

Our primary source for raw data is the United Nations *Global Migration Database*, created through the collaboration of the United Nations Population Division, the Statistics Division of the United Nations, the World Bank and the University of Sussex. This unique source comprises 3,500 individual census and population register records from more than 230 destination countries and territories from across the globe. The database provides information on international bilateral migrant stocks (by citizenship[5] and the place of birth), sex and age. A lot of variation exists however, in how destination countries collect and record migration data and in how they choose to disseminate this information. As such, a meaningful comparison of destination country records over time is often confounded.

Creation of a global bilateral migration matrix faces several important challenges. First, destination countries typically classify migrants according to one of a number of alternative criteria – such as place of birth, citizenship, duration of stay or type of visa. Depending on the citizenship and migration laws of the countries, using different criteria for a global dataset generates discrepancies in the data. Second, the world underwent many geo-political changes between 1960 and 2000 during which time many international borders were redrawn, new countries emerged and some others disappeared. In addition to creating millions of migrants overnight – such as the collapse of the Soviet Union did – these events complicate the task of tracking migrants over time. Third, even if data on international migrant stocks exist in national censuses of destination countries, they are presented along aggregate geographic categories rather than specific origin countries. Thus existing data need to be disaggregated based on various different criteria. Finally, the greatest hurdle in constructing complete origin-destination matrices however is in dealing with the problems of omitted or missing census data. Very few destination countries – especially developing countries – have rigorously conducted censuses or population registers during every census round over the last half of the twentieth century. Wars, civil strife, a lack of funding or political intransigence are but a few reasons why records may be discontinuous.

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[5]Throughout the paper we treat the concepts of nationality and citizenship as analogous and use the terms interchangeably.

The main contributions of this project are in identifying and overcoming these challenges in order to *construct* a consistent and complete set of origin-destination matrices of international migrant stocks for the period 1960-2000, disaggregated by gender. We begin with a master set of 226 countries and regions, from which migrants originate from or migrate to. Despite the fact that borders have changed, we assign all migrants to this fixed master set of countries such that we can meaningfully track migrations over time. These assignments, especially in cases where only aggregate data are available, are made using a number of alternative propensity measures that we calculate. These are based either on a destination country's propensity to accept migrants from overseas or else based on an origin countries' propensity to send migrants abroad.

Cases of omitted data occur either when destination countries do not collect the relevant information, or else when they do not make it publically available. For our purposes this is when a gender breakdown is unavailable or instead when the data are missing altogether. When we do not have a gender breakdown in the underlying data, we calculate gender splits based either on supplementary statistics or alternatively using other data in our matrices. For data from census rounds that are missing altogether, our approach depends on the extent of the omission. Where sufficient data are available for other decades, we use interpolation. In cases where there are simply not enough data available, we again devise propensity measures in order to provide us with bilateral figures for those nations for which we lack data. Finally, it needs to be strongly emphasized that the resulting migration matrices presented here are far from ideal. But they are an important step in an ongoing global effort to improve migration data and, as such, should be viewed as work in progress.

Efforts to produce bilateral datasets of international migration are rare. Existing attempts focus almost exclusively upon industrialised countries as recipient nations, those for which data are more frequently and accurately produced. Harrison et al (2003), attempt to calculate bilateral remittances for the OECD countries together with the largest 27 non-members. These estimates are based upon international bilateral migrant stock data that the authors also provide, although many of these data are derived from the 'Trends in International Migration' (see for example SOPEMI 2002). This annual report, published since 1973, was arguably the most comprehensive guide to international migration for many years, and has been the basis for many studies in the discourse (see for example Mayda 2007).

More recently the OECD has developed a Database on Immigrants in OECD Countries (DIOC, see OECD 2008) which provides a comprehensive overview of migration to the OECD in 2000. Importantly these data are disaggregated by a number of covariates including age, gender, education attainment and place of birth. Another series of papers, again concentrating upon the OECD, examines the Brain Drain in 1990 and 2000 (see for example Docquier and Marfoulk 2006), migrants' gender (Docquier et al 2007), migrants' age of entry (Docquier and Rapoport 2007) and the medical brain drain (Bhargava and Docquier 2007). Parsons et al (2007) construct a matrix encompassing the whole globe for the 2000 census round. Until now, this has represented the most comprehensive global overview of bilateral migrant movements. Building on this, Ratha and Shaw (2007) expand the dataset on South-South migration and link it to bilateral remittance flows.

The data in this paper reveal several important patterns. Between 1960 and 2000, the global migrant stock more than doubled from 76 to 159 million, staying slightly over 2.5% of the world's population. A large fraction of the stock in 1960 can be accounted for by the migrants created when India was partitioned, whereas in 2000 the stock comprised many migrants created by the dissolution of the Soviet Union. Of the remainder, the majority represents rapidly increasing flows, predominantly from the South, to the United States, Western Europe and the Persian Gulf States. The growth in South-North migration has been astonishing and while it continues to grow, North-North, North-South and South-South migrations are all declining as a proportion of total global migration. Even so, quantitatively South-South migration dominates global trends. The majority of these migrations are intra-regional, within the former States of the Soviet Union, South Asia and West Africa. Inter-regional migrations in the South are principally to the Gulf States.

The United States continues to be the most important migrant destination in the world, home to around one fifth of the world's migrant population and the recipient of the largest migrant flows from no less than fifty origin countries. The migrant stock in the United States evolved significantly between 1960 and 2000. At the beginning of our period, most migrants in the US were born in Europe; today the vast majority comes from Latin America and the Caribbean. This change in the composition of migrant stocks mirrors the wider trend. In 1960, the majority of international migrants were born in Europe and South Asia. In 2000 however, global emigration was dominated by migrants from Latin America and Eastern Europe and Central Asia.

Our data clearly show the degree to which international migration is diversifying as migrants increasingly widen their choice of destinations. Today, there are migrations between more country-pairs than at any other time in history. In particular, migrants from East Asia and the Pacific that once largely migrated to elsewhere within the region, have now spread out across the world. Nowadays, the Chinese, the Vietnamese and the Koreans constitute sizeable communities in many nations across the world. The same is true for an increasing numbers of Africans, the majority of whom find homes in Europe and the United States. This diversification is also reflected in destination countries' willingness to accept migrants from ever more diverse backgrounds. This is particularly true of the United States, Australia, Canada and New Zealand, all of which implement selective immigration policies. To a lesser extent this is also true of the countries of 'Old Europe' where the influence of colonial ties is still strongly evident.

As the compositions of emigrant and immigrant stocks have evolved over time, so too has the gender make-up of international migration flows. Our data show that although the global migrant stock is disproportionately male, the percentage of females in the global migrant stock rose significantly between 1960 and 2000. This increased feminization of international migration is particularly pronounced in the immigrant stocks of the oil-rich Persian Gulf countries, Australia and New Zealand and in East Asia and the Pacific. However, Japan, Latin America and the Caribbean and Eastern Europe and Central Asia show the greatest increase in the proportion of females in their emigrant stocks over the period.

The origin countries most affected by international migration are small, typically island states, mostly in the Pacific or the Caribbean. On the other hand, the most affected destination countries are those that have the highest concentrations of migrants relative to their domestic populations – these are the countries of the 'new world[6]' or the oil-rich Persian Gulf countries.

The following section discusses what constitutes a migrant and how migrants are recorded. We then describe the raw data and identify the gaps in our knowledge. Next we discuss the comparability of migration data and highlight the major challenges we face in constructing our matrices. We also detail the conventions and assumptions we adopt in overcoming them. Section five presents an analysis of the data, highlighting the key patterns in international migration over the period 1960-2000. Finally, we conclude.

## 2. Preliminaries

Migration data are complex. First, they almost always come from destination countries since it is very difficult for origin countries to collect demographic data on people who are not present. Unlike trade and financial statistics which are recorded by both transacting parties, the quality of migration statistics depends almost entirely upon the rigor with which destination countries survey the migrants within their borders. Even when destination countries do collect such data, the methods they employ, the definitions they use and the way in which they choose to disseminate results differ greatly. In order to understand the analysis presented in this paper therefore, a full appreciation of the subtleties between the various sources and definitions is required, together with an understanding of the inherent inconsistencies that exist between them.[7] In this section we outline how migrants are typically designated and recorded. We postpone for later our discussion of the challenges we face when trying to make the data comparable across countries and over time and the procedures we use to surmount these problems when generating our global migration matrices.

### 2.1 Who are classified as migrants?

The United Nations (1998) defines a migrant as "any person that changes his or her country of usual residence". This broad definition implies a movement from one location[8] to another, the concept that is most relevant for economic analysis. However, official records are kept according to many different definitions as to what constitutes an international migrant. Most common criteria are based on (i) country of birth, (ii) country of citizenship, (iii) purpose of visit or visa type, (iv) place of last permanent residence and (v) duration of stay.

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[6] These are the United States, Canada, Australia and New Zealand.
[7] This section serves to highlight many of the nuances in the data although for a full treatise on the subject readers are advised to refer to Bilsborrow et al. (1997).
[8] Throughout this paper we use the word 'location' as a catch-all geographic term to mean any country, dependency or territory. When the distinction is important we refer specifically to a country, dependency or territory.

The two main definitions of migration – being born in or being a citizen of a foreign country – are the most consistently used ones over time and across countries. They are also among the most common ways people identify themselves. Citizenship is important for determining an individual's legal rights, regarding obtaining employment, voting and access to public services. The place of birth definition, on the other hand, is superior in terms of determining a physical movement from one place to another. Destination countries typically publish migration figures by either category, mainly based on their migration and citizenship laws. Historically, countries in the Americas and Oceania favor the country of birth definition of migration whereas countries in Asia, Africa and Europe traditionally adopt a mix of both definitions.

Differences in definitions may cause the same individual to be reported as a migrant and a non-migrant simultaneously by the same country, thereby leading to discrepancies in the data. This situation may occur under several different scenarios. First, many destination countries grant citizenship to foreign-born people who are family members of citizens or who satisfy certain legal and residence requirements. Such 'naturalized' people continue to be recorded as migrants under the 'foreign-born' definition but not under the 'foreign citizen' definition. Second, many destination countries (for example the United States) grant citizenship to people automatically if they were born within its territories regardless of their parents' citizenship status. Yet others, such as Japan, require at least one parent to be a citizen for their children to acquire citizenship even if they were born within its borders. These children will be recorded as 'foreign citizens' but not as 'foreign born'. As a result of these differences in citizenship and naturalization laws, the numbers of migrants will be significantly higher in the United States if the foreign-born criterion is used and the opposite will be true in Japan.

In cases where data are available for both definitions, we use country of birth. First, the country of birth definition is more appropriate in analyzing physical movements and in handling the cases of former colonies and dependencies.[9] Second, while nationality can change over one's lifetime, one's place of birth cannot.[10] Third, the rates of naturalizations vary enormously across destination countries. Differences in destination countries' laws regarding granting citizenship, either to migrants or their children (born in the destination country), leaves data based on place of birth unaffected. Fourth, when migrants cannot be assigned to a specific origin, they are often recorded under an aggregated umbrella

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[9] The discussion over definitions highlights the somewhat paradoxical possibility of individuals being classified as migrants without ever having moved across an international border. As mentioned above, this is generally possible only in the case of people born in country X with only the citizenship of country Y. A similar situation arises with dependencies and former colonies. In this paper, we divide the world up into countries, territories and dependencies and treat as an 'international' migration any movement from one of these regions to another. Residents of Martinique – A French dependency in the Caribbean - are automatically granted French citizenship. When presented with the relevant statistics for Martinique, seeing all the domestic population are French, one might think that Martinique is actually part of metropolitan France, or that the vast majority of the population moved to France. In such cases, having both foreign born and foreign nationality data would enable us to differentiate between the number of locally born French (referred to as Martiniquais), those born in metropolitan France who moved to Martinique and people from other countries. Similarly, in the case of former colonies gaining independence, many people were born in those countries but are still recorded as migrants since they carry the citizenship of the former European imperial powers.

[10] Of course the country of birth may be redefined, as we explain in the next section.

heading. These categories embody ambiguity with regards a migrant's origin and since migrants are assigned to them more frequently when using the citizenship definition, we again favor the foreign born concept. Last, there are those that are domiciled in disputed territories such as Kashmir or Western Sahara. In these cases it is often unclear as to a particular individual's status or official citizenship, whilst the country of birth definition is far more certain.

## 2.2 How are migrants recorded?

Destination countries employ a wide range of tools to enumerate migrants.[11] These include population censuses, population registers and registers of foreigners, border statistics, and worker and residence permits. Our aim is provide a comprehensive analysis of the evolution of global migrant stocks. We focus therefore upon census and population register records. These are widely conducted, have the greatest geographical coverage and include similar questions, thereby yielding more standardized responses. As such they constitute the vast majority of primary sources in the United Nations *Global Migration Database*.

Censuses are retrospective tools used to survey an entire population (or in some cases a representative sub-sample, a micro-census) at a single point in time. They are generally conducted decennially, over several months, within 'rounds' lasting ten years from the middle of each decade. For example, to be included in the 2000 census round, a destination country must have carried out its census between 1995 and 2004. Censuses are comprehensive in that they survey everyone and all those interviewed respond to the same questionnaire. However, the size and scope of the questionnaires vary enormously, both over time and across different destination countries.[12] Other than their universal coverage, the greatest strength of a census, at least for our purposes, is the fact that questions relating to place of birth and nationality are generally included. Censuses also typically aim to enumerate the resident population, illegal or otherwise (Bilsborrow et al pg. 55). As such, although some migrants have a strong incentive to provide false information to enumerators, many illegal migrants *will* be captured in our matrices[13]

Population registers are also used to record data on migrants. Popular in many parts of Europe, population registers are continuous reporting systems providing up-to-date demographic and socio-economic information for all those surveyed in a particular country at any given point in time.

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[11]Throughout this paper we deal exclusively with migrant stocks. We cannot therefore say anything about when migration took place, save for inferences we can make by comparing the difference in stocks over time. Nor do we know anything about the circumstances (i.e. visa type) under which an individual entered a particular destination country.

[12]Census results are also often released in waves, typically beginning with preliminary estimates and incrementally releasing additional, more detailed data over time. Long intervals between these waves are common. Even if all the waves are eventually released, which is often not the case; it is not uncommon for revisions to occur over time. Seldom is the full information from either population registers or censuses published in the official publications. Even when statistical documentation is available it is often opaque, frequently lacking any of the supporting documentation, including the census questionnaire.

[13]Unfortunately, the extent to which we capture illegal migration remains unknown.

Population registers differ from censuses therefore in that they go beyond merely providing limited snapshots of various demographic characteristics at ten year intervals.

In cases where both population registers and censuses are available, we give priority to censuses. Typically, registers evolved over time, from parish records for example. They were never developed specifically to record international migration. Although population registers have the scope to cover the entire population, and despite the fact they often do, there is no guarantee that this is always the case and they are far more heterogeneous across countries. For example, the laws under which individuals are classified as a migrant and the conditions under which individuals are inscribed or deregistered vary significantly across nations (Bilsborrow et al pg 83).

### 3. The Raw Data

The underlying raw data for our analysis were obtained from the *Global Migration Database* maintained by the United Nations Population Division (UNPD). This is a vast collection of destination country data sources detailing migrant stocks from numerous origin countries and regions. Compiling the underlying primary sources for the database required a herculean effort that involved scouring the key census collections of the world and entering the data by hand. In total, the database comprises some 3,500 separate census records from over 230 migrant destination countries and territories, by sex and age. Given the numerous revisions that destination countries make between census waves, the database incorporates as many of these revised figures as possible. Users can then decide for themselves which version best suits their own purposes. [14]

Following a detailed comparison of the available data, our starting point was to choose the most relevant destination country source from each completed census round (1955-2004).[15] We prioritize data which are superior bilaterally and those available with a gender breakdown.[16] Given the large number of sources for each destination country-year, some were combined where appropriate, such that the resulting destination country-year data was as rich as possible. Table 1 provides a summary of the total number of sources obtained from the United Nations *Global Migration Database* from which we generated the global migration matrices. Of the 3,500 sources detailed in the overarching database, 1,022 were chosen for analysis of which 884 recorded data disaggregated by gender.

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[14]The raw data is available at http://esa.un.org/unmigration.
[15]In the case of Colombia and Bhutan, given that neither of these countries conducted censuses during the 2000 census round, we instead include the relevant censuses for 2005 and treat them as equivalent. We also include data from the 1950 census round for seven countries that lack data for the 1960 census round.
[16]There exists little standardization between the age brackets that countries use to record the migrants' age. This is the foremost reason why an analysis of migrants' age is omitted from the current study.

**Table 1: Total number of database sources**

| Census Round | No. Birthplace Sources | No. Nationality Sources | Total No. National Sources | No. Birthplace by Gender | No. Nationality by Gender |
|---|---|---|---|---|---|
| 1960 | 102 | 68 | 141 | 95 | 63 |
| 1970 | 91 | 55 | 124 | 82 | 46 |
| 1980 | 126 | 87 | 156 | 112 | 79 |
| 1990 | 134 | 113 | 182 | 112 | 96 |
| 2000 | 126 | 120 | 169 | 103 | 96 |

Source: Authors' own calculations

Despite the large number of primary sources drawn upon in generating our global migration matrices, there are still inevitable gaps. This might be because a particular destination country did not conduct a census in a given decade, or disseminate the relevant information either on aggregate or by gender. Table 2 lists the number of countries for which we have missing data in each census round. The third column in table 2 gives the percentage of world migration during the 2000 census round that the numbers of missing censuses refer to. The fourth column reports the percentage of world migration excluding the countries of the former Soviet Union. Estimates for these countries prior to the 1990 census round are difficult to obtain and, where available, a definition pertaining to ethnicity is common. The majority of the migrants omitted from our censuses are those enumerated in the Middle East and Africa. The countries of the Middle East are often reticent to release data, while many countries in Africa have a long history of conflict. As seen in table 2, countries with three or more missing census data host only 16% of the global migrant stock in 2000, excluding migration within the former Soviet Union.

**Table 2. The number of census rounds for which data are missing**

| Number of missing census rounds | Number of Destination Countries | Percentage of World Migration, in 2000 | Percentage of World Migration in 2000, (excluding migrations within the former Soviet Union) |
|---|---|---|---|
| 0 | 49 | 47 | 57 |
| 1 | 49 | 6 | 8 |
| 2 | 41 | 17 | 20 |
| 3 | 52 | 21 | 13 |
| 4 | 29 | 8 | 2 |
| 5 | 6 | 0 | 1 |
| Total | 226 | 100 | 100 |

Source: Authors' Calculations

Furthermore, even if a destination country disseminated data in a given decade, there is no guarantee that bilateral data corresponding to every origin location exist or indeed have been made available. Many countries instead choose to assign migrants to aggregated geographic regions from which less information about a migrants' origin country can be gleaned. The main contribution of this paper is in overcoming these shortcomings in recording and dissemination practices and to estimate these missing data to obtain comparable and consistent matrices for every decade. This is the subject to which we now turn.

## 4. Harmonizing the Matrices

Given the complexities of the underlying data, we face several major challenges when constructing our bilateral migration matrices. In some cases we have to recognize that the underlying processes that generated the data are less than ideal and accept the data at face value. In others, every effort has been made to standardize the data. In this section we highlight the issues related to harmonizing the data.

### 4.1 Defining our master country list

Over the time period studied in this paper, the global political landscape underwent many fundamental changes. In the post-war era, many countries, especially in Africa, Oceania and the Caribbean, gained their independence from European imperial powers. Following the end of the cold war, many states redrew their political boundaries.[17] Some fragmented into smaller nation states - such as the Soviet Union, Czechoslovakia or Yugoslavia – and others reunified following an extended period of separation, for example Germany or Yemen.[18]

We specify a single standard set of countries, for both our origin and destination locations, such that migration numbers between pairs of countries can be compared over time. Since many new origin and destination countries emerged during our period of study, we choose the most current set of countries and regions. We begin by including all 203 internationally recognized sovereign nations. To this list, we add an additional twenty-three territories and dependencies that both produce their own censuses and feature in the records of other countries. These include Martinique, Monaco and St Helena. In all, we have a total of 226 countries and territories and use this list in each of the five migration matrices.[19] Since our matrices are based on destination country records their inclusion will ensure that they are as comprehensive as possible.

One implication of this exercise is that we report, for example, migration from Croatia to Germany in every matrix, even though Croatia did not exist in earlier time periods. If we were interested in finding out the migration from Yugoslavia to Germany in 1960, all we need is to add up the individual migration levels from the successor states of Yugoslavia reported in the 1960 matrix. Even though it would have been easier to perform the analysis according to historical boundaries, this would have masked many recent international movements. Moreover, drawing conclusions with regards destination countries that no longer exist would provide fewer inferences for policy makers.[20]

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[17]When international borders change and new countries are created, typically large numbers of migrants are instantaneously created. For example, prior to the break-up of the Soviet Union, the entire population shared the same citizenship and country of birth. However, following the break-up, fifteen new countries of birth and citizenship resulted. Therefore, all of those born in modern day Ukraine but residing in what is nowadays Russia would overnight be reclassified as migrants under both definitions. There is little we can do to adjust for these changes other than to recognise their importance in our analysis.

[18]We ignore all small border changes and territorial disputes throughout the course of this paper since to account for these would require far more detailed statistics on migrants' region of birth that are simply unavailable.

[19]For a full list of these countries please refer to Appendix 1.

[20]Another complication is that there are nine additional destinations which have census data but these do not perfectly map to our master list. Four of these countries were aggregated into other countries in our master list.

## 4.2 Recording and recoding

In the absence of a worldwide governing body that oversees the implementation of censuses and given the almost unlimited scope destination countries have for choosing idiosyncratic methodologies, it is perhaps of no surprise that there is little standardization in recording and dissemination practices across destination countries.[21] In this sub-section, we aim to highlight the main issues that emerge in the raw data. In the following sub-section, with both our master list defined and the raw origin data recoded, we proceed by explaining how we map these raw data to the countries on our master list.

The level of detail by which destination countries may record and disseminate migrants' data depends fundamentally upon the original questionnaire design. Some census questionnaires require people to provide a specific country of birth and others simply ask for a general geographic region, such as Africa. Even if detailed questions were asked in the original questionnaire, some countries only disseminate data on how many individuals were born abroad or have foreign citizenship. In general, we observe three types of classifications on migrants' origins data that are disseminated by the destination countries:

(A) Specific geographic regions: Some of these correspond to one of the 226 countries and territories in our master list. Others pertain to different localities which tend to be obscure territories, islands or regions, such as the Isle of Man, a self-governing crown dependency, geographically located within the British Isles.

(B) Aggregate geographic regions: These correspond to two or more countries and/or territories in our master list. They can be continents (such as Africa), parts of continents (such as South Asia), political alliances (European Union) or other classifications (such as 'Other Ex-French Africa', 'Algeria, Tunisia and Morocco', or 'Melanesia'). These aggregate regions need to be allocated to the 226 countries in our list. The details of the procedures we use are discussed below.

(C) Miscellaneous categories: These include 'Refugees', 'Stateless' and 'Born at Sea' and there are generally no geographic correspondences for these.

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These are Christmas islands (to Australia), Cocos Islands (to Australia), South Yemen (to Yemen) and West Germany (to Germany). Five additional countries do not exist today but they map onto two or more of the 226 locations on our master list. These are the Gilbert and Ellice Islands, the former Yugoslavia, Czechoslovakia, Burundi-Ruanda and the Trust Territory of the Pacific Islands. We therefore disaggregate these census numbers between the destination countries currently in existence. For example, the 1988 census of the Trust Territory of the Pacific Islands was disaggregated according to the successor countries that exist today, i.e. the Republic of the Marshall Islands, the Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands and the Republic of Palau. All of these disaggregations were made according to the population shares of the successor countries in existence at the time of census. We are inherently assuming therefore that all successor countries' migrant and population distributions are proportional in that year.

[21]The United Nations has published a series of recommendations (1998), aimed at promoting the standardization of recording practices across countries. Until these guidelines are adhered to, the issue of harmonization will remain a key issue in understanding and comparing migration statistics.

Over 10,000 separate geographic regions and categories emerged from over one thousand individual destination country sources chosen for the analysis. The vast majority of these however, are repetitions that refer to identical geographic locations using different expressions. These can be easily relabeled. For example French Upper Volta and the Republic of Upper Volta were relabeled Burkina Faso. Similarly, the Soviet Union, the CCCP, and the USSR were all relabeled as the Union of Soviet Social Republics. Nevertheless, going through these thousands of categories one by one and relabeling them required a tremendous amount of time and attention. In the end, 291 specific geographic regions (group A above) and 231 aggregate geographic regions (group B above) were identified. The 291 specific regions include the 226 countries and territories in our master list and 65 other single locations that can be assigned to one of the 226 in the master list.[22] 231 aggregate geographic regions pose much larger problems. The number of migrants originating from a given aggregate geographic area needs to be allocated to the individual countries that comprise that area in order to generate a bilateral migration matrix. The next section explains in detail how this task is accomplished.

Finally, the miscellaneous categories (group C above) also need to be dealt with consistently to ensure meaningful comparisons are possible between country pairs. For these categories, calculations were made to check if these totals contributed to the foreign born or foreigners total in each census. In most circumstances they did not and so they were dropped altogether. In the few cases when they did contribute i.e. in those cases when these totals actually referred to migrants, these totals were treated as an appropriate aggregate category to later be assigned, as detailed below. We drop all categories referring to the 'Stateless'[23] since, although these migrants form an important minority in global migrant patterns, there exists no way to meaningfully assign them to an origin. Similarly, the number of non-responses to foreign-born type questions is often high (Bilsborrow et al pg. 60). These cases result in large 'unknown' categories from which it is impossible to glean any information as to a migrants' origin. We assume all of these individuals are natives since it is unclear as to whether these persons refer to the domestically born or the foreign born. We therefore delete them from our matrices.

### 4.3 Standardizing Origins

After the labeling of over 10,000 origin categories and standardizing them down to 522 categories, the next task is to assign them to the 226 countries and territories in our master list. As mentioned earlier, of these 522 origin categories, 291 of them are specific regions (group A) and 231 are aggregate geographic regions (group B). Among the 291 specific regions, 226 are in our master list and 65 represent single geographic locations that map perfectly to one of the 226 countries or territories in the master list. Please see Appendix 2 for this mapping.

The 231 aggregate origin categories have to be disaggregated among the 226 countries and territories on the master list. These aggregations in the raw data are one of the most significant difficulties we face

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[22] For example, Vatican is assigned to Italy, Wake Island to the United States and Labuan to Malaysia. For a full list of these aggregations, please see Appendix 2.

[23] Some estimates put the number of 'Stateless' persons, those lacking citizenship, to be as high as 11 million persons, although many of these will not be captured in censuses. The stateless represent an important category of migrants and interested readers should refer to UNHCR: http://www.unhcr.org/pages/49c3646c155.html

in creating a truly bilateral matrix of migration and represent one of the largest contributions of the current work. Since the quality of the underlying data varies enormously between countries and over time, we devise a number of propensity measures dependent upon varying levels of quality. They are based either on a destination country's propensity to accept migrants from a particular origin or else based on an origin countries' propensity to send migrants abroad. We then use these propensity shares, in order of quality, to assign the migrants to the specific origin countries in the master list.

The first task is to divide all the 231 aggregate categories into two distinct groups. Some aggregate categories refer to all countries under that heading, regardless of whether or not they are elsewhere mentioned in a census. Alternatively, some aggregate categories refer instead to all the countries within a particular group other than those mentioned elsewhere. For example, take the category 'Other South America', and assume that elsewhere in that census, Brazil and Argentina are expressly mentioned as origin countries. In some cases, the category 'South America' would refer to all of the countries in South America including Brazil and Argentina. In other cases, the 'South America' category would refer only to those not elsewhere mentioned; in this case, all countries *except Argentina and Brazil*. First, we separately identify each aggregate category as falling into one of these two classifications. The former group is simply referred to as 'across' since the migrants in that category need to be assigned across all origin countries in that group. The second group is called 'other' since we only need assign migrants to those origin countries in that group that are not explicitly mentioned.

Some aggregate categories also overlap, so it is important that they are disaggregated in order to ensure that no information is lost from the census entries. In the case of a census detailing migrants from 'Across South America' and 'Other South America, it would be important to assign those from 'Other South America' first. This is because we know they come from an origin country other than those already mentioned in the census (Brazil and Argentina in this case). For similar reasons, we assign all the aggregate categories in terms of size, starting with the smallest first. It would make no sense to disaggregate 'Across World' before say another category referring to those from a more specific part of the globe.

**4.4 Disaggregation of aggregate categories**

One of the most important steps in creating a bilateral migration matrix is the disaggregation of the 231 aggregated origin regions identified in the censuses. We specify three propensity equations with which we allocate migrants to one of the 226 countries in our master list. Each of these measures varies in quality depending on the availability of the underlying data. We choose more than a single method of allocation since we want to use the data already contained in the matrices to maximum effect.

Our favored option is to use data from other decades as the basis for disaggregation. We therefore allocate migrants according to a relative propensity, which is averaged over time. This propensity is simply the likelihood that a particular destination country will accept migrants from a specific origin country, relative to all the other countries comprising that origin aggregate region. For example, Australia records, in total, 29,311 migrants from the Union of Soviet Socialist Republics in 1966. This total needs to be disaggregated among the fifteen countries in our master list that once comprised the

Soviet Union. Our data for Australia, for which we have census material for each of our five rounds, details all of these fifteen constituent countries, but only in the 2001 census. According to the first method for allocating aggregate categories, we calculate from the 2001 census the contribution of each of these countries towards the sum of these numbers. Once these shares have been calculated, they are multiplied by 29,311 in order to calculate the bilateral numbers for Australia in 1966. Please see table 3 for the demonstration.

**Table 3. Allocation of Aggregate origin region, according to preferred method**

| Origin Country listed in 2001 Australian census | Total immigrants to Australia in 2001 | Share of USSR migration to Australia in 2001 | Number migrants allocated in 1966 across constituent countries |
|---|---|---|---|
| Azerbaijan | 145 | 0.3% | 93 |
| Armenia | 899 | 2.0% | 576 |
| Belarus | 1,041 | 2.3% | 667 |
| Estonia | 2,386 | 5.2% | 1,529 |
| Georgia | 310 | 0.7% | 199 |
| Kazakhstan | 438 | 1.0% | 281 |
| Kyrgyzstan | 101 | 0.2% | 65 |
| Latvia | 6,690 | 14.6% | 4,287 |
| Lithuania | 3,689 | 8.1% | 2,364 |
| Moldova | 483 | 1.1% | 309 |
| Russian Federation | 15,022 | 32.8% | 9,625 |
| Tajikistan | 41 | 0.1% | 26 |
| Turkmenistan | 26 | 0.1% | 17 |
| Ukraine | 14,062 | 30.7% | 9,010 |
| Uzbekistan | 412 | 0.9% | 264 |
| **TOTAL USSR** | **45,745** | **100%** | **29,311** |

Source: Authors' own calculations

Of course, in this simple example, only the data for 2001 were available. Should there have been data for other decades available we would calculate the average of the shares in the third column of table 3 across all decades, before calculating the bilateral numbers for Australian migration in 1966. This can be formally written as:

**Equation 1: Average destination country shares**

$$M_{o,d}^{t,g} = \left( \frac{\sum_{k \neq t} M_{o,d}^{k,\text{"total"}}}{\sum_{k \neq t} \sum_{i \in J} M_{i,d}^{k,\text{"total"}}} \right) \sum_{i \in J} M_{i,d}^{t,g}$$

Where:

o = the country of origin (for example, Armenia)

d = the country of destination (in this case, Australia)

k = all the decades under study i.e. 1960 to 2000 for which there is data (in this case, only 2000)

t = the decade in question (in this case, 1970)

*g* = is the gender type of migrants, either 'male' or female'

*J* = the set of all countries in the aggregated category in which *o* belongs (in this case, USSR)

*i* = a single country in the aggregate category *J*.

The number of migrants allocated by equation 1 is equal to the product of two terms. The first term is the propensity of an origin country from one of our 231 aggregates to send migrants to a specific destination country, relative to all other origin countries comprising that aggregate. Using the example above, it is the average contribution say of Armenia's migration to Australia over all decades for which we have suitable data, relative to the contributions of all the other countries in the Union of Soviet Socialist Republics. The second part of the equation is simply the total number of migrants that need to be allocated. In the previous example this is equal to the total number of Soviet migrants in Australia in 1966.

In the absence of data for option one, (where we use disaggregated data for the *same* destination country in *other* census years), we disaggregate the world into sub-regions. We then assume that origin countries have a similar propensity to send migrants to a particular sub-region of the world over time, as they do to a destination country within that sub-region for which we lack data. For example, let us assume that in the census data from Morocco, we only have the origin category 'Across West Africa' and we do not have specific data on migrants from Ghana. Let us further assume that the data for Morocco in other decades is not sufficiently rich to apply equation 1 – there is no bilateral data from Morocco in other time periods that detail Ghanaian migrants individually. In this instance, we assume that migrants from Ghana have a similar propensity to migrate to other countries in North Africa over time as they do Morocco. We then use data from other countries in North Africa – Tunisia, Libya, Algeria and Egypt – to calculate the propensity of Ghanaians to migrate to North Africa relative to one another. Since these propensity shares again sum to one, they can be applied to the 'Across West Africa' aggregate category from the Moroccan census to disaggregate it into the constituent West African countries. Equation 2 expresses this propensity measure.

**Equation 2: Average regional shares**

$$M_{o,d}^{t,g} = \left( \frac{\sum_{k \neq t} \sum_{f \in REG} M_{o,f}^{t,g}}{\sum_{k \neq t} \sum_{f \in REG} \sum_{i \in J} M_{i,f}^{t,g}} \right) \sum_{i \in J} M_{i,d}^{t,g}$$

Where:

*o* = the country of origin (Ghana in this case)

*d* = the country of destination (Morocco in this case)

*REG* = the set of all countries in a particular sub-region of the world in which *d* belongs (North Africa except Morocco, in this case)

*J* = the set of all countries in the aggregated category in which *o* belongs ('Other West Africa' in this case)

*g* = is the gender type of migrants, either 'male' or female'

*t* = the decade in question

*i* = a single country in the aggregate category *J*.

*k* = all the decades under study i.e. 1960 to 2000 for which there is data

This equation also comprises two parts. The first is equivalent to, for a particular decade, the number of migrants sent from an origin country (Ghana) to a destination region, *REG* (North Africa except Morocco), in which the destination country (Morocco) belongs; divided by the total number of migrants from all other countries in set *J* (West Africa), to all other countries in *REG*. It is therefore the relative propensity of an origin country to send migrants to a particular sub-region of the world relative to other countries in its region.

In those few cases in which we have neither data for destination countries in other decades nor data for the destination sub-region in which the destination country belongs, we resort to using global shares. This is the least effective way to allocate migrants from aggregate categories and we only use it as a last resort such that every migrant can be assigned a specific origin. The global share is simply the propensity of a particular origin country to send migrants to the rest of the world over time relative to all other origin countries sending migrants to the rest of the world. These propensities can be calculated for every origin country and since they sum to one they can again be used to reallocate aggregate categories reported by destination countries. This global propensity is given by:

**Equation 3: Global Shares**

$$M_{o,d}^{t,g} = \left( \frac{\sum\limits_{k \neq t} \sum\limits_{f} M_{o,f}^{t,g}}{\sum\limits_{k \neq t} \sum\limits_{f} \sum\limits_{i} M_{i,f}^{t,g}} \right) \sum\limits_{i \in J} M_{i,d}^{t,g}$$

Where:

*o* = the country of origin

*d* = the country of destination

*J* = the set of all countries in the aggregated category in which *o* belongs

*t* = the decade in question

*J* = the set of all countries in the aggregated category in which *o* belongs

*i* = a single country in the aggregate category *J*.

*f* = the set of all countries worldwide

*g* = is the gender type of migrants, either 'male' or female'

*k* = all the decades under study i.e. 1960 to 2000 for which there is data

The first part of equation 3 is the propensity of origin country *o* to send migrants to the rest of the world, relative to all other countries. The second part of the equation is simply the number of migrants that need to be reallocated from a particular aggregate category.

### 4.5 Varying survey dates

Another difficulty we face is because survey dates remain un-harmonized. During the ten-year window of each census round there are no conventions as to when a destination country should actually conduct its census. Although many destination countries conduct their censuses at the turn of each decade, i.e. 2000/01 or 1990/91, the actual date during these years is also left up to the destination country in question. Attempting to standardize census dates would necessarily involve changing the numbers reported in the original census documents. Table 4 shows however, that the majority of destination countries conduct their census within two years of the middle year of each census round i.e. between 1998 and 2002 for the 2000 census round.

#### Table 4. The fraction of censuses conducted during the middle of each census round

|  | %  Censuses by birthplace | % Censuses by Nationality |
|---|---|---|
| **1960** | 75 | 71 |
| **1970** | 66 | 73 |
| **1980** | 73 | 70 |
| **1990** | 76 | 70 |
| **2000** | 84 | 76 |

Source: Authors' own calculations

Since this is the case, we elect simply to keep the numbers unchanged and report all censuses as comparable in each round. A full list of census dates is provided in Appendix 1.[24]

### 4.6 Calculating missing gender splits

Although common in the underlying data, census data disaggregated by gender are sparser than aggregate migrant totals, see table 1. Even so, an important contribution of the current work is in estimating the gender breakdown of all destination countries in our global migration matrices. Similar to the previous section, in which we allocate the aggregated categories from the UNPD *Global Migration Database* to specific origins in our master list, we devise two measures for calculating gender splits based upon data of differing quality.

Our preferred option is to again divide the world into a number of sub-regions. We then assume that the male to female ratio of an origin country's emigrant stock, in a specific decade, is the same for each destination country in that sub-region. We can thus calculate the missing gender ratio in an origin country's emigrant stock, by using data disaggregated by gender from all those destinations in the same sub-region as the destination country for which we lack data. For example, imagine that in a particular

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[24]A version of the database that has been mapped to the United Nations *Trends in the World Migrant Stock* can be obtained from the authors. These data are standardized over time in terms of the years to which they refer.

decade we know the gender split of emigrants from New Zealand residing in all Pacific Islands with the exception of say Kiribati. In this situation, and taking our sub-region to be the 'Pacific Islands', we assume that the balance of male to female emigration from New Zealand to Kiribati is simply the average of males to females of the New Zealand emigrant stock among all of the other Pacific Islands in that decade. We can formally state our equation for calculating the gender split as:

**Equation 4: Gender splits based upon concurrent sub-regional shares**

$$M_{o,d}^{t,g} = \left( \frac{\sum_{f \in REG} M_{o,f}^{t,g}}{\sum_{f \in REG} M_{o,f}^{t,"total"}} \right) M_{o,d}^{t,"total"}$$

Where:

o = the country of origin (New Zealand)
d = the country of destination (Kiribati)
t = the decade in question
REG = the set of all countries in a particular sub-region of the world in which d belongs (Pacific Islands)
g = is the gender type of migrants, either 'male' or female'

Again the equation has two parts. The numerator in the term in brackets is the number of *male* or *female* migrants that origin country *o*, sends to all destination countries in the sub-region, *REG*. This is divided by the *total* number of migrants in the same destination sub-region from origin country *o*. In other words; it is the average propensity of the destination countries in sub-region *REG* to accept male or female migrants from each origin *o*. Once calculated for males or females, these proportions can simply multiplied by the number of migrants that need to be allocated a gender split.

For example, the 1990 Swedish census data lacks a gender dimension. In this year, Sweden records 2,640 migrants as originating from Uruguay. We continue by assuming that the ratio of males to females in Sweden's immigrant stock during the 1990 census round is the same as the average ratio of Uruguayan male to female migrants in all other countries in the sub-region, in this case Scandinavia. See table 5 for the actual calculation.

**Table 5. Calculation of sex-ratios based on concurrent sub-regional shares.**

| Destination Country in Scandinavia | Number male migrants in 1990 from Uruguay | Number female migrants in 1990 from Uruguay | Males (Percent) | Females (Percent) |
|---|---|---|---|---|
| Denmark | 92 | 90 | 51 | 49 |
| Finland | 11 | 21 | 39 | 66 |
| Norway | 67 | 78 | 46 | 54 |
| Average across sub-region | | | 47 | 53 |

Source: Authors' own calculations

Table 5 shows that there is quite a lot of variation in the balance of male to female migration from Uruguay to Scandinavian countries during the 1990 census round. On average however, 47% of Uruguayan migrants are male and 53% are female. Knowing the total number of migrants that Sweden reports from Uruguay in 1990 we can estimate that 1,250 (=0.47*2,640) of these migrants will be male, while 1,390 (=0.53*2,640) will be female.

These calculations based upon concurrent shares can only be calculated if data disaggregated by gender exist for all of the other destination countries in the sub-region. Where this is not possible, we divide the world into (destination) sub-regions and calculate gender splits based upon regional shares *over time*. Elaborating upon our previous example, let us imagine that in 1990 the data for Finland, Norway and Denmark were unavailable. As such, we cannot calculate our gender split for Uruguayan migrants in Sweden based upon data for 1990. In this case, we would instead look across all other decades for which we have data in Scandinavia and take the average male to female ratios over time. This can be written formally as:

**Equation 5: Gender splits based upon average sub-regional shares over time**

$$
M_{o,d}^{t,g} = \left( \frac{\sum\limits_{k \neq t} \sum\limits_{f \in REG} M_{o,f}^{k,g}}{\sum\limits_{k \neq t} \sum\limits_{f \in REG} M_{o,f}^{k,"total"}} \right) M_{o,d}^{t,"total"}
$$

The numerator in brackets is the number of *male* or *female* migrants from origin *o*, to all destination countries in the destination sub-region, *REG,* across all decades for which we have data. Of course we do not have complete data for the current decade *t* since, should that be the case, we would prefer to opt for equation 4. The denominator is equal to the *total* number of migrants in the same destination sub-region from origin country *o*, again across all decades. In other words, it is the average propensity across all decades and destination countries, (comprising the destination sub-region *REG*), to accept male or female migrants from each origin *o*. Once calculated, this share is multiplied by the total of number of migrants that needs to be assigned a gender ratio.

## 4.6 Combining definitions

We can only include a single definition of a migrant (foreign born or foreign citizen) for each destination country in the final matrices. It makes no sense to switch definitions over time for the same destination country since that would result in the data being inconsistent. We give priority to the foreign-born definition and always use these data if we have at least three censuses with detailed bilateral information by that definition. However, many destination countries remain for which there are only data available by nationality. For countries such as Japan, that rarely offer citizenship to foreigners, this does not pose too much of a problem since the foreign born and nationality data will be very similar. For other destination countries, including data based on the nationality concept will lead to disparities. When we have fewer than three foreign born data sources and superior quality data by the nationality definition, we choose the latter. Appendix 1 lists the definitions used for each destination country. In cases where we have fewer than three data points by either definition, we deem it necessary to make a number of assumptions to fill the missing data, the details of which follow.

## 4.7 Missing censuses

The final hurdle in constructing our global migration matrices is in dealing with omitted data. No census round is truly complete since there has never been a census round that includes every country in existence at that time. Censuses are expensive because of their universal coverage and are extremely labor intensive. Indeed, many countries have only started to conduct them relatively recently; Vanuatu's first census was in 1967 whilst Bhutan's was in 2005. Censuses are also frequently abandoned due to civil unrest or military conflict. They can also become highly politicized because they can be used to estimate how many individuals of a particular ethnic grouping reside in a specific region. Data may never be released even if collected therefore. Indeed there is no guarantee that a question relating to nationality or country of birth is even included in the questionnaire. Historically, many countries in Central Asia, together with Sri Lanka, Tonga and Fiji have instead included questions pertaining to ethnicity in various years which for our purposes are meaningless. For all these reasons inevitable gaps in the data emerge, see table 2.

We adopt three conventions for calculating missing data. Which one we use depends upon how many data are missing and for which decades these data are missing relative to the decades for which we do have data.

## 4.7.1 Missing in-between decades

Where we have missing data, but in circumstances in which we have data corresponding to the time period immediately prior to, and following, the missing decade, we simply assume a linear trend between the earlier and later bilateral data. In total, 42 country-years of data were interpolated using this method.

### 4.7.2 Missing end decades

There are cases where the data are missing at the beginning or the end of the time period, and hence not surrounded by data corresponding to earlier and later decades. Then, we simply assume the destination country has the same bilateral migrant composition as the decade closest to the missing period. We then apply the bilateral shares from the closest decade for which we have data to the destination country's total number of migrants for the missing decade. The information on the 'total' number of migrants comes from one of two sources. In some cases, the census provides the total number of migrants without any bilateral information. If this is not available, we take the total from the closest decade and adjust it for growth in migration. The growth rates applied in these circumstances are taken from *Trends in the World Migrant Stock (TWMS)*[25] database produced by the United Nations Population Division. We calculate missing end decades for 115 countries for which we lack data, the majority of which relate to the 1960s and 1970s.

The United Nations *TWMS* details total migrant stocks for all countries in the world at five year intervals. It is useful for our purposes for two reasons. First, we can use them to estimate growth rates to apply to our census totals to calculate missing totals in years for which we lack censuses. Second, the *TWMS* database provides us with a consistent set of totals over time, for countries for which we have data of insufficient quality. An important difference between our matrices and the TWMS database is in our treatment of refugees. While refugees are generally enumerated in developed country censuses, this is not always the case in developing countries. Indeed, where refugees are interned in camps, they are less likely to be surveyed at the time of census. Making allowances for these persons, the TWMS database adds on to the number of migrants reported by UNHCR and UNWRA "for developing countries where they were likely not to have been included in the census data". Since the majority of developed countries record refugees on a bilateral basis, alongside all other migrants, there are normally no remedial measures that can be taken to remove them. Similarly, for developing countries for which we have census data, we cannot be totally sure that the numbers contained therein include or exclude refugees. However, in those cases in which we implement the TWMS database we can subtract the number of refugees from the totals. In so doing, we aim to effectively remove, where possible, those refugees in camps, since our focus is upon economic migration. Given the lumpy flows of refugees in times of upheaval and crisis, a failure to remove these refugees from the totals will skew the calculations of our growth rates that we apply to our censuses to calculate data for decades for which we lack sufficient information.

### 4.7.3 Countries with very poor data

For 86 destination countries for which we lack sufficient data i.e. have two or fewer data points, we adopt a different strategy. This is because we simply do not have adequate data to meaningfully interpolate missing census totals or bilateral numbers. In these cases we adjust the census totals for which have data, to the *Trends in the World Migrant Stock* totals. This has the advantage of producing consistent totals for the number of migrants in each of our five census periods. We then apply the

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[25] See http://www.un.org/esa/population.

average bilateral shares from the censuses for which we do have data to these totals, thereby yielding bilateral data for the whole period.

Finally, there are nine destination countries for which we completely lack bilateral data[26]. In these cases, we use the data recorded from all other countries in the sub-region in which the country with missing data belongs. We use these data to calculate the propensity of every country in the destination sub-region to accept migrants from elsewhere in the world. Again all of the propensities sum to one. Once calculated these shares are multiplied by the total migrant stock figures provided in the *Trends in the World Migrant Stock* database in order to calculate the required bilateral numbers.


## 5. The Evolution of Global Bilateral Migration

The greatest strengths of our global migration matrices are their universal bilateral coverage, the expansive number of decades to which they refer and their disaggregation by gender. These data prove too rich therefore to allow a full analysis of all bilateral movements between all pairs of countries. Instead we summarize the major trends in the evolution of bilateral migrant stocks, based primarily upon the World Bank regions[27].

### 5.1 Global Trends

Our migration matrix for the 1960 census round reflects a realigning world in the post-colonial era. At this time, one quarter of the world's migrant population was born in Europe. A further quarter is the migrants created when India was partitioned[28]. Over the period, the composition of world migration fundamentally changed however, driven by world events and increasingly selective immigration policies. By 2000, our matrices portray a globalized world with migration between more country pairings than at any other time in history. Figure 1 tracks the total number of world migrants from 1960 to 2000. Without taking into consideration the break-up of the Soviet Union and the partition of India, the growth in world migration rises more sharply in the 1990s.

Between 1960 and 2000, our data show that the total global migrant stock more than doubled from 76 to 159 million. About a half of this growth is due to migrant flows to Western Europe and the United States. Around a quarter can be accounted for by the break-up of the Soviet Union. The remainder is due to the emergence of the Gulf States as key migrant destinations, greater intra-Africa migration flows and migration to Australia, New Zealand and Canada. The number of migrants in South Asia actually fell

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[26]These nine nations are: Afghanistan, China, Eritrea, Lebanon, the Maldives, Qatar, Somalia, the People's Republic of Korea and Vietnam. Of these Afghanistan, Eritrea, Lebanon and Somalia have been affected by conflict. Vietnam and China have conducted censuses over the period but their definition of migration is not compatible with ours.
[27]Appendix 1 provides details of the World Bank regions. These are South Asia (SAS), East Asia and the Pacific (EAP), Sub-Saharan Africa (AFR), Latin America and the Caribbean (LAC), and the Middle East and North Africa (MENA). We use the term High MENA to refer to the richest, predominantly oil producing nations of the MENA region as well as Israel. These include: Saudi Arabia, Bahrain, Oman, Kuwait, the United Arab Emirates and Qatar.
[28]Unfortunately, we cannot differentiate between the proportions of migrants that moved before, during or immediately after partition since these migrations occurred before the beginning period of our matrices.

over the period reflecting attrition amongst those migrants that emerged following partition, see figures 2a and 2b.



Figure 1. The Evolution of the Global Migrant Stock, 1960-2000



Figure 2a Growth of Migrant Stocks in selected regions



Figure 2b Growth of Migrant Stocks in selected regions
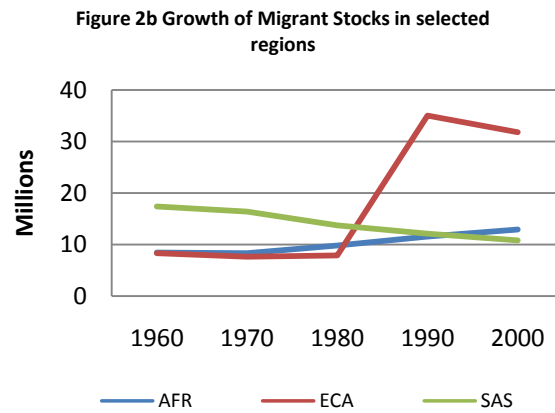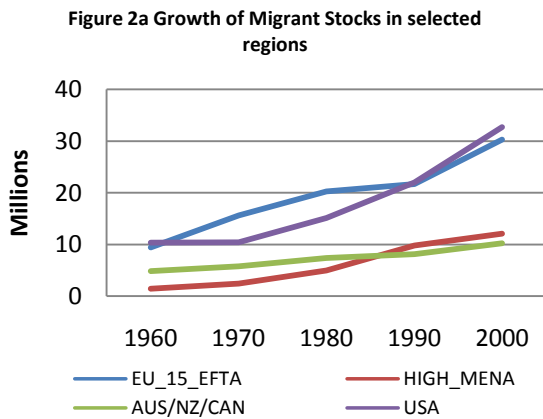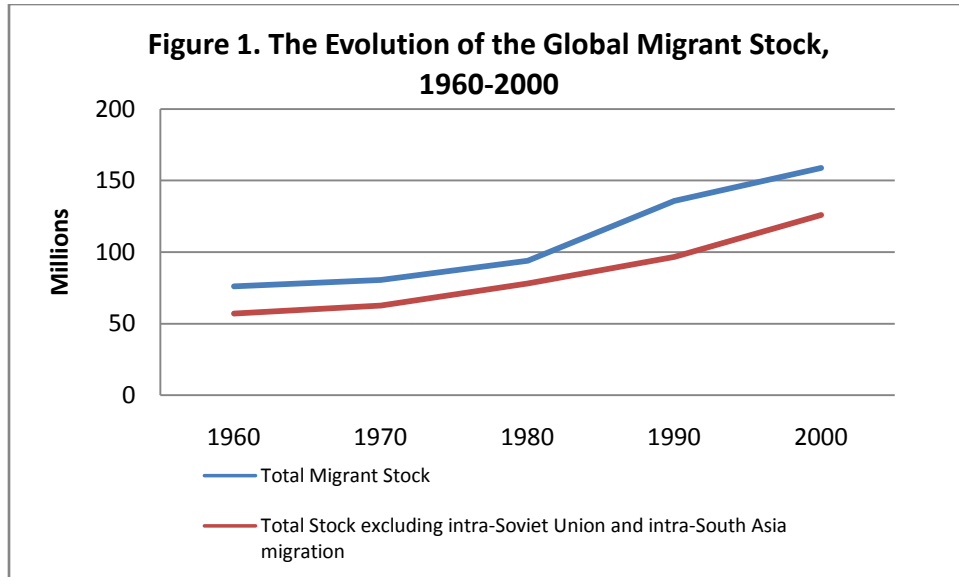
Source: Authors' own calculations

Despite the sustained increase of the global migrant stock over the period, our data show that as a proportion of the world population, the migrant stock actually declined between 1960 and 1980, from 2.52% to 2.12%. After 1980, the proportion of migrants in the world rose again, in large part due to the disintegration of the Soviet Union, see figure 3. Even excluding the effects of the break-up of the Soviet Union and the partition of India, the data show a gradual increase in the proportion of migrants in the world from 1970 onwards.

**Figure 2. The World Migrant Stock as a Percentage of the World Population, 1960-2000**



Legend:
— Total Migrant Stock
— Total Stock excluding intra-Soviet Union and intra-South Asia migration
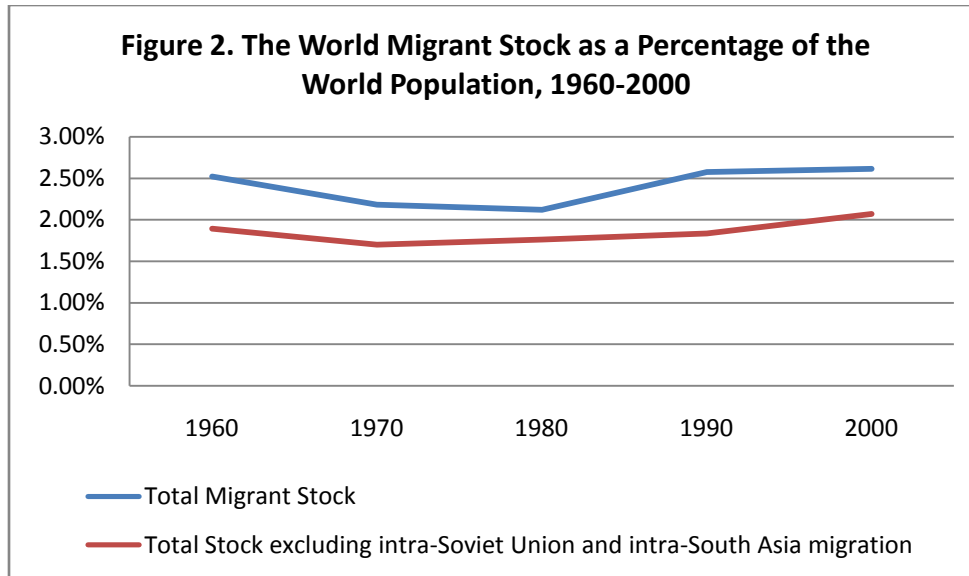
**5.2 Comparison with the United Nation's Trends in World Migrant Stock**

Figures 1 and 3 highlight some of the disparities that exist between our estimates and those reported in the United Nations *TWMS*. Overall the TWMS reports 176.7 million migrants in 2000, as opposed to our 159.1 million, a difference of some 17.6 million migrants. Our treatment of refugees - that in 2000 totaled some 15.7 million worldwide - explains much of this difference, although in other cases additional reasons account for these asymmetries.

First, the totals may simply not match. One reason for this is because censuses do not always make allowances for temporary workers. For example, in the case of Singapore, the official census of 2000 records 563,429 foreign-born migrants. The United Nations however reports some 1,351,806 foreign born migrants in the same year. Similarly, Saudi Arabia enumerates relatively few Filipino workers. In other cases however it is simply not obvious where the differences lie however. The 1981 Indian census reports 7,938,405 foreign-born migrants. The United Nations reports 8,841,054 migrants in 1980, although just one year apart a difference of over 900 thousand migrants.

There are also cases where we report data by nationality but the corresponding figure in the TWMS refers to the foreign born. This situation typically arises when a census doesn't make provision for estimating the foreign born on a bilateral basis[29]. Examples include Austria and Cote d'Ivoire. Important disparities can also be found because of the differences in the years to which the data refer, for example when comparing our 1966 estimate for Australia against the United Nations data for 1970. This is important not just when making comparisons across countries but also when comparing data for the

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[29]In the case of South Korea, we assume that the difference between the total number of foreign nationals and the foreign born are North Koreans. Similarly, in the case of the United States, since we effectively treat the overseas territories of the United States as foreign countries, we add back into the census totals those born in Puerto Rico etc.

same country over time. Last, whereas our master list refers to the countries currently in existence, the United Nations aggregate those countries that have since broken up into their old geographic regions; for example the USSR. As such, and since our data is superior in more recent decades we ultimately record relatively more migrants in these countries in earlier decades.

## 5.3 Migration Concentrations

The relative importance of migration for destination and origin countries will likely depend upon the size of the populations in either the home or host country. Figures 4 and 5 therefore, present total immigrant and emigrant stocks from across the world as a fraction of the destination and origin country populations respectively. In doing so, we highlight the relative concentrations of immigrant and emigrant populations across the world.

**Figure 4. Immigrant Population as a Fraction of Destination Country Population, 2000**
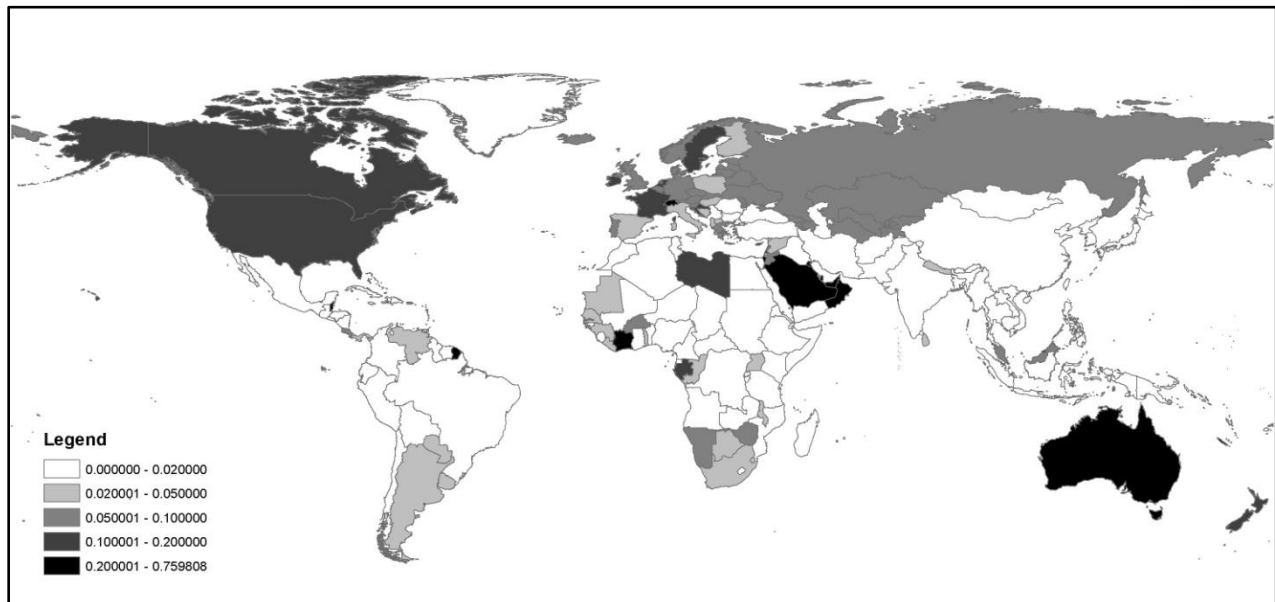


Source: Authors' own calculations

As might be expected, many of the countries in the world with the highest concentrations of immigrants are small nations with comparatively few people. The countries with both more than one million people and with more than a 20% migrant population include the United Arab Emirates (70%), Kuwait (62%), Israel (33%), Oman (25%), Cote d'Ivoire (24%), Saudi Arabia (24%) and Australia (22%).

As far as the origin countries are concerned, the ones most impacted by migration are either small island states or those plagued by political upheaval and military conflict. For example, nearly four times as many people that were born in Niue live outside of the small Island nation as compared to those that remain. Montserrat, Tokelau, the Cook Islands and America Samoa can all be categorized as having a greater number of people born on their soil that have left than have remained. The top five nations with more than one million residents with the largest emigration stocks relative to home populations are

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Jamaica (38%), the Republic of Ireland (35%), Armenia (31%), the Occupied Palestinian Territories (30%), Bosnia and Herzegovina (30%) and Albania (26%) see figure 5 for further details.

**Figure 5. Emigrant Population as a Fraction of Origin Country Population, 2000**
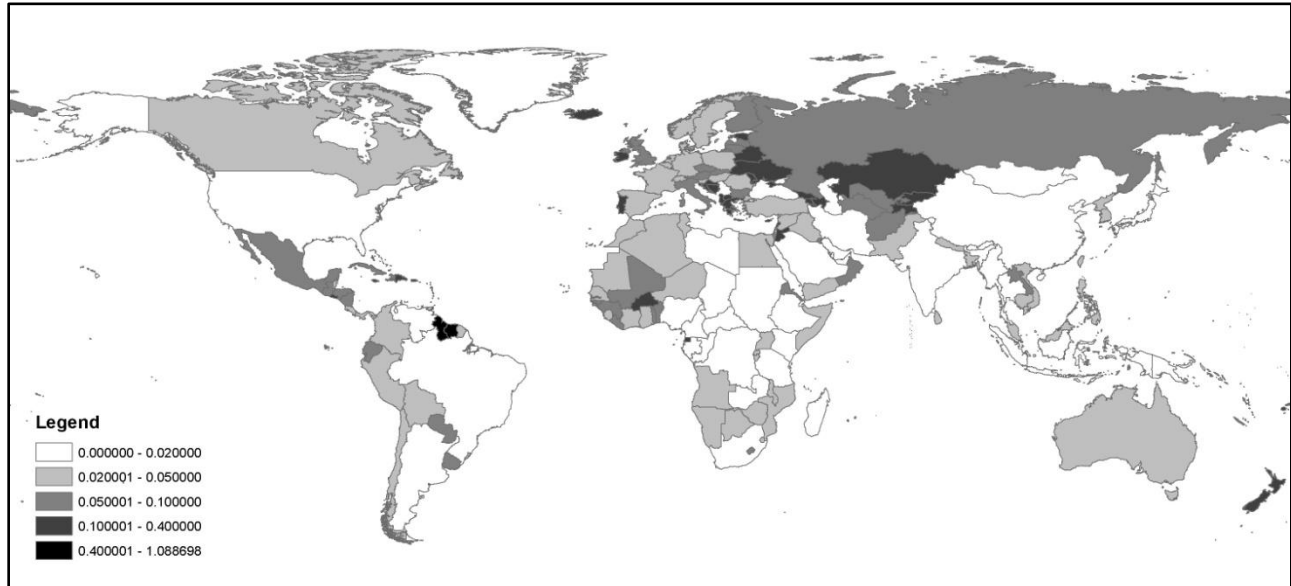


Source: Authors' own calculations

## 5.4 Global Migration between the 'North' and the 'South'

Dividing the world into two regions, the 'North' and the 'South',[30] our data highlight some of the most important patterns underpinning international migration over the last half of the twentieth century as seen in figure 6. The number of migrants from the North remained fairly stable over the period. So too did the number of Southern migrants between 1960 and 1980. Between 1980 and 1990 however, the numbers dramatically increased, in part reflecting the break-up of the Soviet Union. Between these dates our data show that the number of migrants from the 'South' rose by some 41 million, of which 14 million can be accounted for by the increase in the migrant stocks in the countries of the former Soviet Union.

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[30] The 'Northern countries' are Australia, New Zealand, Japan, Canada, the United States of America the EU_15 and the nations of the European Free Trade Association.. All other countries are classified as being in the 'South'.

**Figure 6. The Evolution of Migrants Stocks
Between the 'North' and the 'South', 1960-2000**
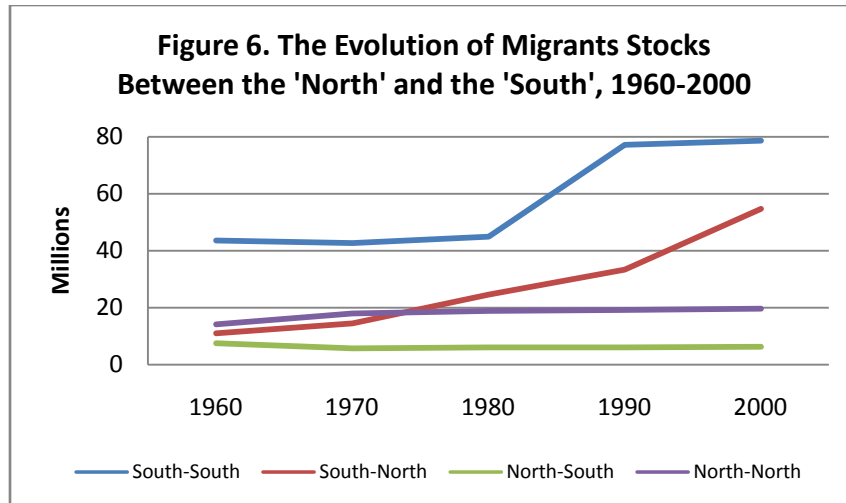
It is of no surprise therefore that numerically South-South migration dominates global trends. Interestingly however, as a proportion of the total migrant stock - even when factoring in the migrant creating effects of South Asia and the Soviet Union - South-South migration is declining as a proportion of world migration. In 1960, South-South migration accounted for 57% of the total migrant stock, but by 2000, it had fallen to 49%. In fact, as a proportion of the total migrant stock, only South-North migration has increased between 1960 and 2000. Increasingly liberal immigration policies in the North - in terms of the number of countries from which richer countries accept migrants - have been paralleled by significant movements from the South. Our data show that between 1960 and 2000, the number of migrants from the South living in the North rose from 11 to 54.7 million migrants. Surpassing North-North migration between 1970 and 1980, both in terms of numbers and as a proportion of the total migrant stock, the dramatic increase in South-North migration is unquestionably one of the defining trends over the period.

Figure 7 highlights the main inter-regional migrations between sub-regions of the South in 2000. Intra-Soviet Union and intra-South Asia flows constitute over 45% of all South-South migration globally. The largest flows in the countries of the former Soviet Union are to the Russian Federation and between Russia and the Ukraine. In South Asia, the Bangladeshi Diaspora living in India is the largest migrant population. All migrant flows between India, Pakistan and Bangladesh are all very large in both directions.

**Figure 7. South-South inter- and intra-regional migration, 2000**
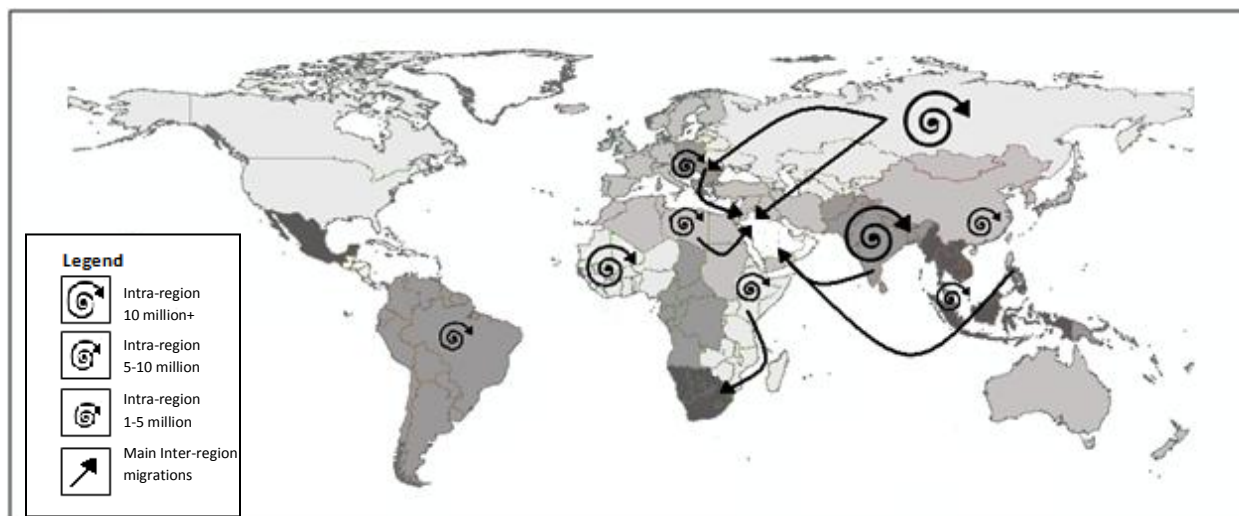
A further 16% of South-South migration is to the high income countries of the Middle East (high MENA in the figures). This region hosts nearly 5 million South Asian migrants, over 4 million from the MENA region and around 1 million migrants from both the countries of the former Soviet Union and South East Asia. Across the globe, in every other sub-region in the South except Southern Africa, intra-regional flows dominate South-South migration. In the case of Southern Africa, there are a greater number of migrants from East Africa. Aside from the internal flows in the countries of the former Soviet Union and South Asia, intra-sub-regional flows are greatest in West Africa and East Asia. The latter is a product of our decision to treat Macao, Hong Kong, Taiwan and the Republic of China as separate entities in our matrices.

## 5.5 The Composition of International Migration

We now turn to the evolution in the composition of immigrant stocks in major destination regions.

**Figure 8. The Source Composition of Migration to the United States, 1960-2000**
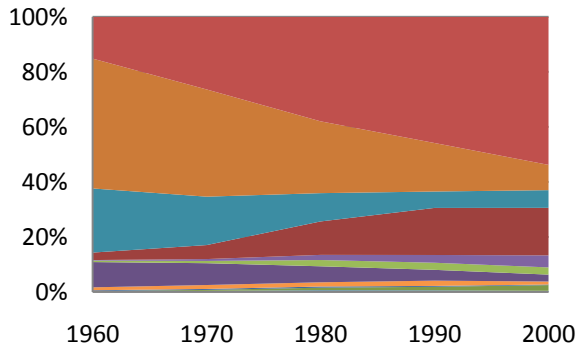


**Figure 9. The Source Composition of Migration to Western Europe, 1960-2000**
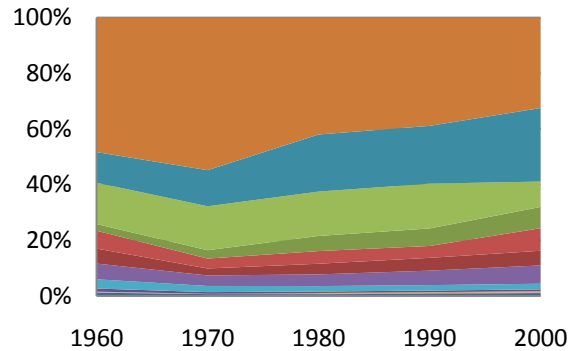


**Figure 10. The Source Composition of Migration to the High MENA region, 1960-2000**
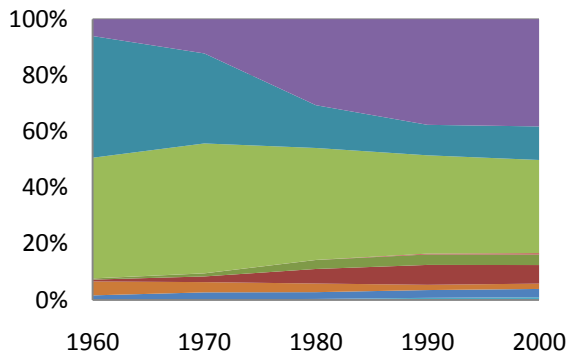


**Figure 11 The Source Composition of Migration to Australia , New Zealand and Canada, 1960-2000**



Legend: AUS/NZ ■ HIGH_MENA ■ JPN ■ CAN ■ USA ■ SAS ■ EAP ■ LAC ■ AFR ■ MENA ■ ECA ■ EU_15_EF
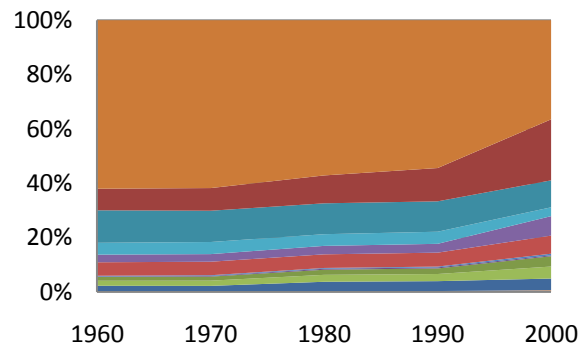
Source: Authors' own calculations

Our data show that the United States is the single most attractive destination country for international migrants in every decade. Between 1960 and 2000, the migrant stock in the United States grew by 22.3 million and, by the end of the period, no less than one fifth of the world's migrant population lived there. While the migrant stock in the United States has grown rapidly, see figure 2a, its composition has also radically changed, see figure 8. Immigration in 1960 was predominantly from four regions - Western Europe, Eastern Europe and Central Asia (ECA), Latin America and the Caribbean (LAC) and Canada. European migration was especially dominant and in 1960 seven of the top ten migrant populations in the United States originated from Europe. Of the total of 10.4 million migrants at that time, 1.26 million were born in Italy, 990 thousand in Germany, 837 thousand in Great Britain, 750 thousand in Poland, 340 thousand in both Russia and Ireland and 305 thousand in Austria. Relative to the total, migration from Western Europe and ECA declined significantly up until the turn of the century, from a combined total of 70% in 1960, to just 16% in 2000. Balancing these trends, the number of migrants from LAC and from East Asia and the Pacific (EAP) rose sharply. In 2000, 17.6 million immigrants or 54% of the total immigrant stock in the United States were born in LAC while a further 17% were born in EAP.

Western Europe, also home to around a fifth of the all global migrants in 2000, consistently receives a high proportion of international migrants in every decade of the last half of the twentieth century. As opposed to the historical patterns in the United States however, our data show that the composition of migrants remained more stable over the period, see figure 6. By 2000, the migrant stock in Western Europe had more than tripled to 30.3 million migrants, of which around a third were born elsewhere in Western Europe. Indeed increasingly over the period, Western European migrants favor migrating to another country within the region. In 2000, just under half of all Western European migrants lived elsewhere in Western Europe, driven largely by the removal of barriers and the expansion of the European Union. This is a significant increase from 1960 when a greater fraction of Europeans chose to migrate to the United States and to LAC. Despite these increased numbers however, intra-Western European migrants are increasingly becoming the minority as a proportion of the total migrant stock in Western Europe. This is because of the large influxes of migrants from ECA, the low income countries of the Middle East and North Africa (MENA) and Africa.

The emergence of the Gulf States as major migrant destinations is one of the most significant forces that shaped international migration in the last half of the twentieth century. The wealth created following the oil price shocks of the 1970s generated huge demands for labor which has been largely met by migrants originated from the poorer countries in the Middle East and North Africa and South Asia. Between 1960 and 2000 the migrant stock in the high MENA region rose from 1.4 to 12.1 million or from 1.9% to 7.6% of the world total. Of these, 8.6 million (or 71%) originated from South Asia and the rest from MENA[31].

Australia, New Zealand, and Canada, were all founded upon immigration by pursuing proactive immigration policies to attract overseas residents.[32] At the beginning of our period this migration was dominated by those from Europe, specifically from the UK. In 1960, 62% of all migrants to Australia, New Zealand and Canada were born in Western Europe, of which 32% were born in the United Kingdom. By 2000 however, Western European migrants constituted just 36% of total migrants in these countries. Consequently, Canada, Australia and New Zealand look ever further afield for potential migrant sources. Of growing importance in all these countries are the stock of migrants from the East Asia and Pacific region (particularly those from China, Vietnam and Hong Kong), which today account for nearly a quarter of all migrants in the region.

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[31]Another important migration corridor is from the Soviet Union and Eastern Europe to Israel. In 1960, over half of all migrants in Israel were born in the Eastern Europe and Central Asia region.
[32]Here we analyze Australia, New Zealand and Canada as a single (destination) region.

**Figure 12. The Composition of Emigration from East Asia and the Pacific, 1960-2000**
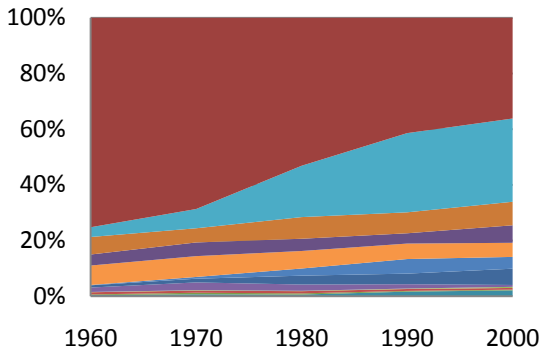
**Figure 13. The Composition of Emigration from Eastern Europe and Central Asia, 1960-2000**
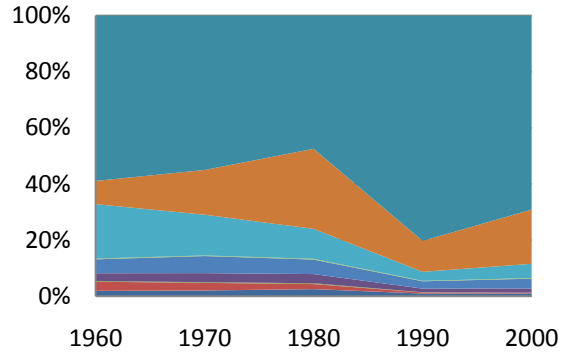
**Figure 14. The Composition of Emigration from Latin America and the Caribbean, 1960-2000**
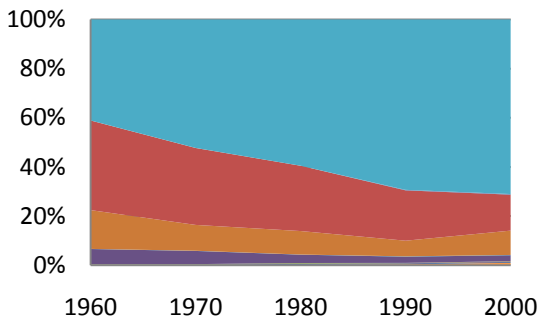
**Figure 15. The Composition of Emigration from the Middle East and North Africa region , 1960-2000**
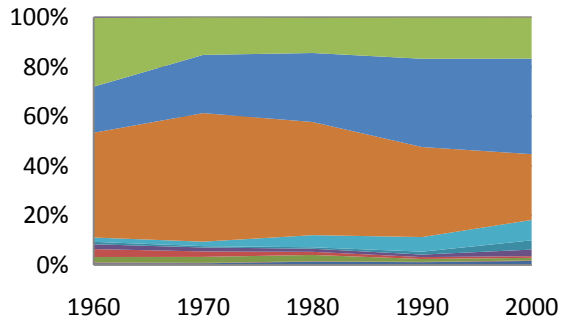
**Figure 16. The Composition of Emigration from Sub-Saharan Africa, 1960-2000**
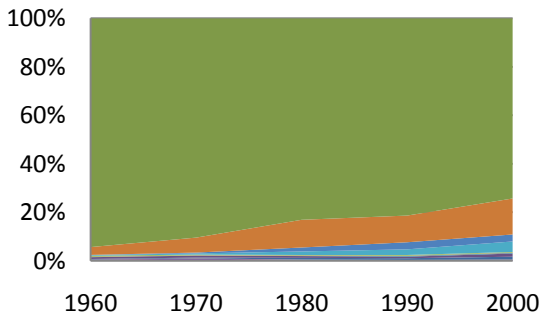
**Figure 17. The Composition of Emigration from South Asia, 1960-2000**

AUS/NZ ■ HIGH_MENA ■ JPN ■ CAN ■ USA ■ SAS ■ EAP ■ LAC ■ AFR ■ MENA ■ ECA ■ EU_15_EF
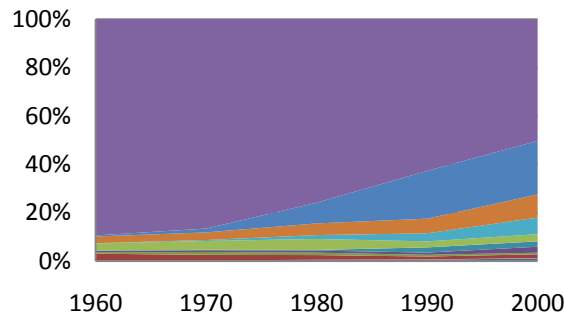
Source: Authors' own calculations

We now discuss the more interesting patterns in the composition of migrant stocks in terms of origins and destinations for each region between 1960 and 2000. No origin region in our matrices has diversified the number of destination countries to which they send migrants more so than the East Asia and Pacific region (EAP), see figure 12. In 1960, three quarters of emigration from the EAP region was to elsewhere in the region. By 2000 however, these intra-regional migrants totaled just over one third. In

2000, six of our destination regions each hosted at least 5% of the EAP emigrant stock, namely: Australia and New Zealand, other nations in East Asia and the Pacific, Canada, Western Europe, the United States and Japan. Our data show that the United States is the most important destination region for EAP migrants in 2000, especially for those from the Philippines, Vietnam, China and Korea. The number of emigrants from the Pacific Islands increased more than sevenfold between 1960 and 2000. Although most live in Australia and New Zealand, increasing numbers now settle in the United States.

Emigration from Eastern Europe and Central Asia between 1960 and 2000 is dominated by movements within the region. Although, the number of these 'international' migrants increased artificially following the break-up of the Soviet Union, Yugoslavia and Czechoslovakia, these migrants consistently represent the majority within the region over time. Elsewhere in the world, the European Union and the United States are also important destinations. Between 1960 and 2000 the number of ECA migrants in Western Europe increased from 1 million to 8 million. In contrast, the number of ECA migrants in the United States has languished, such that the proportion of those from the ECA migrating to the United States has gradually declined since 1960.

The meteoric growth in the number of Latin America migrants over the last half of the twentieth century has been startling. In 2000, except for those from the former Soviet Union, there were more Latin American emigrants than from any other region in the world, in total nearly 25 million. Some 21 million (77%) of these live in the United States. Although the number of Latin American emigrants moving to elsewhere in Latin America and to Western Europe have also increased, proportionally fewer Latin Americans now live in either of these destinations when compared to earlier decades, see figure 14.[33]

In 2000, migration from the MENA region was typically to another country within MENA (17%), or else to the high income MENA region (39%), Western Europe (27%), or the United States (8%), see figure 15. However, while the stock of emigrants from MENA has grown by over 300% since 1960, proportionally fewer migrants from MENA now choose Western Europe or elsewhere in the region as their destination as compared to in 1960.

The majority of migrants from Sub-Saharan Africa reside elsewhere in Africa. Outside of the continent, the most significant destinations are the European Union and the United States. Between 1960 and 2000 the proportion of African emigrants to these regions rose from 5% and under 1% to 15% and 4% respectively.

The overall number of South Asian emigrants changed surprisingly little between 1960 and 2000. During this time however, South Asian migrants have spread themselves across many more destinations worldwide. In 1960, 88% of South Asian migrants resided elsewhere in the region, although this proportion fell to just half by 2000. This decline, which is in part due to the effects of partition, has been paralleled by significant outflows to the United States, Western Europe and the high income MENA region, the latter of which is home to around 22% of all South Asian migrants.

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[33]Interestingly, in 2000, Latin American migrants also comprised 18% of the immigrant stock in Japan with these flows predominantly from Brazil, the N*ikkei burajiru-jin*

## 5.6 Prominent Global Migration Corridors

We now take the opportunity to discuss some of the more interesting bilateral migration corridors around the globe. The United States is by far the single most important destination for international migrants, receiving the largest migrant flows from fifty countries across the globe, including China, Colombia and Cuba. Moreover, fifteen of the largest fifty migration corridors in the world and nine out of ten largest South-North corridors in 2000 were to the United States.

**Figure 18. Selected Migration Corridors to the North, 1960-2000**
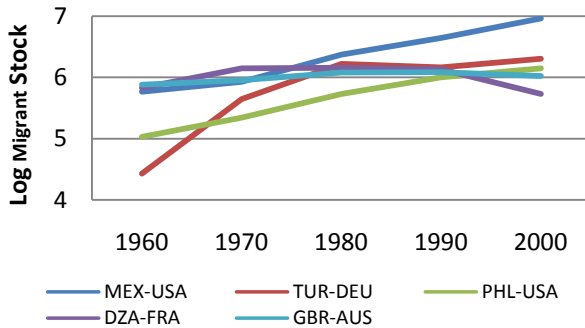


**Figure 19. Selected Migration Corridors to the South, 1960-2000**
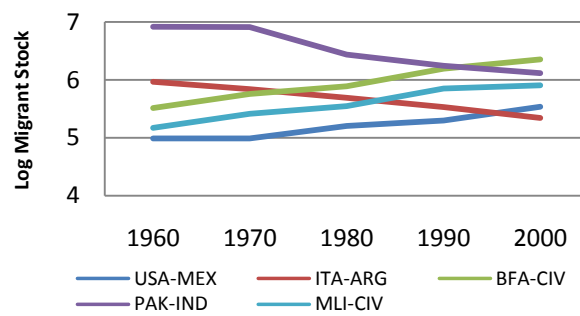


Source: Authors' own calculations

The two most significant migration corridors to the United States in 2000 are from Mexico and the Philippines, which represent the first and third largest South-North migration corridors in the world. Alone they account for 10.6 million migrants, equivalent to 32% of the migrant stock in the US or nearly 7% of the world migrant stock. Interestingly, the reverse flow from the United States to Mexico is the largest North-South migration corridor in the world. In 2000, over 340,000 individuals born in the United States lived there. In all the other decades before 2000 though, our data show that the migration between Italy and Argentina was the world's largest North-South migration corridor.

The second largest South-North migration corridor in the world is from Turkey to Germany and the Turkish in Germany constitute the single largest Diaspora in Western Europe. The modern migration of Turks to Germany is traced to the early 1960s, when Turkish workers migrated in response to mass unemployment at home and an excess demand for labor in Germany. The growth in the number of Turks was later compounded by waves of family reunification in the seventies and eighties, which saw the number of Turks in Germany more than double. Our data show that as of 2000, over two million Turks still live in Germany. Outside of Germany, the most significant migrant corridor from the South to Western Europe is from Algeria to France. In all decades except 2000 this corridor is in the top four most significant South-North migrations in the world.

South-South migration corridors are dominated by internal flows between the countries of the former Soviet Union and as can be seen from the magnitude of the Pakistan to India corridor, from South Asia. Aside from these flows however, the most significant South-South movements are to Cote d'Ivoire, the largest migrant destination in Africa and home to some four million overseas migrants. As the largest

cocoa producer in the world, it is common for hundreds of thousands of workers from elsewhere in the region to be recruited during harvest time, particularly from Burkina Faso and Mali. Our data show that in 2000, these two migrant populations alone totaled 77% of the total migrant stock in Cote d'Ivoire.

The British living Australia constitute the largest North-North migration globally. In the post war period, and faced with a chronic skills shortage, Australia famously implemented the 'Ten Pound Pom' scheme under the auspices of their "Populate or Perish" policy. Open to any British citizen, including those from Cyprus and Malta, the Australian Government managed to persuade over one million British citizens to migrate to Australia before 1973 for the price of just ten British pounds. Given the cultural similarities between Australia and the United Kingdom and the relaxed visa restrictions granted by both countries for nationals of the other, migration flows continue to remain strong to this day.

### 5.7 Gendered Assessment of International Immigrant and Emigrant Stocks

Figures 20a and 20b highlights the differences between the gender composition of regional immigrant stocks in 1960 and 2000. According to our data, all destination immigrant stocks comprised at least 50% males in 2000. Historically, the high income countries of North Africa and the Middle East, East Asia and the Pacific, Canada and Japan have had the highest proportion of male immigrants. Western Europe and the United States traditionally have the lowest. Over our period however, in most regions of the world, the proportion of females rose. This feminization of the global migrant stock is no more evident that in Australia and New Zealand the high income countries of North Africa in the Middle East. Between 1960 and 2000 the proportion of women increased in these two regions by 8% and 9% respectively. Mirroring this trend, all regions of the world are sending proportionally fewer men abroad, excepting the Africa, the Middle East and North Africa and South Asia regions. However, Japan, Latin America and the Caribbean and Eastern Europe and Central Asia show the greatest increase in the proportion of females in their emigrant stocks over the period.



**Figure 20a. Proportion of males in destination immigrant stocks, 1960 and 2000**

**Figure 20b. Proportion of males in origin emigrant stocks, 1960 and 2000**

Source: Authors' own calculations

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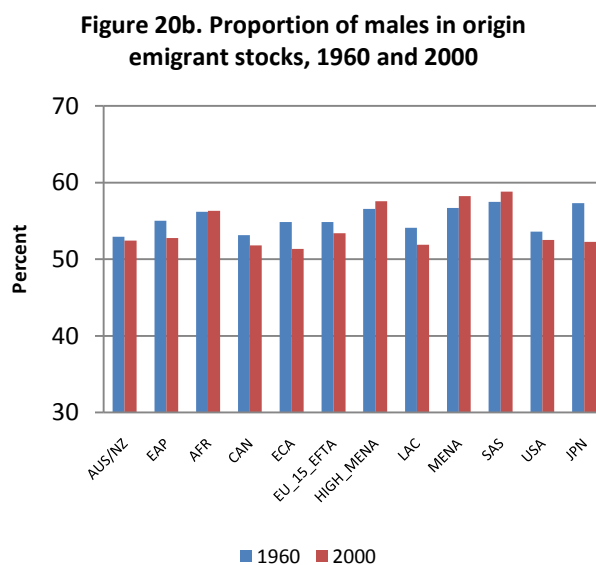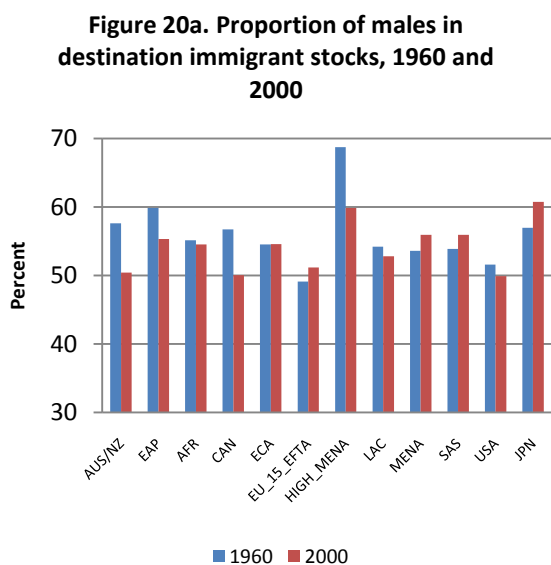
## Conclusion

In this paper we draw upon all the available censuses and population registers that provide information on international bilateral migration to estimate consistent square matrices for the five last five completed census rounds i.e. from 1960 to 2000. Numerous problems exist in the underlying data that confound meaningful comparisons however. These include differences in recording and recoding practices between destination countries and the problems of missing and omitted data.

The contribution of this paper is in recognizing these challenges and overcoming them by making a number of simplifying assumptions. Inevitably, there exists a trade-off between pragmatism and accuracy and one of the largest hurdles we have to overcome is in introducing a standard set of rules to a heterogeneous set of countries. Given the constraints that as researchers we face when dealing with migration data; any attempts to reconcile them will inevitably fall short of the ideal, especially when compared to trade and financial statistics. Nevertheless, given the paucity of comparable data on international migration, especially outside of the OECD, we hope that the completed database represents an important step in the ongoing effort to better understand trends in international migration. We are confident that we provide a reasonably accurate portrayal of global migration over the last half of the twentieth century and hope that the data will prove useful to a broad range of researcher and policy makers.

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## Appendix 1. List of Sources

| | Definition | 1960 census round | 1970 census round | 1980 census round | 1990 census round | 2000 census round |
|---|---|---|---|---|---|---|
| **Australia and New Zealand** | | | | | | |
| **Australia** | FB | 1961 | 1966 | 1981 | 1986 | 2001 |
| **New Zealand** | FB | 1961 | 1971 | 1981 | 1986 | 2001 |
| | | | | | | |
| **Japan** | | | | | | |
| **Japan** | NT | 1960 | 1970 | 1980 | 1990 | 2000 |
| | | | | | | |
| **Canada** | | | | | | |
| **Canada** | FB | | | 1981 | 1986 | 2001 |
| | | | | | | |
| **United States** | | | | | | |
| **United States of America** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Western Europe** | | | | | | |
| **Andorra** | NT | | 1969 | 1984 | 1994 | 2004 |
| **Austria** | NT | 1961 | 1971 | 1981 | 1991 | 2001 |
| **Belgium** | NT | 1961 | 1970 | 1981 | 1994 | 2001 |
| | | | | | | |
| **Cyprus** | FB | 1960 | | | 1992 | 2001 |
| **Denmark** | FB | 1960 | 1965 | 1981 | 1991 | 2001 |
| **Faeroe Islands** | NT | | | | 1994 | 2004 |
| **Finland** | FB | | | 1980 | 1990 | 2000 |
| **France** | FB | 1962 | 1968 | 1982 | 1990 | 1999 |
| **Germany** | NT | 1960 | 1970 | | | 2000 |
| **Gibraltar** | FB | 1961 | 1970 | 1981 | 1991 | 2001 |
| **Greece** | NT | 1961 | 1971 | 1981 | 1991 | 2001 |
| **Iceland** | FB | 1960 | 1965 | 1980 | | 2000 |
| **Ireland** | FB | 1961 | 1970 | 1981 | 1986 | 2002 |
| **Italy** | FB | | | 1981 | 1991 | 2001 |
| **Liechtenstein** | NT | 1960 | 1970 | 1980 | 1990 | 1998 |
| **Luxembourg** | FB | 1960 | 1970 | 1981 | 1991 | 2001 |
| **Malta** | NT | 1957 | 1967 | | | 1995 |
| **Monaco** | FB | 1961 | 1968 | 1982 | 1990 | 2000 |
| **Netherlands** | FB | 1960 | | | 1992 | 2002 |
| **Norway** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Portugal** | FB | 1960 | | 1981 | 1991 | 2001 |
| **San Marino** | NT | | 1972 | 1980 | | |
| **Spain** | NT | 1960 | 1970 | 1981 | 1991 | 2001 |
| **Sweden** | FB | 1960 | | 1980 | 1985 | 2000 |
| **Switzerland** | NT | 1960 | 1970 | 1980 | 1990 | 2000 |
| **United Kingdom** | FB | 1961 | 1971 | 1981 | 1991 | 2001 |
| | | | | | | |
| **Eastern Europe and Central Asia** | | | | | | |
| **Albania** | NT | | | | 1989 | |
| **Armenia** | NT | | | | 1989 | 2001 |
| **Azerbaijan** | NT | | | 1979 | 1989 | 1999 |
| **Belarus** | FB | | | | 1989 | 1999 |
| **Bosnia & Herzegovina** | FB | | | 1981 | | |
| **Bulgaria** | FB | | | | | 2001 |
| **Croatia** | FB | | | | 1991 | 2001 |
| **Czech Republic** | FB | | | | | 2001 |
| **Estonia** | FB | | | | 1989 | 2000 |
| **Georgia** | NT | | | | | 2002 |

| | Definition | 1960 census round | 1970 census round | 1980 census round | 1990 census round | 2000 census round |
|---|---|---|---|---|---|---|
| **Eastern Europe and Central Asia** | | | | | | |
| **Hungary** | NT | 1960 | | | | 2001 |
| **Kazakhstan** | FB | | | | 1989 | |
| **Kyrgyzstan** | NT | | | | 1989 | 1999 |
| **Latvia** | FB | | | | 1989 | 2000 |
| **Lithuania** | FB | | | | 1989 | 2001 |
| **Macedonia** | FB | | | 1981 | 1994 | |
| **Moldova** | FB | | | | 1989 | |
| **Poland** | FB | | 1970 | | | 2002 |
| **Romania** | FB | | | | 1992 | 2002 |
| **Russian Federation** | FB | | | | 1989 | 2002 |
| **Serbia & Montenegro** | FB | | | | 1991 | 2002 |
| **Slovakia** | FB | | | | | 2001 |
| **Slovenia** | FB | | | | 1991 | 2002 |
| **Tajikistan** | FB | | | | 1989 | |
| **Turkey** | FB | 1960 | | 1980 | 1990 | 2000 |
| **Turkmenistan** | NT | | | | 1989 | |
| **Ukraine** | FB | | | | 1989 | |
| **Uzbekistan** | NT | | | | 1989 | |
| | | | | | | |
| **High Income Middle East and North Africa** | | | | | | |
| **Bahrain** | NT | 1959 | 1971 | 1981 | 1991 | 2001 |
| **Israel** | FB | 1961 | 1972 | 1983 | | 2001 |
| **Kuwait** | NT | 1957 | 1970 | 1975 | 1985 | 2001 |
| **Oman** | NT | | | | 1993 | 2004 |
| **Qatar** | FB | | | | | |
| **Saudi Arabia** | NT | | | | 1992 | 1995 |
| **United Arab Emirates** | NT | | | 1980 | 1993 | |
| | | | | | | |
| **Rest of Middle East and North Africa** | | | | | | |
| **Algeria** | NT | | 1966 | | | |
| **Egypt** | NT | 1960 | | 1976 | 1986 | 1996 |
| **Iran (Islamic Republic of)** | NT | | | | 1986 | 1996 |
| **Iraq** | FB | 1957 | | | | |
| **Jordan** | NT | 1961 | | 1979 | 1994 | 2004 |
| **Lebanon** | FB | | | | | 1996 |
| **Libyan Arab Jamahiriya** | NT | 1964 | 1973 | | | |
| **Morocco** | NT | 1960 | 1971 | | | 2004 |
| **Occupied Palestinian Territory** | FB | | | | | 1997 |
| **Syrian Arab Republic** | NT | 1960 | 1970 | 1981 | 1994 | |
| **Tunisia** | NT | | | 1984 | 1994 | |
| **Yemen** | NT | | | | | 2004 |
| | | | | | | |
| **Africa** | | | | | | |
| **Angola** | FB | 1960 | | | 1983 | 1993 |
| **Benin** | NT | | | | | 2002 |
| **Botswana** | NT | | 1971 | 1981 | 1991 | 2001 |
| **Burkina Faso** | FB | | | 1975 | 1985 | |
| **Burundi** | FB | | | 1979 | 1990 | |
| **Cameroon** | FB | | | 1976 | 1987 | |
| **Cape Verde** | NT | | | 1980 | | |
| **Central African Republic** | NT | | | 1975 | 1988 | |

|  | Definition | 1960 census round | 1970 census round | 1980 census round | 1990 census round | 2000 census round |
|---|---|---|---|---|---|---|
| Chad | FB |  |  |  | 1993 |  |
| Comoros | FB | 1958 |  | 1980 | 1991 |  |
| Congo | NT |  | 1974 | 1984 |  |  |
| Côte d'Ivoire | NT |  |  | 1975 | 1988 | 1998 |
| Democratic Republic of the Congo | NT | 1958 |  | 1984 |  |  |
| Djibouti | FB |  |  |  | 1991 |  |
| Equatorial Guinea | NT | 1950 |  | 1983 |  |  |
| Eritrea | FB |  |  |  |  |  |
| Ethiopia | NT | 1961 |  |  | 1994 |  |
| Gabon | NT | 1960 |  |  | 1993 |  |
| Gambia | NT | 1963 | 1973 | 1983 | 1993 |  |
| Ghana | FB | 1960 | 1970 | 1984 |  | 2000 |
| Guinea | NT |  |  | 1983 |  | 1996 |
| Guinea-Bissau | FB | 1950 |  | 1979 | 1991 |  |
| Kenya | FB | 1962 | 1969 | 1979 | 1989 | 1999 |
| Lesotho | NT |  |  | 1976 | 1986 | 1996 |
| Liberia | FB | 1962 | 1974 | 1984 |  |  |
| Madagascar | NT |  | 1965 | 1975 |  |  |
| Malawi | FB |  | 1966 | 1977 |  |  |
| Mali | NT |  |  | 1976 | 1987 |  |
| Mauritania | NT |  |  | 1977 | 1988 |  |
| Mauritius | NT |  | 1972 | 1983 | 1990 | 2000 |
| Mayotte | FB |  |  |  | 1991 | 1997 |
| Mozambique | NT | 1955 |  | 1980 |  | 1997 |
| Namibia | NT |  |  |  | 1991 | 2001 |
| Niger | NT |  |  | 1977 | 1993 | 2001 |
| Nigeria | NT | 1963 |  |  | 1991 |  |
| Rwanda | NT |  |  | 1978 | 1991 | 2002 |
| Réunion | FB | 1961 | 1974 | 1982 | 1990 | 1999 |
| Saint Helena | FB |  | 1966 | 1976 | 1987 | 1998 |
| Sao Tome and Principe | NT |  |  | 1981 | 1991 |  |
| Senegal | FB | 1960 |  | 1976 | 1988 | 2002 |
| Seychelles | NT | 1960 |  | 1982 | 1987 | 1997 |
| Sierra Leone | FB |  |  |  | 1985 | 2004 |
| Somalia | FB |  |  |  |  |  |
| South Africa | FB | 1961 | 1970 | 1980 | 1985 | 2001 |
| Sudan | FB |  |  |  | 1983 | 1993 |
| Swaziland | FB | 1956 | 1966 | 1976 | 1986 | 1997 |
| Togo | NT |  |  | 1981 |  |  |
| Uganda | NT |  | 1969 |  | 1991 | 2002 |
| United Republic of Tanzania | FB |  | 1967 | 1978 | 1988 | 2002 |
| Zambia | FB | 1963 | 1969 | 1980 | 1990 |  |
| Zimbabwe | FB | 1956 | 1969 |  | 1992 |  |
|  |  |  |  | South Asia |  |  |
| Afghanistan | FB |  |  | 1975 |  |  |
| Bangladesh | FB | 1961 | 1974 |  |  |  |
| Bhutan | FB |  |  |  |  | 2005 |
| India | FB | 1961 | 1971 | 1981 | 1991 | 2001 |
| Maldives | FB |  |  |  |  |  |
| Nepal | FB | 1961 | 1971 | 1981 | 1991 | 2001 |
| Pakistan | FB | 1961 | 1973 |  |  | 1998 |
| Sri Lanka | NT | 1963 | 1971 | 1981 |  |  |

| | Definition | 1960 census round | 1970 census round | 1980 census round | 1990 census round | 2000 census round |
|---|---|---|---|---|---|---|
| **East Asia and the Pacific** | | | | | | |
| **American Samoa** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Brunei Darussalam** | FB | 1960 | 1971 | 1981 | 1991 | |
| **Cambodia** | FB | | | | | 1998 |
| **China** | FB | | | | | |
| **China, Hong Kong Special Administrative Region** | FB | 1961 | 1971 | 1981 | 1991 | 2001 |
| **China, Macao Special Administrative Region** | FB | | | 1981 | 1991 | 2001 |
| **Cook Islands** | FB | 1956 | 1966 | 1976 | | 1996 |
| **Democratic People's Republic of Korea** | FB | | | | | |
| **Democratic Republic of Timor-Leste** | FB | | | | | 2004 |
| **Fiji** | FB | 1956 | 1966 | 1976 | 1986 | |
| **French Polynesia** | FB | 1962 | | 1977 | 1988 | 1996 |
| **Guam** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Indonesia** | NT | | 1971 | | 1990 | 2000 |
| **Kiribati** | FB | | | 1978 | 1990 | 2000 |
| **Lao People's Democratic Republic** | NT | | | | | 1995 |
| **Malaysia** | FB | 1957 | 1970 | 1980 | 1991 | |
| **Marshall Islands** | NT | | | | 1988 | 1999 |
| **Micronesia (Federated States of)** | FB | | 1973 | | 1994 | 2000 |
| **Mongolia** | NT | | | | | 2000 |
| **Myanmar** | NT | | 1973 | | 1994 | 2002 |
| **Nauru** | FB | 1961 | 1966 | 1977 | | 2002 |
| **New Caledonia** | FB | 1963 | 1969 | 1983 | 1989 | 1996 |
| **Niue** | FB | 1956 | 1966 | 1976 | 1986 | |
| **Norfolk Island** | FB | | | 1981 | 1991 | 2001 |
| **Northern Mariana Islands** | FB | | | | 1990 | 2000 |
| **Palau** | FB | | | 1980 | 1990 | 2000 |
| **Papua New Guinea** | FB | | 1966 | 1980 | | |
| **Philippines** | NT | | 1970 | 1980 | 1990 | 2000 |
| **Republic of Korea** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Samoa** | FB | 1956 | 1971 | | 1986 | 2001 |
| **Singapore** | FB | 1957 | 1970 | 1980 | 1990 | 2000 |
| **Solomon Islands** | FB | | 1970 | 1976 | 1986 | 1999 |
| **Taiwan** | NT | | | | 1990 | 2000 |
| **Thailand** | NT | 1960 | 1970 | | | 2000 |
| **Tokelau** | FB | 1961 | 1972 | 1976 | 1986 | 2001 |
| **Tonga** | FB | 1956 | 1966 | 1976 | 1986 | 1996 |
| **Tuvalu** | FB | 1963 | 1973 | | | |
| **Vanuatu** | FB | | 1967 | 1979 | 1989 | 1999 |
| **Viet Nam** | FB | | | | 1989 | |
| **Wallis and Futuna Islands** | FB | | 1969 | 1976 | 1990 | 2003 |
| | | | | | | |
| **Latin America and the Caribbean** | | | | | | |
| **Anguilla** | FB | | | 1984 | 1992 | 2001 |
| **Antigua and Barbuda** | FB | 1960 | 1970 | | 1991 | 2001 |
| **Argentina** | FB | 1960 | 1970 | 1980 | 1991 | 2001 |
| **Aruba** | FB | 1960 | | 1981 | 1991 | 2000 |

| | Definition | 1960 census round | 1970 census round | 1980 census round | 1990 census round | 2000 census round |
|---|---|---|---|---|---|---|
| **Latin America and the Caribbean** | | | | | | |
| **Bahamas** | FB | 1960 | 1970 | 1980 | 1990 | |
| **Barbados** | FB | 1960 | | 1980 | 1990 | |
| **Belize** | FB | 1960 | | 1980 | 1991 | 2000 |
| **Bermuda** | FB | 1960 | 1970 | 1980 | 1991 | 2000 |
| **Bolivia** | FB | 1950 | | 1976 | 1992 | 2001 |
| **Brazil** | FB | 1960 | 1970 | 1980 | 1991 | 2000 |
| **British Virgin Islands** | FB | 1960 | 1970 | 1980 | 1991 | |
| **Cayman Islands** | FB | 1960 | | 1979 | 1989 | 2000 |
| **Chile** | FB | 1960 | 1970 | 1982 | 1992 | 2002 |
| **Colombia** | FB | 1964 | 1970 | | 1993 | 2005 |
| **Costa Rica** | FB | 1963 | 1973 | 1984 | | 2000 |
| **Cuba** | FB | 1953 | 1970 | | | 2002 |
| **Dominica** | FB | 1960 | | 1981 | 1991 | |
| **Dominican Republic** | FB | 1960 | | | | 2002 |
| **Ecuador** | FB | 1962 | 1974 | 1982 | 1990 | 2001 |
| **El Salvador** | FB | 1961 | 1971 | | 1992 | |
| **Falkland Islands (Malvinas)** | FB | 1962 | | | 1986 | 2001 |
| **French Guiana** | FB | 1961 | 1974 | 1982 | 1990 | 1999 |
| **Greenland** | FB | 1951 | 1970 | 1976 | | |
| **Grenada** | FB | 1960 | | 1981 | 1991 | |
| **Guadeloupe** | FB | 1961 | 1974 | 1982 | | 1999 |
| **Guatemala** | FB | 1963 | 1973 | 1981 | 1994 | 2002 |
| **Guyana** | FB | 1960 | | 1980 | 1991 | 2002 |
| **Haiti** | FB | 1950 | 1971 | 1982 | | |
| **Honduras** | FB | 1961 | | | 1988 | 2001 |
| **Jamaica** | FB | 1960 | 1970 | 1982 | 1991 | 2001 |
| **Martinique** | FB | 1961 | 1974 | 1982 | | 1999 |
| **Mexico** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Montserrat** | FB | 1960 | 1970 | 1980 | 1991 | |
| **Netherlands Antilles** | FB | | 1971 | 1981 | 1992 | 2001 |
| **Nicaragua** | FB | | 1971 | | | 1995 |
| **Panama** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Paraguay** | FB | 1950 | 1972 | 1982 | 1992 | 2002 |
| **Peru** | FB | 1960 | 1972 | 1981 | 1993 | |
| **Puerto Rico** | FB | | 1970 | 1980 | 1990 | 2000 |
| **Saint Kitts and Nevis** | FB | 1960 | 1970 | 1980 | 1991 | 2001 |
| **Saint Lucia** | FB | 1960 | | 1980 | 1991 | 2001 |
| **Saint Pierre et Miquelon** | FB | 1962 | 1974 | 1982 | | 1999 |
| **Saint Vincent and the Grenadines** | FB | | | 1980 | 1991 | |
| **Suriname** | NT | 1964 | | | | 2004 |
| **Trinidad and Tobago** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Turks and Caicos Islands** | FB | 1960 | | 1980 | 1990 | |
| **United States Virgin Islands** | FB | 1960 | 1970 | 1980 | 1990 | 2000 |
| **Uruguay** | FB | 1963 | | 1975 | 1985 | 1996 |
| **Venezuela** | FB | 1961 | 1971 | 1981 | 1990 | 2001 |

## Appendix 2. List of Aggregations

| Aggregated Region | Master Region | Aggregated Region | Master Region |
|---|---|---|---|
| Aden | Yemen | Palmyra | United States of America |
| Alaska | United States of America | Panama Canal Zone | Panama |
| Alboran and Perejil | Spain | Penang | Malaysia |
| Ascension Island | Saint Helena | Pitcairn Island | United Kingdom |
| Azores | Portugal | Providencia Island | Colombia |
| Bonaire | Netherlands Antilles | Saint Croix | United States Virgin Islands |
| Born abroad of U.S. parent(s) | United States of America | Saint Martin | Netherlands Antilles |
| British Indian Ocean Territory | United Kingdom | Saint Thomas | United States Virgin Islands |
| Canary Islands | Spain | San Andres Island | Saint Pierre and Miquelon |
| Canton and Enderbury Islands | Kiribati | Sarawak | Malaysia |
| Ceuta and/or Melilla | Spain | Scotland | United Kingdom |
| Channel Islands | United Kingdom | South Senegal | Senegal |
| Channel Islands and the Isle of Man | United Kingdom | South Vietnam | Vietnam |
| Christmas Island | Australia | South Yemen | Yemen |
| Cocos (Keeling) Islands | Australia | Spanish Sahara | Morocco |
| Curacao | Netherlands Antilles | Svalbard and J. Mayen Islands | Norway |
| Dubai | United Arab Emirates | Terre Nova | Canada |
| East Germany | Germany | Tristan de Cunha | Saint Helena |
| Easter Island | Chile | Vatican | Italy |
| England | United Kingdom | Wake Island | United States of America |
| England and Wales | United Kingdom | Wales | United Kingdom |
| French India | India | West Germany | Germany |
| Galapagos | Ecuador | Western New Guinea | Indonesia |
| Gaza Strip | Occupied Palestinian Territory | Western Sahara | Morocco |
| Germany (East Berlin) | Germany | Zanzibar | Tanzania |
| Germany (unspecified) | Germany | | |
| Great Britain | United Kingdom | | |
| Hawaii | United States of America | | |
| Howland Island | United States of America | | |
| Isle of Man | United Kingdom | | |
| Jammu | India | | |
| Johnston Islands | United States of America | | |
| Kashmir | India | | |
| Labuan | Malaysia | | |
| Madeira | Portugal | | |
| North Borneo | Malaysia | | |
| North Senegal | Senegal | | |
| North Vietnam | Vietnam | | |
| North Yemen | Yemen | | |
| Northern Ireland | United Kingdom | | |