A Global Bilateral Migration Data Base: Skilled Labor, Wages and Remittances[1]

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Note on more recent versions of this dataset: this paper refers to the first version of the GMig2 Data Base compatible with versions 6 and 7 of the GTAP Data Base. In version 8, we were fortunate to have access to a new time series bilateral dataset (Özden, Parsons, Schiff and Walmsley, 2011). This new database provides a comprehensive picture of evolution of migration patterns between 226 countries/regions and by gender. More than one thousand census and population register records are combined to construct decennial matrices corresponding to the five census rounds between 1960 and 2000. This database is available on the website at: http://data.worldbank.org/data-catalog/global-bilateral-migration-database. Added May 2012.

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Abstract

The lack of data on the movement of people, their wages and remittances has been the biggest impediment to the analysis of temporary and permanent migration between countries. Recent efforts in this area by Parsons, Skeldon, Walmsley and Winters (2005) to construct a global bilateral matrix of foreign born populations; and by Docquier and Markouk (2004) on the education levels of migrant labor have significantly improved the data available for analysis.

In this paper these new databases (Parsons et al, 2005 and Docquier and Markouk, 2004) are employed to construct a globally consistent database of bilateral population, labor by skill, wages and remittances which can be used for modeling migration issues[5]. Although the new databases have significantly improved access to migration data, data on the skills of migrant labor are incomplete and bilateral remittances data is unavailable. This paper examines the underlying data available, and then outlines the techniques used and the assumptions made to construct bilateral data on migrant labor by skills, remittances and wages.

Once constructed the relationships within the migration data are examined. We draw on work undertaken on trade intensity indexes by Brown (1949), Kojima (1964), and Drysdale and Garnaut (1982) to analyze the intensity of labor migration between host and home country pairs. The results confirm that skilled labor migration is considerably more important than unskilled migration and that people migrate to both developed and developing economies. A method for further examining the reasons for the intensities is provided which decomposes the intensity indexes into a regional bias, a selection-skill bias and a region-skill bias. The decomposition shows that there are substantial regional biases in migration patterns resulting from historical ties and common borders. These regional biases are much greater than those which exist in trade. Moreover, residents remaining at home are significantly less skilled than the migrant labor, indicating that there is a strong selection bias towards skilled migrant workers. Finally, we find that in the absence of any regional bias unskilled migration is negligible, leading us to conclude that if the movement of labor is to be used as a tool for development then the focus must be on skilled labor, as India has done.

Using the wages data we also observe that 75% of migrant workers move to countries with higher or unchanged real wages relative to their home countries, emphasizing the fact that while migration is regional and people migrate to both developed and developing economies, wages are an important factor in the migration decision. Finally, using the implied income data we ascertain that remittances as a share of income can differ substantially across migrant labor from different countries, indicating that the benefits from migration may differ considerably across countries. Further improvements to the data on migrant wages and remittances flows are therefore essential for improving any analysis of the patterns and benefits of migration.

[5] Versions of this database have been used by Walmsley, Winters, Ahmed and Parsons (forthcoming) and by World Bank (2006) to model labor movements.

A Global Bilateral Migration Data Base: Labor, Wages and Remittances

Terrie L. Walmsley, S. Amer Ahmed and Christopher R. Parsons

1. Introduction

Walmsley and Winters (2005) demonstrated using a Global Migration model (GMig) that lifting restrictions on the movement of natural persons would significantly increase global welfare with the majority of benefits accruing to developing countries. Although an important result, the lack of bilateral labor migration data forced Walmsley and Winters (2005) to make approximations in important areas that naturally precluded their tracking bilateral migration agreements.

Recent developments by Parsons, Skeldon, Walmsley and Winters (2005) to construct a bilateral matrix of foreign population have allowed us to produce a Database of labor, remittances and wages; and hence significantly enhance the ability to examine this issue. The purpose of this paper is to outline how this data is combined with other data on wages and remittances to create a database which can be used to model the impact of labor movements[6]. We refer to this database as the GMig2 Data Base.

The GMig2 Data Base is based on and consistent with the GTAP 6 Data Base (Dimaranan and McDougall, 2005). The GTAP Data Base has been used extensively in global CGE models to analyze trade and environmental issues. We choose the GTAP Data Base because it is the most complete, global database available which can be used to analyze global issues such as the movement of labor. The GTAP 6 Data Base contains input-output data on 87 regions and 57 commodities, as well as detailed bilateral trade, transport and protection information. In addition to the GTAP Data Base and the Parsons, Skeldon, Walmsley and Winters (2005) we also obtain remittance data from Ratha (2004), participation rates obtained from the ILO LABORSTA database website (ILO, 2006), skill splits estimated from data obtained from LABORSTA and Docquier and Markouk (2004), and wage rates from Freeman and Oostendorp (2005). The migration labor force data and total remittances are constructed for 226 countries and then aggregated up to the GTAP countries, where wages and incomes can then be determined. In this way the migration database can be updated as new countries are incorporated into the GTAP Data Base. In this paper we look at the data in an aggregated form, although underlying this are data for 226 countries (or in the case of wages and bilateral remittances, 87 countries).

In addition to constructing this new database we also examine some of the key relationships in the data. In order to examine the migration data we draw on some of the work undertaken on intensity indexes developed by Brown (1949) and further developed by Kojima (1964), and Drysdale and Garnaut (1982). Here we relate the trade intensity index to labor migration or the export and import of labor. A decomposition, similar to the bias and complementarity indexes from Drysdale and Garnaut (1982), is also employed to decompose the intensity of skilled and unskilled migration into a regional bias, and a demand and selection-skill bias. As in trade, there is substantial regional bias in migration patterns. Although where regional biases are insignificant, migration may still be significant due to high demand for skilled migrant labor. In these cases unskilled migration is negligible. With the high demand for skilled migrant labor most counties export significantly more skilled workers (as a share of total) than the share of skilled workers remaining at home.

[6] Those interested in the analysis of labor movements using the bilateral data are referred to Walmsley and Winters (2005), Walmsley, Winters, Ahmed and Parsons (2005) and van der Mensbrugghe (2005).

Examination of the derived wage data reveals that while migration is regional, and people migrate to both developed and developing economies, wages are an important factor in the migration decision; with 75% of migrant labor moving to countries with higher or unchanged real wages relative to their home countries. In the case of the remittances data we find that remittances as a share of income can differ substantially across migrant labor from different countries.

The paper is divided into six sections. Following the introduction, section 2 outlines the data sources used to derive the Global Bilateral Migration Data Base. Section 3 explains the procedures used to obtain migrant labor by skill. In this section we also employ the intensity indexes to examine the migrant labor data. In section 4 we examine the techniques used to determine wages and remittances. Section 5 then concludes the paper.

2. Data Sources

The following data are utilized in the construction of the Global Bilateral Labor Migration (GMig2) Data Base:

a) Labor income data is obtained from the GTAP 6 Data Base (Dimaranan and McDougall, 2005). The GTAP Data Base covers 87 regions, 5 endowments (skilled and unskilled labor, capital, natural resources and land) and 57 sectors.

b) The number of foreigners by home and host are obtained from Parsons, Skeldon, Walmsley and Winters (2005); henceforth PSWW (2005). This is a matrix of 226 by 226 countries. PSWW (2005) collected data on both the foreign born and nationality of residents at a given point in time, primarily from census data. The resulting foreign born data, filled using the methods described in PSWW (2005), are utilized. Note that this data are based on foreign born and no account is taken of the length of stay, hence the data include both permanent and temporary migrant labor in the host region by home country at a given point in time.

c) Total remittances received are obtained from Ratha (2004), which are based on IMF balance of payments statistics on remittances and workers compensation. Data is available for 157 countries/regions.

d) Participation rates for 150 countries were obtained from LABORSTA (ILO, 2006).

e) Data on the split between skilled and unskilled were obtained from two different sources: a) Docquier and Markouk (2004) provide skilled-unskilled labor split data for migrant workers in 29 host regions originating from up to 193 home regions; and b) data on the skill level of labor for 70 countries was also obtained from LABORSTA (ILO, 2006).

f) We also use skilled and unskilled wage rates from Freeman and Oostendorp (2005). This data includes wages for 161 occupations, 49 sectors, 150 countries and 20 years. Although there are a lot of zeros in this database, in the end we were able to use data for 49 countries, across all occupations, for 3 years (1999-2001).

g) Purchasing power parity data was also obtained from the World Bank for all 226 standard countries.

3. The Global Migrant Labor Force

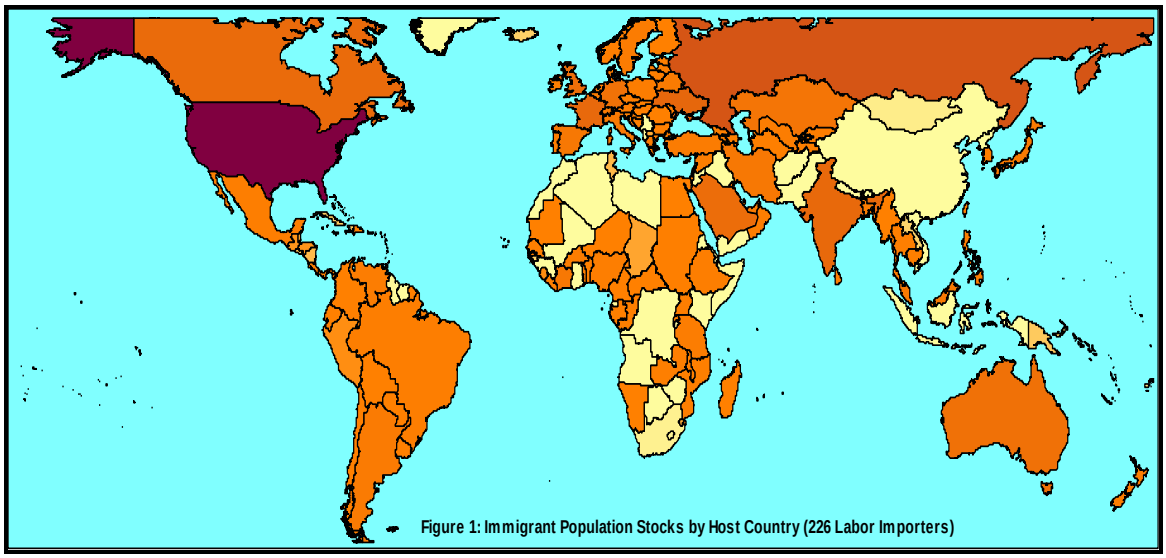
In this section we use the bilateral foreign population stock data (PSWW, 2005), along with some additional data and assumptions, to obtain bilateral foreign labor forces by skill. Following this we examine the intensity of these migration patterns.

3.1. The Global Migrant Population

The bilateral foreign population database constructed by PSWW (2005) underlies all of the new data in the GMig2 Data Base. Before proceeding, an examination of some of the relationships in this data is undertaken. Figures 1 and 2 depict the labor importing and exporting countries. While the developing countries are the primary exporters of labor, most countries export labor to a greater or lesser extent; however, the set of countries which import labor is much smaller and more focused on the developed or richer developing economies, such as Australia, North America, Europe and the Middle East.

The United States is by far the largest importer of labor (Figure 1), 19.7% of all migrant workers live in the USA (or 12.5% of the US labor force are migrant workers). This is followed by Russia (6.8% of the total migrant population live in Russia or 8.2% of Russia's population), Germany (5.2% and 11% respectively), Ukraine (3.9% and 14% respectively), France (3.5% and 10.5% respectively), India (3.5% and 0.6% respectively), Canada (3.2% and 18.3% respectively), Saudi Arabia (2.9% and 23% respectively), United Kingdom (2.7% and 2.9% respectively), Pakistan (2.4% and 2.9% respectively) and Australia (2.3% and 20.9% respectively).

Figure 1: Immigrant Population Stocks by Host Country (226 Labor Importers)*



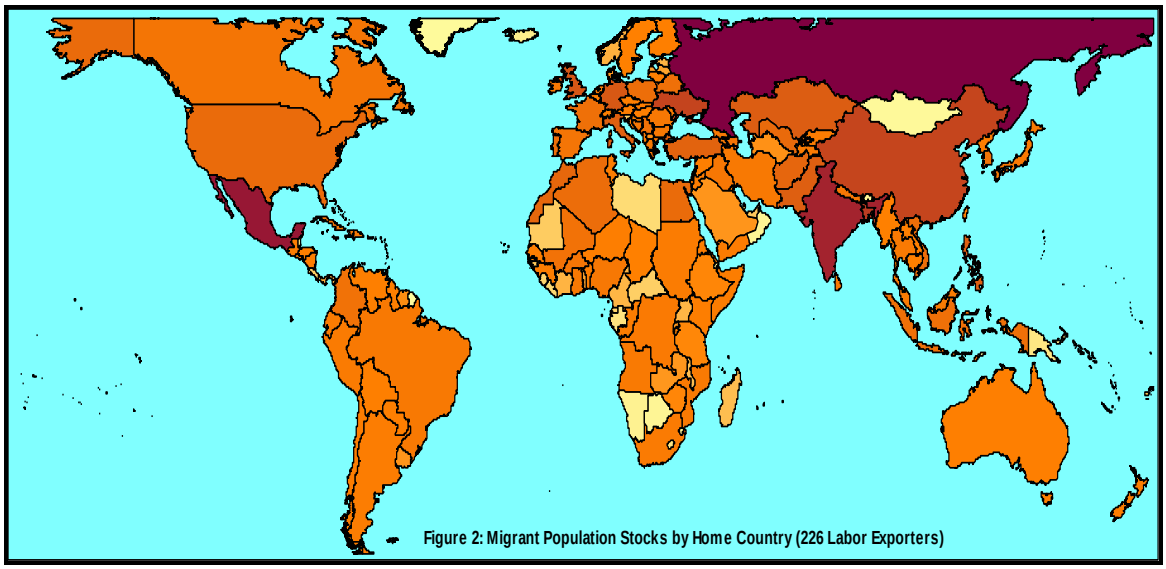
Source: PSWW, 2005

* The darker the color the larger the share of total migrant labor living in the country.

In terms of labor exporters (Figure 2), Russia is the largest with 6.9% of migrant labor coming from Russia (or 8.3% of people born in Russia live abroad), followed by Mexico with 5.7% of migrant labor (or 9% of the Mexican born population), India (5% and 0.8% respectively), Bangladesh (3.7% and 4.8% respectively), Ukraine (3.3% and 12% respectively), China (3.2%

and 0.4% respectively), the United Kingdom (2.3% and 7.1% respectively), Germany (2.3% and 5.2% respectively), and Kazakhstan (2% and 22.7% respectively).

Figure 2: Emigrant Population Stocks by Home Country (226 Labor Exporters)*



Source: PSWW, 2005

* The darker the color the larger the share of total migrant labor emigrating from the country.

Many countries appear at the top of both the labor exporter and importer lists, such as Russia, Ukraine, India, the United Kingdom and Germany. Reasons for this might include:

a) Countries with very large populations are expected to import and export a larger number of migrant workers. Although, with the exception of India, all of the other countries import and export more labor as a portion of their population than average, hence not all of this bias can be explained by higher populations.

b) Low barriers to migration within a region might result in larger flows of labor in both directions, particular for the richest country in the region. For example, India would get more migrant labor than any other South Asian country if barriers were removed within the region. Other examples include labor movements between the Former Soviet Union (Russia and the Ukraine); and EU migration (Germany and United Kingdom).

c) Historical reasons might also explain the migration. For example, the United Kingdom is a larger importer of labor today, but in the past it has experienced large outward migration to Canada, USA and Australia which is also reflected in the foreign born data, and more recently migration to Europe and in particular to Spain.

The fact that India is on both lists demonstrates that not all migration is from developing to developed countries; there is considerable migration between developing economies, most notably within South Asia and from developing countries to the Middle East.

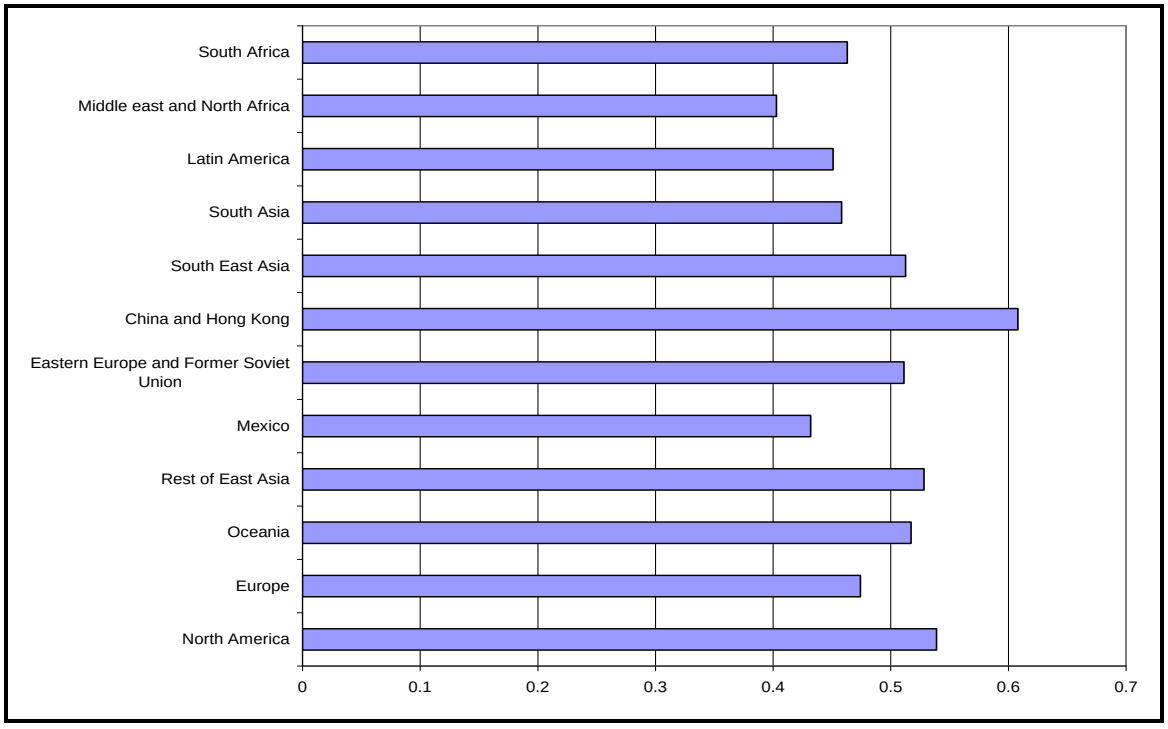
Table 1 shows the number of migrant workers by selected (aggregated) host regions for selected (aggregated) home regions, obtained from PSWW (2005). The data clearly show that a lot of

migration is regional. This can be seen in the case of Europeans and Eastern Europeans in Europe and Mexicans and Latin Americans in the USA. It is also the case for the developing host countries where migrant labor are primarily from other developing countries within the region: South Asia and India, Eastern Europe and the Former Soviet Union, Latin America, the Middle East and North Africa (although there are a lot of South Asians in the Middle East too) and Southern Africa. We will investigate these patterns further below in section 3.4.

3.2. Participation Rates

The PSWW (2005) database is based on foreign born and does not distinguish between those in the labor force and those who are not. In order to convert the population data to labor forces, additional data on the participation rates in all 226 countries are collected from LABORSTA (ILO, 2006). It is then assumed that the participation rates of migrant labor are the same as the participation rates in the home region. This means that migrant labor is assumed to move with their families; since PSWW (2005) define the foreign population in terms of foreign born we surmise that migration is more permanent in nature and hence migrant workers move with their families. Figure 3 shows the participation rates for selected regions. Participation rates are generally between 40 and 60 percent.

Figure 3: Participation Rates by Region



Source: ILO, 2006

Table 1: Migrant Population Stocks by Home and Host for Selected Countries/Regions

Home Regions	Host Regions											
	North America	**Europe**	**Oceania**	**Rest of East Asia**	**Mexico**	**Eastern Europe and Former Soviet Union**	**China and Hong Kong**	**South East Asia**	**South Asia**	**Latin America**	**Middle East and North Africa**	**South Africa**
North America	3.09%	2.32%	2.60%	3.84%	71.38%	0.19%	0.72%	4.08%	0.48%	7.71%	0.79%	0.40%
Europe	14.78%	34.40%	42.66%	1.96%	8.93%	4.35%	0.89%	5.65%	3.11%	20.82%	5.39%	4.99%
Oceania	0.87%	0.87%	14.45%	0.56%	0.17%	0.06%	0.49%	0.94%	0.27%	0.14%	0.12%	0.12%
Rest of East Asia	4.79%	0.75%	2.74%	30.33%	0.99%	0.11%	8.13%	1.50%	0.46%	1.99%	0.18%	0.19%
Mexico	23.24%	0.30%	0.06%	0.24%	0.00%	0.30%	0.49%	0.50%	1.34%	1.43%	0.62%	0.62%
Eastern Europe and Former Soviet Union	6.03%	12.82%	6.02%	1.20%	0.78%	91.76%	3.88%	2.26%	5.06%	1.81%	11.70%	3.58%
China and Hong Kong	4.47%	1.50%	5.55%	19.85%	0.37%	0.21%	68.21%	19.56%	1.13%	0.90%	0.29%	0.41%
South East Asia	9.05%	3.66%	11.84%	25.68%	0.11%	0.34%	6.35%	51.42%	2.14%	0.25%	4.55%	0.50%
South Asia	4.95%	5.85%	4.43%	2.25%	0.11%	0.61%	5.73%	8.83%	79.29%	0.54%	38.01%	1.71%
Latin America	22.77%	7.21%	1.63%	12.94%	16.33%	0.48%	2.64%	2.17%	2.11%	62.53%	0.86%	0.99%
Middle East and North Africa	3.62%	22.11%	4.41%	0.69%	0.72%	1.13%	2.38%	2.08%	2.42%	1.39%	34.01%	3.58%
South Africa	2.33%	8.20%	3.62%	0.48%	0.12%	0.46%	0.07%	1.02%	2.20%	0.49%	3.50%	82.92%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: PSWW, 2005

3.3. Skill Levels

The skill level of migrant labor has become a very important issue for policy makers in both the labor exporting and labor importing economies. In labor importing economies skilled migrant labor have become increasingly accepted in their host economies, while unskilled labor still raises significant concerns despite potential gains (Walmsley and Winters, 2005). In the labor exporting economies, on the other hand, the loss of skilled labor is often a cause for concern, for example, the migration of doctors to the United Kingdom from Africa. In general migrant labor are thought to be more skilled than the workers they leave behind, particularly those moving to developed economies like the United States. In order to determine the skill levels of migrant labor we draw heavily on the education database developed by Docquier and Markouk (2004).

In the GTAP Data Base the skill splits are defined in terms of occupation (Liu, J., N. van Leeuwen, T. Thanh Vo, R. Tyers and T. W. Hertel, 1998). Unfortunately migration data by occupation are scarce and we have had to rely on education data. Determining the skill splits of labor by home and host regions proceeded as follows:

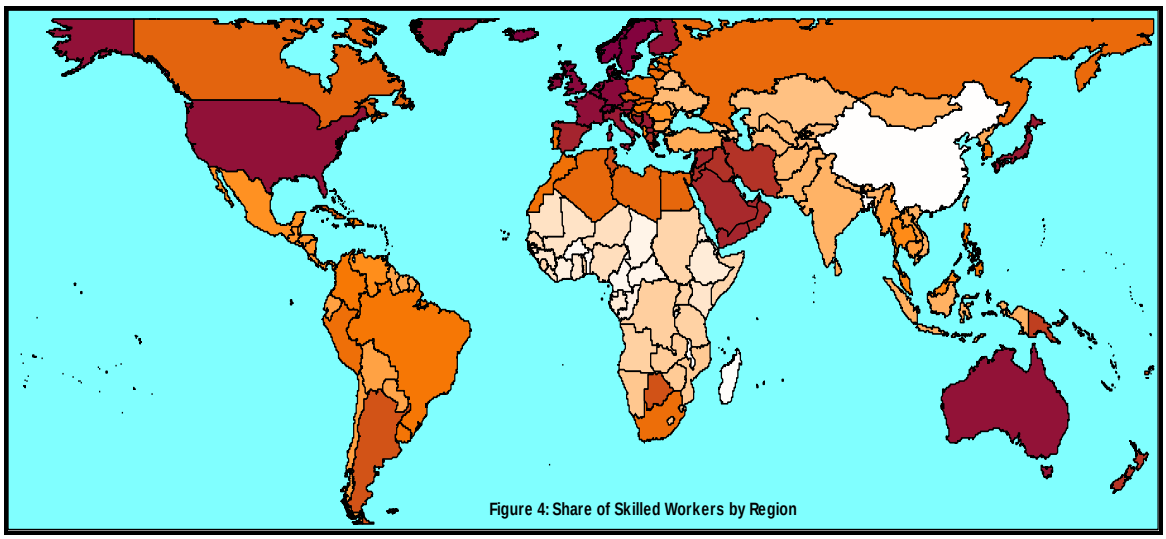
1. Initially data were collected on the numbers of skilled and unskilled workers by occupation in each country from LABORSTA (ILO, 2006). Unfortunately, shares could not be obtained for all 226 countries; and hence shares for the existing economies were used as initial estimates for the remaining countries. These were then combined with the wages data in the GTAP Data Base to obtain the relative wages of skilled and unskilled workers in a given region.

2. This produced relative wages of skilled to unskilled for all regions, which were then compared to those obtained from Freeman and Oostendorp (2005). In most cases the resulting relative wages were reasonable; however there were some cases, where data on skill shares had been unavailable and estimates were made where the resulting relative wages were considered unreasonable. In these cases, most notably the Eastern European economies, the shares of skilled and unskilled were adjusted to obtain the more reasonable estimates of relative wages from Freeman and Oostendorp (2005). The final skill shares by region used are shown in Figure 4. As expected the share of skilled workers falls as we move from developed to developing economies.

3. Once the share of skilled labor was obtained for the region/country as a whole, we had to obtain the skill characteristics of the migrant labor. A number of sources and assumptions were investigated:

    a. First foreign labor was assumed to have the same skill characteristics as their home region. This assumption ensures that those countries with more skilled labor supply more skilled migrant labor, e.g., more skilled labor is supplied by developed economies such as the USA, Europe and Australia (Figure 5) as a share of total migrant labor. This method, however, failed to pick up some of the more interesting features we might expect, e.g., the tendency for India and China to export skilled labor, since China and India have very low shares of skilled labor at home. Mattoo, Neagu and Ozden (2005) investigate the skill level of migrant labor by education in the USA and find that the skill levels of migrant labor do not necessarily follow the skill levels of the home residents.

Figure 4: Share of Skilled Workers by Region*



* The darker the color the higher the share of skilled workers in the country.

b. Docquier and Markouk (2004) recently completed a database on educational attainment of migrant labor in 30 host regions from 193 home regions. The benefit of this database was that it did pick up some of the features referred to in (a) above; however, data was based on education, rather than occupation. Harrison et al. (2003) also use education to examine the skill levels of migrant labor.

c. Finally we obtained data on the skill levels of migrant labor, by occupation, for the US and UK from census data. These data were considered to be the most accurate, although insufficient for our purposes. These data were compared to those obtained using methods (a) and (b) above. It was found that data based on education (b) were better than those based on home characteristics (a).

Hence, despite the inconsistency, the skill shares of migrant labor used in the GMig2 Data Base are based on the education data from Docquier and Markouk (2004).

4. Once again, skill shares could not be obtained for all migrant labor in all countries, so the missing shares were filled using an average skill share overseas, with the method of calculation depending on the type of missing data. Specifically, there were three types of instances where skill share data was unavailable.

   a. The first was where there was data on the skill of migrant labor from region r, but not distinguished by all of the host regions. Given that the Docquier-Markouk database covers on 30 of our 226 host countries, and that most of these 30 countries are developed OECD countries, a large number of countries fit into this category. One option is to use the average skill share for the migrant labor from r, across all host regions for which data was available, to fill in the missing values. In this case migrant workers who leave region r have the same characteristics as other migrant labor that leaves region r, regardless of their destination. For example if India sent skilled workers to the USA, they were also likely to send skilled workers to Europe, China and the Middle East etc. This has the limitation that there may be considerable differences in the skill levels of migrant labor by destination; e.g., the average Indian migrant living in the USA

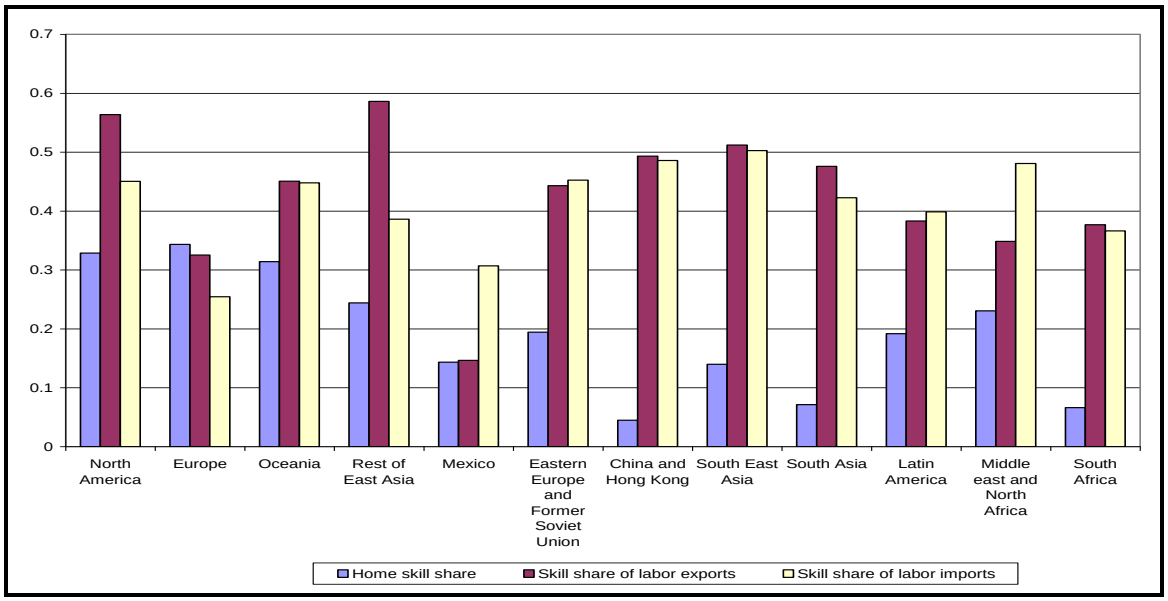
is employed in the high tech computer industry and is therefore much more skilled than the average Indian working in the Middle East. Ideally we would like to be able to gather data for each country or region but this is not available. Hence the average skill share for the migrant labor from r, across all host regions for which data was available, is used to fill in the missing values.

b. The second was where there was data for migrant labor in the host region c, but not distinguished by all home regions. In a manner similar to that used above, the missing skill shares for a host region c were taken to be the average skill share of all migrant labor in that region. Since there was no data on the characteristics of the average migrant from region r, it was assumed that migrant labor from region r, destined for region c would have similar characteristics to other migrant labor in region c. Hence if migrant labor to the USA tended to be skilled, then migrant labor from the missing home regions tended to be more skilled. Since the Docquier-Markouk database included data on 193 of our 226 home countries this was not a major issue and had little impact on the resulting skill shares when aggregated to the GTAP Data Base's 87 regions.

c. The third was where there was no data on the skill shares for any migrant labor from region r or located in region c (where r is the home country and c is the host country). These gaps were filled by using the average skill share from the Docquier-Markouk database.

The resulting skill shares confirm that skilled workers are more mobile than unskilled workers. In most cases the host country's share of skilled imported labor is higher than the country's own share of skilled labor; for example, China and India export mostly skilled workers, even though their share of skilled workers at home is very small (Figure 5).

Figure 5: Skill Shares of permanent residents and migrant labor exported and imported



The data also show that mobility of unskilled is greater between host and home countries which are in close proximity, e.g., USA and Mexico, and the EU and Eastern Europe; this is likely to be due to the fact that the cost of migrating to a country which is in close proximity to the home country are likely to be smaller and hence unskilled migrant labor find it easier to migrate. With the exception of Mexico and Eastern Europe, the skill data for the developing countries as host regions is not available. The data for Mexico and Eastern Europe however also show the tendency to import primarily skilled labor.

3.4. Intensity Indexes

In this section we examine the migrant labor force data in great detail. As discussed above we draw on the intensity indexes developed by Brown (1949) and further developed by Kojima (1964), and Drysdale and Garnaut (1982). In this work 3 indexes are defined: the intensity index and two decompositions, the complementarity and the bias affect, and are applied to international trade. Here we apply these indexes to the import and export of labor; migration.

The intensity index (Equation 1) compares the actual level of migration ($M_{i,r,s}$) with the level of migration expected, given the host economy's tendency to import migrant labor of skill i ($M_{i,s}$) and given the home economy's share of skilled workers ($Q_{i,r}/Q_r$) and their tendency to export labor (X_r). In addition to the fact that we are looking at migration, the index also differs from those used previously for trade for the following reasons: a) the intensity index is found for both skilled and unskilled workers; and b) the skill share within the home country is used to ascertain the propensity of the country to export skilled and unskilled labor. These modifications to the intensity indexes allow us to comment on the differences between the home skill share and the migrant skill share.

High intensities therefore indicate that more migrant labor of skill i, move from region r to s than would be expected. Table 2 shows the intensity indexes for our aggregated regions. There are two things worth noting from these results: a) higher intensities can be seen on skilled labor; and b) higher intensities exist between countries which are within the same region.

$$I_{i,r,s} = \frac{M_{i,r,s}}{\left[. \frac{\left(Q_{i,r}/Q_r\right) X_r . M_{i,s}}{T_{i,r}} \right]} \qquad (1)$$

Where:

$M_{i,r,s}$ are migrant labor of skill i, from region r living in region s
$Q_{i,r}$ are permanent residents of skill i living in region r
Q_r are permanent residents of region r
X_r are exports of migrant labor from r
$M_{i,s}$ are imports of migrant labor of skill i, by region s
$T_{i,r}$ are total imports of migrant labor (except for those of region r)

Table 2: Intensity Index

Home Regions		Host Regions											
		North America	Europe	Oceania	Rest of East Asia	Mexico	E.Europe and FSU	China and HK	South East Asia	South Asia	Latin America	M.East/ N. Africa	South Africa
North America	Unskilled	0.70	0.47	0.43	1.18	23.53	0.06	0.18	1.11	0.12	1.94	0.24	0.09
	Skilled	2.05	2.35	1.84	1.57	26.89	0.09	0.33	1.91	0.29	5.09	0.47	0.28
Europe	Unskilled	0.64	1.70	2.36	0.09	0.32	0.27	0.05	0.29	0.17	1.32	0.36	0.25
	Skilled	1.29	2.35	2.44	0.12	0.85	0.16	0.04	0.34	0.17	0.92	0.28	0.33
Oceania	Unskilled	0.73	0.59	14.02	0.50	0.12	0.05	0.40	0.88	0.23	0.12	0.13	0.09
	Skilled	1.45	2.40	18.23	0.68	0.31	0.09	0.58	1.09	0.40	0.24	0.17	0.23
Rest of East Asia	Unskilled	1.16	0.20	0.63	11.00	0.22	0.03	2.46	0.38	0.12	0.49	0.06	0.05
	Skilled	6.05	1.25	3.28	21.84	1.50	0.11	6.27	1.51	0.52	2.83	0.20	0.25
Mexico	Unskilled	4.40	0.02	0.01	0.03	0.00	0.05	0.08	0.09	0.23	0.25	0.13	0.10
	Skilled	3.66	0.32	0.03	0.06	0.00	0.04	0.06	0.06	0.22	0.26	0.10	0.12
E.Europe and FSU	Unskilled	0.13	0.34	0.18	0.03	0.01	2.32	0.08	0.06	0.13	0.05	0.42	0.09
	Skilled	0.62	1.06	0.36	0.10	0.10	6.90	0.25	0.14	0.40	0.14	0.74	0.33
China and HK	Unskilled	0.60	0.22	0.67	3.13	0.05	0.03	9.66	3.17	0.16	0.13	0.05	0.05
	Skilled	13.99	5.12	16.90	44.19	1.15	0.54	145.00	44.54	3.25	2.94	0.81	1.40
South East Asia	Unskilled	0.84	0.41	1.09	2.49	0.01	0.04	0.60	5.39	0.20	0.02	0.42	0.04
	Skilled	5.78	2.47	7.21	13.93	0.09	0.16	3.01	24.85	1.39	0.17	2.58	0.35
South Asia	Unskilled	0.11	0.24	0.11	0.09	0.00	0.02	0.21	0.32	3.57	0.02	1.59	0.06
	Skilled	3.22	2.76	2.65	0.83	0.10	0.25	1.97	3.61	34.31	0.29	17.84	0.98
Latin America	Unskilled	1.93	0.54	0.10	0.97	1.01	0.04	0.20	0.18	0.16	4.60	0.08	0.07
	Skilled	4.53	1.92	0.42	2.54	3.89	0.09	0.47	0.40	0.42	15.53	0.18	0.23
M.East and N.Africa	Unskilled	0.14	1.78	0.29	0.04	0.04	0.11	0.17	0.15	0.17	0.09	2.29	0.25
	Skilled	0.77	2.00	0.58	0.08	0.12	0.09	0.23	0.27	0.34	0.22	5.56	0.45
South Africa	Unskilled	0.08	0.45	0.12	0.03	0.00	0.03	0.00	0.07	0.13	0.03	0.21	4.87
	Skilled	2.11	5.84	2.82	0.25	0.11	0.22	0.03	0.38	1.14	0.26	1.97	49.01

In order to investigate the reasons for these intensities, the intensity index (equation 1) is decomposed into 3 components: a regional bias, a selection-skill bias and a region-skill bias. Each of these is discussed in turn below:

The *regional bias* (equation 2) compares the intensity of migration between two regions. It compares actual migration between two regions ($M_{r,s}$) with that expected, using the skill shares of migrant labor. Regional bias might arise from proximity/borders, historical ties or some other relationship between the home and host economies. If both the skilled and unskilled intensities (equation 1) are high then the regional bias is likely to be high.

$$B_{r,s} = \frac{M_{r,s}}{\sum_{j}\left[\frac{X_{j,r}.M_{j,s}}{T_{j,r}}\right]} \qquad (2)$$

Where:

$M_{r,s}$ are migrant labor from r, located in region s
X_r are exports of migrant labor from r
M_s are imports of migrant labor by region s
T_r are total imports of migrant labor (except for those of region r)

Note that the regional bias abstract from any difference between migrant and home skill shares, and so is not dependent on the share of skilled workers in the home region ($Q_{i,r}/Q_r$).

The second decomposition is labeled the *region-skill bias*; depicted in equation 3. This index compares trade of skill i between regions, based on the skill shares of migrant labor exported and imported, relative to the regional intensity (equation 2). The region-skill bias, like the regional bias, abstracts from any differences between migrant and home skill shares ($Q_{i,r}/Q_r$). Hence actual labor migration by skill is compared to what it would be given the home and host countries' propensities to export and import labor by skill type.

$$RS_{i,r,s} = \frac{M_{i,r,s}}{\left[\frac{X_{i,r}.M_{i,s}}{T_{i,r}}\right]} \Bigg/ \frac{M_{r,s}}{\sum_{j}\left[\frac{X_{j,r}.M_{j,s}}{T_{j,r}}\right]} \qquad (3)$$

The results indicate whether the two regions trade more intensely in skilled or in unskilled labor than expected given that the home region r supplies $X_{i,r}$ migrant labor of skilled and unskilled type. A value greater than 1 indicates that migration of this skill level is more intense than the regional bias[7]. The extent to which the index is greater than 1 indicates the intensity of the migration. We label this the *region-skill bias* since non-unit values for the index reflect differences between the actual labor migration by region s for workers of skill i, from region r (as a share of total migration from region r), and the expected migration based on the migrant share the home region is currently exporting, and the share the host region is currently importing.

[7] Note that like the selection-skill bias, the region-skill bias will be greater than 1 for the skill level which is demanded most intensely; and less than 1 for the other skill level. This is due to the fact that there are only 2 skill types (skilled and unskilled).

The *selection-skill bias* (equation 4) compares the share of labor being exported by home region r ($X_{i,r}/X_r$), with the share of labor located in region r (i.e., the home skill share, $Q_{i,r}/Q_r$) . A value equal to 1 suggests that the home country is supplying migrant labor in the same proportions as their home population and hence the relative sizes of the skilled and unskilled workforce at home do not change. However we know from other research (Mattoo, Neagu and Ozden, 2005) that there is a tendency for migrant labor to be more skilled than their home counterparts. In this case we'd expect the selection-skill bias to be greater than 1 for skilled workers and less than 1 for unskilled.

$$SS_{i,r} = \frac{X_{i,r}}{\sum_i X_{i,r}} \Bigg/ \frac{Q_{i,r}}{\sum_i Q_{i,r}} \tag{4}$$

Table 3 shows that with the, exception of Europe, there is indeed a very large bias toward the skilled migration, relative to the home population.

Table 3: Selection-Skill Bias of Home workers to Migrant Labor

Home Regions	Unskilled	Skilled
North America	0.65	1.72
Europe	1.02	0.95
Oceania	0.79	1.46
Rest of East Asia	0.54	2.45
Mexico	0.996	1.02
Eastern Europe and Former Soviet Union	0.69	2.34
China and Hong Kong	0.53	11.39
South East Asia	0.56	3.80
South Asia	0.56	7.11
Latin America	0.76	2.06
Middle east and North Africa	0.85	1.51
South Africa	0.67	5.92

Finally the indexes are related in the following manner:

$$I_{i,r,s} = B_{r,s} \times RS_{i,r,s} \times SS_{i,r} \tag{5}$$

Table 4: Intensity Indexes and Decomposition

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Total			Region-Skill Bias		Selection-Skill bias		Regional Measures		
Home (Exporter)	Host (Importer)	Unskilled	Skilled	Bias	Unskilled	Skilled	Unskilled	Skilled	Border	Distance	Share of Host country Imports
		Equ. 1		Equ. 2	Equ. 3		Equ. 4				
Czech Republic	Slovakia	212.64	468.1	255.84	0.95	1.33	0.88	1.38	1	250.43	0.67
Estonia	Finland	160.68	429.47	215.31	0.98	1.06	0.76	1.88	0	174.75	0.25
Slovakia	Czech Rep	173.31	260.6	171.42	0.94	1.96	1.08	0.78	1	250.43	0.66
Madagascar	France	6.89	325.44	15.46	0.73	2.22	0.61	9.48	0	8567.52	0.01
Sweden	Finland	106.26	138.62	118.4	0.99	1.03	0.91	1.13	1	525.18	0.23
Romania	Hungary	61.52	150.04	75.44	1.01	0.93	0.8	2.15	1	451.50	0.48
Albania	Greece	58.42	147.99	65.87	0.91	2.01	0.98	1.12	1	417.38	0.35
Lithuania	Poland	41.5	118.85	50.33	0.92	1.73	0.89	1.37	1	471.65	0.1
Finland	Sweden	90.07	64.88	82.18	1.02	0.92	1.07	0.86	1	525.18	0.19
Mozambique	Portugal	15.99	137.77	20.32	0.92	1.93	0.85	3.51	0	8126.52	0.13
Bulgaria	Turkey	56.59	87.6	59.93	0.99	1.07	0.95	1.37	1	551.60	0.4
Slovakia	Hungary	35.86	83.43	40.2	0.83	2.68	1.08	0.78	1	174.92	0.15
China	Korea	7.21	111.92	11.83	1.12	0.83	0.54	11.37	0	999.25	0.48
Uganda	UK	7.6	95.18	11.9	1.12	0.83	0.57	9.67	0	6560.98	0.01
Belgium	Luxembourg	24.78	75.99	37.76	0.64	2.09	1.02	0.96	1	182.33	0.09
Hungary	Slovakia	47.2	42.58	55.54	1.12	0.4	0.76	1.94	1	174.92	0.13
Korea	Japan	22.23	63.35	31.2	1.29	0.71	0.55	2.86	0	843.84	0.28
Venezuela	Spain	9.32	73.5	18.36	0.97	1.08	0.53	3.7	0	7149.46	0.03
USA	Mexico	38.49	44.09	43.45	1.3	0.62	0.68	1.64	1	1623.72	0.74
Cyprus	Greece	10.96	62.7	18.82	0.69	2.34	0.85	1.42	0	948.77	0.02
Luxembourg	Belgium	35.78	35.96	33.78	0.94	1.39	1.13	0.77	1	182.33	0.01
Brazil	Japan	17.82	53.61	24.57	1.03	0.95	0.7	2.3	0	17931.71	0.13
Sweden	Denmark	25.11	43.28	31.12	0.89	1.23	0.91	1.13	0	229.90	0.06
Czech Rep	Austria	20.61	45.22	24.45	0.96	1.34	0.88	1.38	1	240.83	0.06
Australia	New Zealand	26.91	36.6	29.42	1.33	0.76	0.69	1.64	0	2556.26	0.08
Total/Average for 1932 pairs		2999.25	7990.74	3655.85	0.85	1.78	0.78	2.94	14/75	2404.45	

Using 87 regions from the GTAP 6 Data Base we have 7569 country pairs. Of these 1932 country pairs have skill shares for migrant labor from the Docquier and Markouk database. Table 4 shows the intensity indexes of the 25 country pairs with the highest total intensity (sum of skilled and unskilled). We also include the weighted distance[8] between capital cities and note border countries (CEPII, 2006). Many of the country pairs involve at least one European or Eastern European country[9], and then there are a few unsurprising pairs like USA-Mexico, Japan-Brazil, Korea-Japan, China-Korea and Australia-New Zealand which are based on key historical or regional ties. The patterns for some key labor importers and exporters are discussed in section 4.

Some of the key features illustrated by these indexes are:

a) The intensity of skilled labor migration is greater than that of unskilled labor migration in 90% of cases, emphasizing the extent and importance of global skilled migration. This can also be seen by comparing columns III and IV in Table 4.

b) The regional bias explains a considerable part of the high intensities for many country pairs (column V, Table 4); particularly for unskilled migrant labor. In the case of skilled migration the regional bias is also an important factor; although it becomes less important the more open the host region is considered to be to migration (e.g., USA, UK, and Germany).

c) Where the regional bias represents a small contribution to the overall intensity, the intensity on skilled labor is much higher than that on unskilled. Indeed, there are no cases where the regional bias is unimportant and the unskilled migrant intensity dominates the skilled migrant intensity.

d) The remaining intensity can be accounted for by the selection-skill bias, and to a lesser extent the region-skill bias. Both these indexes tend to emphasize the importance of skilled labor migration – on average these indexes are less than 1 for unskilled and greater than 1 for skilled (see last row of Table 4).

e) The selection-skill bias for skilled labor is considerable (column IX, Table 4). On average the share of skilled migrant labor is almost 3 times the share of skilled labor in the home counterpart. Only some countries in Europe, Eastern Europe and Africa, supply more unskilled migrant labor than would be expected given the share of unskilled workers at home.

f) Even after taking account of the tendency for countries to export more skilled labor than the share of skilled workers at home (the selection-skill bias), there is still a reasonably large region-skill bias towards skilled labor migration.

g) Whether the two countries share a common border can also be an important factor in determining the intensity/regional bias for most host regions, particularly for unskilled

[8] CEPII calculates the distance (in km) between two countries based on bilateral distances between the largest cities with the inter-city distances being weighted by the share of the city in the country's overall population

[9] Perhaps unsurprising given that we were restricted to investigating those countries for which data was available – and many of these are European countries.

migrant labor. All 75 border country pairs appear in the top one-third of regional biases. Sharing a common boarder is less important for skilled migration.

h) Distance is generally found to be negatively correlated with the unskilled intensity index and regional bias. Overall the relationship between intensity and distance is slight; however this conceals some larger correlations for certain host regions. Like the sharing of common borders, distance is less important for skilled migration, and sometimes the correlation is positive.

Overall the data confirm that: a) there are strong regional biases in migration patterns for both skilled and unskilled labor migration; and b) skilled workers are much more mobile than unskilled workers. As in trade, such regional biases seem to be closely linked to historical ties or common borders; although the extent of these regional biases is considerably higher than those found in trade. The tendency for migration to occur along 'well-trodden' migration paths is not surprising given the high costs of migration; the reluctance (or indeed refusal) of many countries to accept (unskilled) migrants; and the uncertainty of employment after migrating. Indeed a number of papers (see Vertovec, 2002) have documented the importance of social networks as a way of finding jobs and reducing the adverse effects of migration. These social networks continue to be essential to the movement of migrants, unlike trade where such networks have diminished considerably in significance over the last 100 years.

With regard to skilled migration we find that the intensity can be high even when the regional bias and unskilled migration intensity are insignificant; while substantial migration of unskilled workers only occurs where there is a strong regional bias. This is primarily due to the high global demand for skilled migrant labor which has allowed them to become more mobile and to move away from traditional, 'well trodden' migration routes. The share of skilled workers in the migrant labor force has risen significantly relative to that of the residents remaining at home.

While social networks are prevalent in both skilled and unskilled migration, it is argued that these networks differ with social position and occupations (Salaff, Fong and Wong, 1999 and Bott, 1957); hence skilled migrants are likely to have different social networks to unskilled migrant workers. The high global demand for skilled workers has allowed skilled workers to establish new social networks (e.g., Indian migrant labor working the US high tech sectors), which would account for the high region-skill biases seen above. Given these migration patterns, it is not surprising to that India has chosen to focus on skilled labor migration to fuel development. While it is possible that over time the continued migration of skilled workers could open the doors for unskilled migration, unskilled migration will continue to lag behind skilled migration without a fundamental change in approach to unskilled migration.

4. Analysis of a few key Labor Importers and Exporters

Closer examination of a few specific relationships will further illustrate some of the trends. We select two developed economies and two less developed economies as the host countries and examine their relationships with important home regions.

The United States: The vast majority of immigrant labor in the USA come from the UK, Germany, India, the United States' neighbors (Canada and Mexico), and Central America[10]. In

[10] Most notably Puerto Rico

contrast there are fewer immigrant workers from South America, most of the rest of Western Europe, and Australia, with hardly any migration from Africa. The intensity of migration flows for selected labor exporters to the USA is investigated in table A1. There are a number of high intensities between the USA and Mexico, East and South East Asia, Canada, South America and India. Only for Mexico does the regional bias explain the migration; in all other cases the regional bias is less that 50% of the story, even for Canada, the Philippines and Vietnam where one might expect a higher regional bias to reflect historical ties and borders. Moreover, there is also a slight preference for unskilled Mexican workers to migrate to the USA when compared to the tendencies for the USA to demand unskilled workers and Mexico's tendency to export unskilled (shown in the column labeled "region-skill bias"). There also seems to be a similar preference for unskilled workers from Canada, although this is outweighed by Canada's tendency to export skilled workers (VIII and IX, Table A1). It is the tendency for exporting countries to send more skilled migrant labor than would be expected given the home country share of skill (columns VIII and IX, Table A1) that explains all of the other countries high intensity values for skilled migrant labor. Another factor is the USA's tendency to import large numbers of skilled migrant labor (as shown by the large average region-skill bias shown in the last row of column VII, Table A1). In particular, there is high demand by the USA for skilled migrant labor from India, Venezuela, Uganda and Thailand. These results for India probably reflect the recent upsurge in skilled workers emigrating from India to work in high-skill sectors such as software programming and information technology. In the case of Venezuela, Uganda and Thailand it is unclear why the USA demands even more skilled workers from them than is justified given the US demand for skilled workers in general. However, it can be seen that these countries have some of the lowest regional biases, suggesting that migration is very restricted and skills are essential in order to migrate from these countries to the USA.

Germany: The distribution of immigrant labor in Germany, again by country of origin, shows that most migrant labor to Germany are from Europe (Austria, Greece and Denmark), Eastern Europe and Turkey. Table A2 shows the intensity indexes for migrant labor located in Germany. The data clearly shows that that regional biases are a more important factor in migration flows into Germany, than was the case for the USA; there are clear regional biases for migrant labor from Turkey, Austria, Bosnia, Greece and Luxembourg (columns V, Table A2). Moreover, the intensities for skilled migrant labor from these countries does not completely overshadow those for unskilled (columns VI and VII, Table A2), as was the case in the USA. Turkey, Austria, Bosnia, Greece and Luxembourg also tend not to supply an excessive share of skilled labor (columns VIII and IX, Table A2). These intensities are consistent with the fact that Austria, Luxembourg, and Germany have a common language. The intensities and biases with Turkey, Greece, and Bosnia (former Yugoslavia) are possibly due to the effects of the Gastarbeiter[11] bilateral recruitment agreements that Germany signed with those countries between 1950 and 1970. As in the USA, home countries where the bias is low (column V, Table A2) tend to supply more skilled workers than they have (column IX, Table A2). These include Madagascar, Uganda, Zimbabwe and Vietnam.

Korea: South Korea is interesting in that the only border it has is with North Korea, with which there is very little legal migration. Migrant labor living in Korea are primarily from China (48%), followed by Japan with just 9%, Indonesia (6%), Vietnam (6%), the Philippines (7%) and the USA (8%). The results for Korea are very similar to those for the USA, there is one partner country (Japan) where migration of both skilled and unskilled workers occurs, and the regional bias explains most of the migration. Korea generally imports labor from countries which export more skilled workers than the home countries share would propose, although it tends to demand

[11] guest-worker

more unskilled workers then indicated by the selection-skill bias. This is illustrated by the fact that many of the region-skill biases for unskilled in Column VI of Table A3 are greater than 1, and the average in the last row (1.15) is much lower than in the other cases discussed above.

Turkey: Forty percent of migrant labor located in Turkey is from Bulgaria; and 22% from Germany. There are considerable regional biases with Bulgaria and with Germany, and also between Turkey and the other European and Eastern European countries, which are unsurprising given their close proximities. Turkey also shares borders with Bulgaria and has strong transnational linkages with Germany stemming back to Germany's guest-worker agreement with Turkey, it is possible that the high number of German-born migrants in Turkey are the children of previous Turkish guest workers living in Germany. These high regional biases explain many of the high skilled and unskilled intensities. Migrant labor in Turkey, like those in Germany, are from countries which do no export excessive skilled labor (column IX, Table A4), but there is also a high demand for skilled migrant labor by Turkey (hence the indexes in column VII (Table A4) are also greater than 1).

Table A1: Intensity Indexes and Decomposition of Migration to the United States

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Total		Bias	Region-Skill Bias		Selection-Skill bias		Regional Measures		
Home (Exporter)	Host (Importer)	Unskilled	Skilled		Unskilled	Skilled	Unskilled	Skilled	Border	Distance	Share of Host country Imports
		Equ. 1		Equ. 2	Equ. 3		Equ. 4				
Taiwan	USA	0.66	23.97	3.23	0.85	1.04	0.24	7.14	0	12099.73	0.01
China	USA	0.46	11.22	0.92	0.92	1.08	0.54	11.37	0	11099.80	0.04
Vietnam	USA	1.73	9.93	2.6	0.99	1.01	0.67	3.79	0	13666.17	0.03
Canada	USA	1.94	8.36	3.56	1.01	0.99	0.54	2.36	1	1154.53	0.03
Philippines	USA	0.77	8.75	2.18	0.86	1.06	0.41	3.77	0	13085.26	0.04
Mexico	USA	4.92	4.48	4.85	1.02	0.9	1	1.02	1	1623.72	0.25
Venezuela	USA	0.59	7.89	1.7	0.66	1.25	0.53	3.7	0	3996.41	0
Korea	USA	1.08	7.36	2.3	0.84	1.12	0.55	2.86	0	10624.66	0.02
Japan	USA	1.35	6.35	2.86	0.95	1.02	0.5	2.17	0	10193.96	0.02
Hong Kong	USA	0.54	6.95	1.48	0.8	1.12	0.46	4.21	0	12593.08	0.01
India	USA	0.13	6.5	0.56	0.53	1.28	0.42	9.05	0	13076.46	0.03
Uganda	USA	0.09	6.2	0.38	0.4	1.67	0.57	9.67	0	12799.76	0
Peru	USA	1.26	4.75	2.02	0.91	1.09	0.68	2.15	0	5822.98	0.01
Colombia	USA	1.13	4.05	1.67	0.94	1.08	0.72	2.26	0	4099.04	0.01
Thailand	USA	0.56	3.68	1.11	0.79	1.23	0.64	2.71	0	13907.75	0.01
Total/Average for 69		34.09	191.09	58.96	0.67	1.61	0.78	2.94	2/2	9322.89	

Table A2: Intensity Indexes and Decomposition of Migration to the Germany

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Total			Region-Skill Bias		Selection-Skill bias		Regional Measures		
Home (Exporter)	Host (Importer)	Unskilled	Skilled	Bias	Unskilled	Skilled	Unskilled	Skilled	Border	Distance	Share of Host country Imports
		Equ. 1		Equ. 2	Equ. 3		Equ. 4				
Madagascar	Germany	0.99	17.63	1.69	0.96	1.1	0.61	9.48	0	8657.00	0
Turkey	Germany	8.38	9.99	8.48	0.98	1.22	1	0.97	0	2111.05	0.18
Austria	Germany	4.94	7.87	5.68	0.93	1.21	0.93	1.15	1	529.59	0.02
Bosnia and Herzegovina	Germany	7.91	4.28	7.04	1.03	0.82	1.1	0.74	0	805.61	0.03
Uganda	Germany	0.69	11.39	1.2	1.01	0.98	0.57	9.67	0	6023.66	0
Greece	Germany	5.18	4.99	5.04	0.97	1.18	1.06	0.84	0	1786.29	0.03
Poland	Germany	1.89	7.44	2.92	0.84	1.41	0.77	1.81	1	608.99	0.04
Romania	Germany	1.75	7.51	2.47	0.88	1.42	0.8	2.15	0	1300.49	0.02
Luxembourg	Germany	3.49	4.47	3.6	0.86	1.62	1.13	0.77	1	298.19	0
Hungary	Germany	1.97	5.59	2.68	0.97	1.08	0.76	1.94	0	805.99	0.01
Vietnam	Germany	0.56	6.76	1.11	0.75	1.61	0.67	3.79	0	9236.97	0.01
Albania	Germany	1.55	5.52	2	0.79	2.47	0.98	1.12	0	1361.83	0.01
Zimbabwe	Germany	0.39	6.42	0.73	1.11	0.85	0.48	10.27	0	8039.66	0
Portugal	Germany	1.69	4.63	2.03	0.76	3.6	1.1	0.63	0	1984.23	0.03
Morocco	Germany	1.56	4.73	1.95	0.74	3.42	1.08	0.71	0	2377.60	0.03
Total/Average for 69		86.56	240.8	103.93	0.89	1.47	0.78	2.94	3/9	3061.81	

Table A3: Intensity Indexes and Decomposition of Migration to the Korea

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Total			Region-Skill Bias		Selection-Skill bias		Regional Measures		
Home (Exporter)	Host (Importer)	Unskilled	Skilled	Bias	Unskilled	Skilled	Unskilled	Skilled	Border	Distance	Share of Host country Imports
		Equ. 1		Equ. 2	Equ. 3		Equ. 4				
China	Korea	7.21	111.92	11.83	1.12	0.83	0.54	11.37	0	999.25	0.48
Japan	Korea	12.95	20.63	16.15	1.62	0.59	0.5	2.17	0	843.84	0.09
Indonesia	Korea	4	23.05	6.1	1.1	0.86	0.6	4.38	0	5063.60	0.06
Vietnam	Korea	2.98	17.22	4.48	0.99	1.01	0.67	3.79	0	3207.43	0.06
Thailand	Korea	4.04	13.31	5.71	1.1	0.86	0.64	2.71	0	3691.08	0.03
Philippines	Korea	2.74	8.75	4.03	1.68	0.58	0.41	3.77	0	2646.08	0.07
USA	Korea	3.93	5.3	4.52	1.28	0.72	0.68	1.64	0	10624.66	0.08
Bangladesh	Korea	0.51	7.5	0.81	0.95	1.12	0.66	8.3	0	3826.10	0.03
Canada	Korea	1.5	2.95	1.94	1.44	0.64	0.54	2.36	0	9919.80	0.02
Australia	Korea	1.51	2.11	1.76	1.25	0.73	0.69	1.64	0	8080.57	0
Brazil	Korea	0.55	1.69	0.76	1.02	0.96	0.7	2.3	0	17741.18	0
Malaysia	Korea	0.36	1.17	0.52	1.41	0.65	0.49	3.46	0	4395.56	0
France	Korea	0.56	0.76	0.63	0.97	1.06	0.92	1.15	0	9220.22	0.01
India	Korea	0.11	1.09	0.19	1.43	0.64	0.42	9.05	0	5055.01	0.01
United Kingdom	Korea	0.28	0.3	0.3	1.14	0.82	0.83	1.26	0	8928.76	0.01
Total/Average for 69		43.94	219.39	60.58	0.95	1.15	0.78	2.94	0/0	6282.88	

Table A4: Intensity Indexes and Decomposition of Migration to the Turkey

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		Total			Region-Skill Bias		Selection-Skill bias		Regional Measures		
Home (Exporter)	Host (Importer)	Unskilled	Skilled	Bias	Unskilled	Skilled	Unskilled	Skilled	Border	Distance	Share of Host country Imports
		Equ. 1		Equ. 2	Equ. 3		Equ. 4				
Bulgaria	Turkey	56.59	87.6	59.93	0.99	1.07	0.95	1.37	1	551.60	0.4
Cyprus	Turkey	5.21	20.75	7.76	0.79	1.88	0.85	1.42	0	558.89	0.01
Germany	Turkey	7.57	13.28	8.87	0.9	1.38	0.95	1.08	0	2111.05	0.22
Greece	Turkey	8.42	4.82	7.69	1.03	0.75	1.06	0.84	1	654.66	0.04
Austria	Turkey	3.21	7.77	4.02	0.85	1.68	0.93	1.15	0	1573.43	0.01
Netherlands	Turkey	2.81	7.6	3.87	0.82	1.63	0.89	1.2	0	2444.70	0.02
Switzerland	Turkey	2.52	6.23	3.26	0.76	1.97	1.02	0.97	0	2069.12	0.01
Belgium	Turkey	2.05	4.53	2.52	0.79	1.87	1.02	0.96	0	2443.00	0.01
Sweden	Turkey	1.98	4.19	2.55	0.85	1.45	0.91	1.13	0	2421.33	0
Romania	Turkey	2.21	2.88	2.53	1.08	0.53	0.8	2.15	0	754.98	0.02
Denmark	Turkey	1.54	3.38	1.94	0.82	1.68	0.97	1.04	0	2329.61	0
France	Turkey	0.75	3.04	1.18	0.69	2.24	0.92	1.15	0	2413.32	0.01
USA	Turkey	0.24	2.65	0.76	0.46	2.13	0.68	1.64	0	9558.77	0.01
Albania	Turkey	0.33	2.32	0.48	0.7	4.29	0.98	1.12	0	949.04	0
Australia	Turkey	0.66	1.92	1.02	0.93	1.15	0.69	1.64	0	14112.30	0
Total/Average for 69		99.3	188.27	113.32	0.83	1.99	0.78	2.94	2/2	2996.38	

5. Wages and Remittances

4.1 Wages and Labor income

Labor income earned by migrant labor is required in order to examine the impact of policies on migrant incomes. No data is available on either labor income or wage rates earned by migrant labor on a global basis and hence must be derived. Labor income earned within a region by all workers is obtained from the GTAP 6 Data Base (Dimaranan and McDougall, 2005).

Wage rates of workers of skill i, from region r, located in region c ($W_{i,r,c}$) are assumed to equal the home wage ($HW_{i,r}$) in region r, plus a proportion (BETA) of the difference between the host and home wage ($HW_{i,c}$ - $HW_{i,r}$):

$$W_{i,r,c} = HW_{i,r} + BETA_{i,r,c} \times (HW_{i,c} - HW_{i,r}) \qquad (4)$$

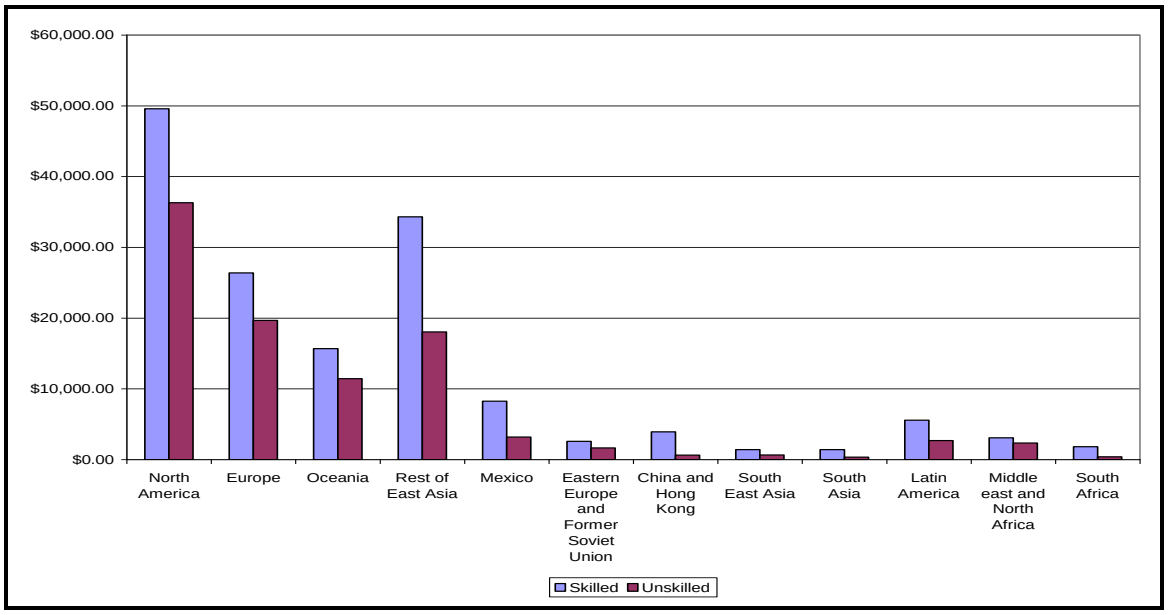
where: BETA is the proportion of the difference obtained by a person of labor type i migrating from region r to region c.

This equation stems from the fact that the wages of migrant labor are generally lower than the wages prevailing in the host country (Borjas, 2000). The extent to which wages are lower is determined by BETA. BETA is set equal to 0.75 when the home wage is less than the host country wage; e.g., when a migrant moves from a developing to a developed economy. The choice of a high value for BETA (0.75) reflects the fact that the workers are more permanent and therefore earn a larger proportion of the host countries wage and productivity. BETA is set to 0.3 when the host wage is less than the home wage; e.g., when a person moves from a developed to a developing country wages are not likely to decline significantly. The catch-up parameter (BETA) is obviously crude, but in the absence of information we do not have a better estimate. Borjas (2000) reports eventual catch-up of over 100% for permanent migrant labor (i.e., overtaking local wages), but for temporary workers the catch-up will inevitably be significantly smaller.

The labor income earned by all permanent residents and migrant workers must also equal the total returns to labor from the GTAP Data Base in order to be consistent with the GTAP Data Base, hence the last stage is to adjust the wage rates to ensure balance.

Figure 6 depicts the average (nominal) wages of permanent residents in selected countries. As expected the wages of skilled are greater than those of unskilled workers, and wages in developed countries are higher than those in developing countries.

Figure 6: Average Wages of Permanent Residents by Region in the Base Data



4.2 Purchasing Power Parity and Real Wages

Given that we are interested in the impact of movements of labor across countries, it is also important to take into consideration the differences in purchasing power between countries (Figure 7). For this reason we also obtain measures of purchasing power parity from the World Bank. The resulting real wages of permanent residents are shown in Figure 8.

Figure 7: Purchasing Power Parity Indices

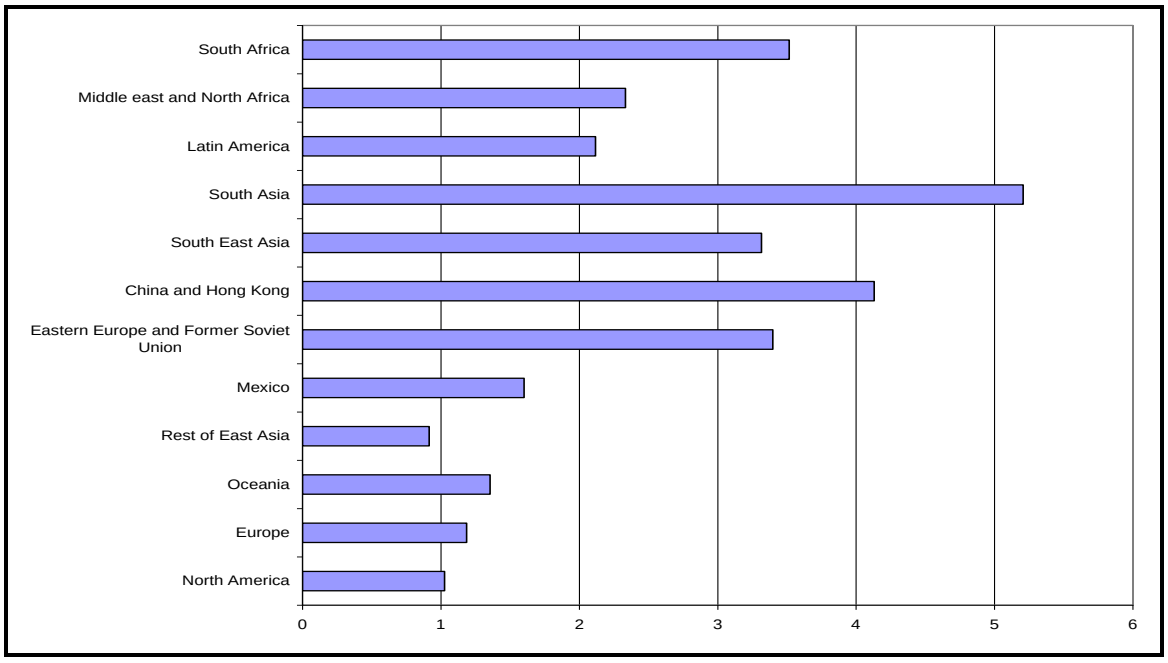
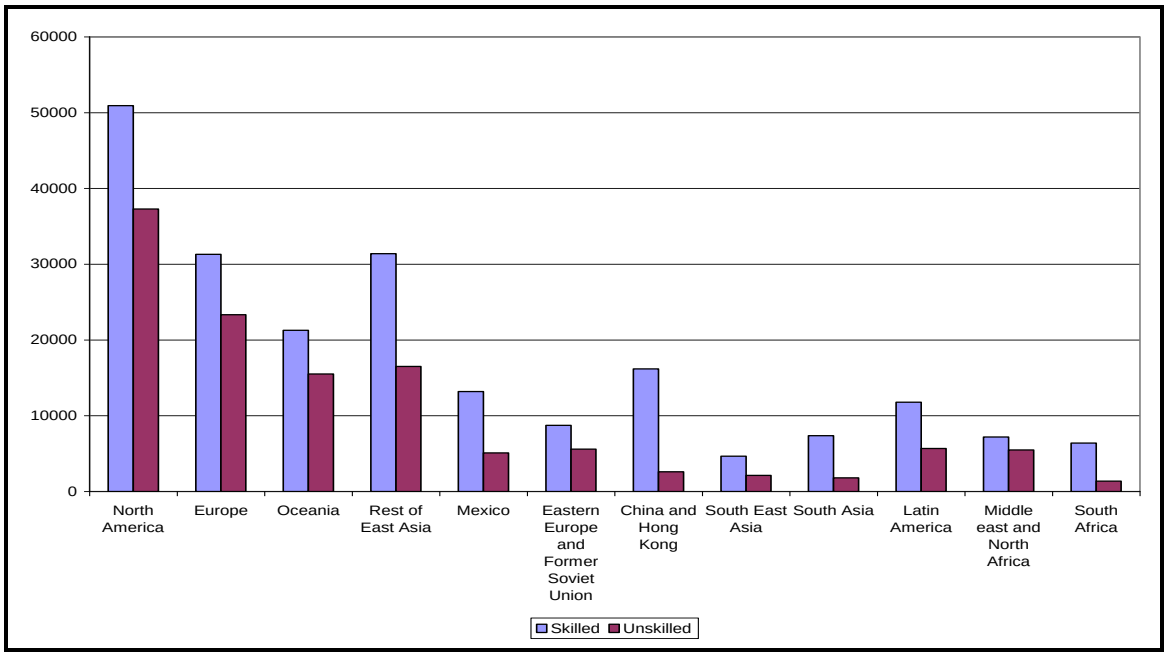


Figure 8: Average Real Wages of Permanent Residents by Region in the base data



Although the extent of South-South migration is significant, Table 5 shows that 80% of unskilled workers and 60% of skilled workers migrate to countries where the average wage is the same or greater than the average wage in their home countries. This confirms that wages are indeed an important factor in determining whether and where to migrate. Even where migration is regional (and South-South), migrant labor move to the country in the region with the higher wages (e.g., Pakistanis and Bangladeshis move to India; and African's move to South Africa and Botswana). Although it appears as though wages are more important for unskilled workers; while skilled workers may move for other reasons, such as more opportunities.

Table 5: Real Wages and Migration (% of migrant labor)

Real wages in host relative to home	Unskilled Labor	Skilled Labor	Total
Higher	70.2%	59.3%	65.7%
Unchanged	9.5%	10.4%	9.8%
Lower	20.3%	30.4%	24.4%

4.3 Remittances

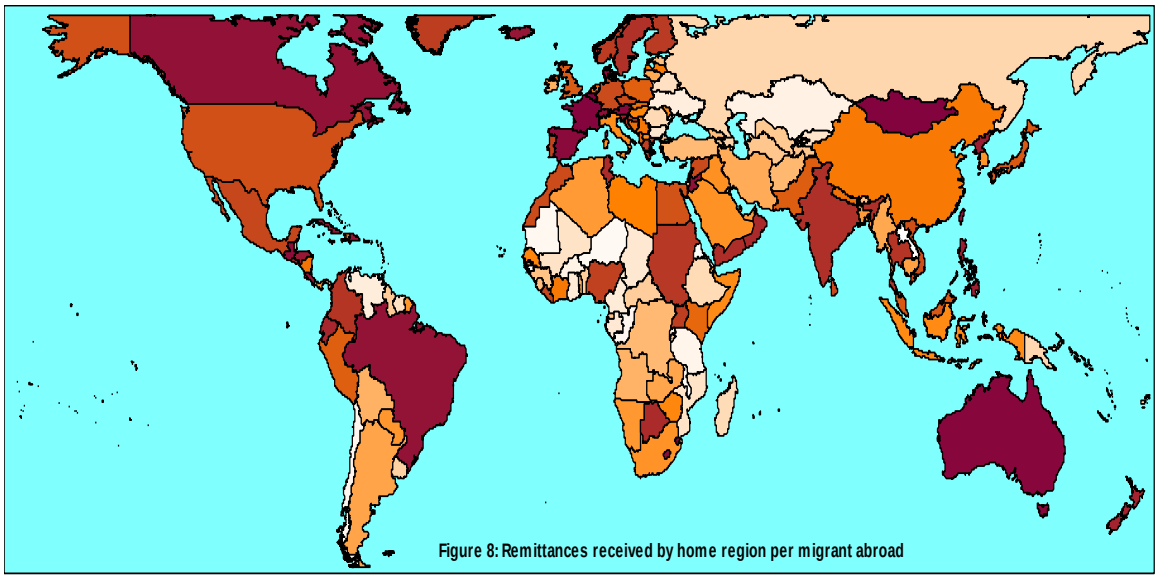
The extent to which remittances received by home economies compensate the home country for outward migration is a key issue in any analysis of the gains/losses from labor migration. Furthermore remittances have grown considerably in recent years and often exceed official aid flows and, in the case of Africa, foreign direct investment (OSSA-UN, 2005).

Total remittances received by the home country were obtained for 212 regions from the World Bank (Ratha, 2004). These data were based on migrant transfers and workers compensation from the IMF balance of payments statistics. Ratha (2004) and Kapur and McHale (2005) point to numerous problems with miss-reporting and under-reporting of remittances, and therefore argue that both these definition should be included in the remittances data.

Using the data on numbers of migrant labor from PSWW (2005) we obtained remittances received per migrant (Figure 9). This shows that migrant labor from Pacific Island economies, Australia, New Zealand, Canada, the Levant[12] and some parts of Europe send home the largest remittances per person. High remittances per person may be the result of a combination of factors, including a) high wages resulting from skilled migration; b) high wages resulting from migration to high income countries; or c) high remittance rates.

A different story emerges when we examine remittances sent home per dollar earned (Figure 10); here we see that Indian migrant labor remit by far the highest share of their incomes[13]. With the exception of China and India, most of the developing countries remit 10-40% of their incomes. The difference between India and China are surprising given that both export substantial numbers of skilled workers to developed economies, such as the USA. Kapur and McHale (2005) suggest that these differences in remittances are primarily due to differences in incentives, and in particular tax incentives. They argue that Chinese migrant labor tend to send money home in the form of foreign direct investment, and in particular for the purchase of real estate, rather than as remittances. The fundamental difference between remittances and FDI relates to control of the asset, which remains with the migrant in the case of FDI. Hence both remittances and FDI should be considered when examining the impact of migration; unfortunately data on FDI by migrant labor is unavailable.

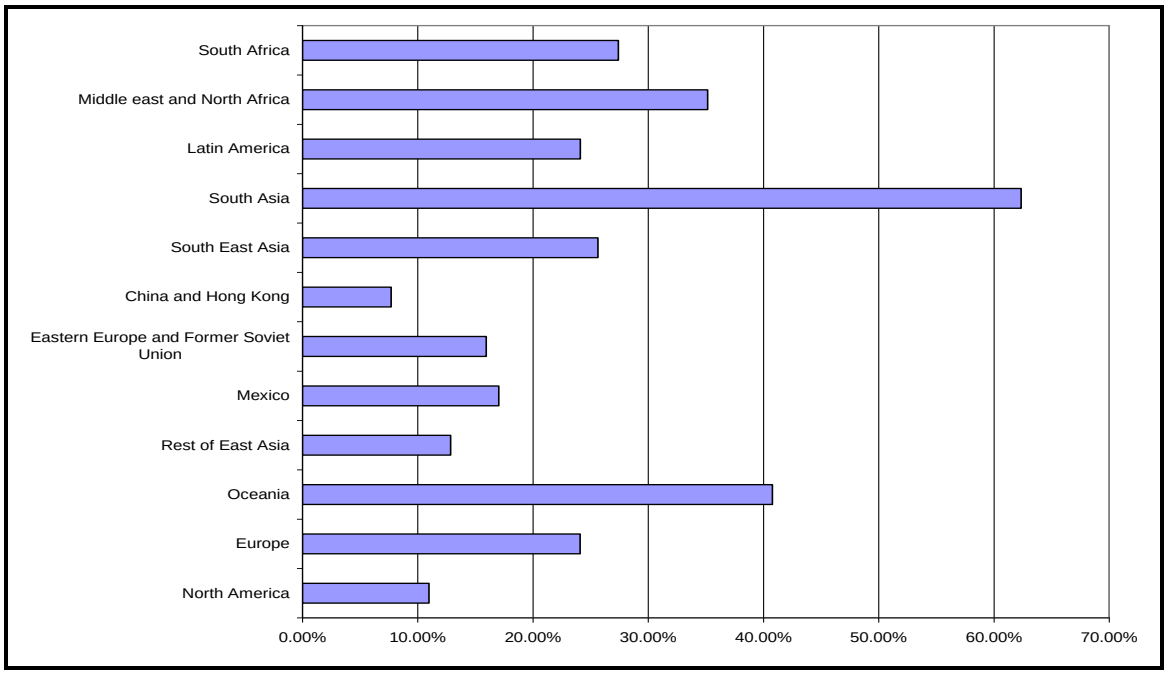
Figure 9: Remittances received by Home Region per person living abroad*



* The darker the color the larger the remittances received per migrant.

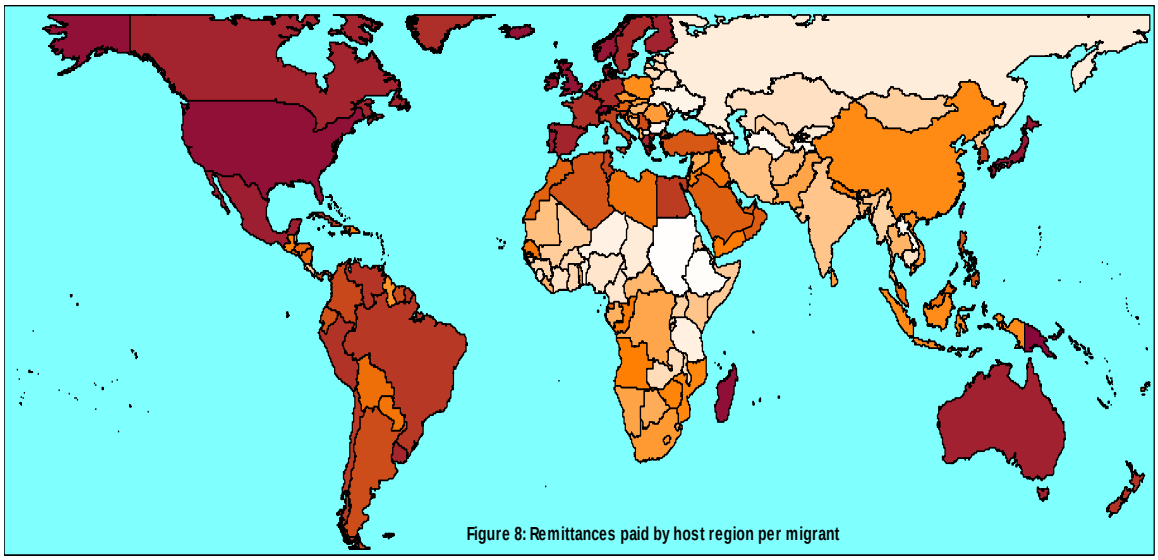
[12] The countries bordering the Eastern Mediterranean Sea, such as Syria and Lebanon.
[13] Note the low wages found for India workers may explain part of this, but even with higher wages remittances are a very high proportion of income.

Figure 10: Ratio of Remittances to Labor Income sent home by Migrant Labor from each Region in the initial database (%)



Remittances were then allocated across source regions to determine bilateral remittances by assuming a constant share of remittances to income. The resulting remittances paid per migrant are also shown in Figure 11. North America, Europe, Australia, Japan and parts of the Middle East have the highest remittances out per person, reflecting the higher wages earned by migrant labor there, and to a lesser extent the high numbers of people from high remitting regions.

Figure 11: Remittances Paid by host Region per migrant*



* The darker the color the larger the remittances paid per migrant.

Since the GTAP 6 Data Base does not include remittances, their inclusion in the database affects the income of both the home and host regions[14]. Since income earned must equal income spent, this change in income in the region must also affect expenditure in the region. In the GTAP Data Base saving is the residual. For this reason saving is adjusted in each region. In countries where (net) remittances are received income and saving will rise; in those where (net) remittances flow out of the country, income and saving fall. This is not to say that all remittance income is saved; but when the underlying GTAP Data Base was constructed and remittances were excluded from income, and saving was determined as the residual between income and consumption, hence artificially lowering saving in the standard GTAP Data Base.

6. Conclusion

The lack of data on international migration has been a severe impediment to the analysis of temporary and permanent migration between countries. In this paper we review some of the recent efforts to improve the data and use this data to construct a globally consistent database of bilateral population, labor by skill, wages and remittances which can be used for analysis of migration issues. This database relies heavily on recent work undertaken by Parsons, Skeldon, Walmsley and Winters (2005) to construct a global bilateral matrix of foreign born populations; and by Docquier and Markouk (2004) on the education levels of migrant labor have significantly improved the data available for analysis.

We then examine some of the underlying relationships in the migration data, including the skills levels of migrant labor and remittances data. Modified versions of the trade intensity indexes developed by Brown (1949), Kojima (1964), and Drysdale and Garnaut (1982) are used to analyze the key relationships in the global labor migration data. As in trade, we find that there is a substantial regional bias in migration patterns; although the regional biases found in migration are much more significant than those found in similar work undertaken on trading patterns. The data also confirm that skilled workers are much more mobile (globally) than unskilled workers. Indeed, substantial migration of unskilled workers occurs only where there is a strong regional bias which affects both skilled and unskilled migrant labor; moreover, these regional biases are generally linked to historical ties or common borders. Skilled labor migration, on the other hand, may be high even when regional biases are insignificant. This irregularity is due to the high global demand for skilled migrant labor which, unlike unskilled migrant labor, makes it more mobile (regardless of historical ties, distances and borders). As a result the share of skilled workers in the migrant labor force is significantly higher than that of the residents remaining at home for most countries. Given these migration patterns it is not surprising to that India has focused on skilled labor migration to fuel development. Unless unskilled migration becomes more accepted globally or regional agreements for unskilled labor migration can be negotiated this is unlikely to change.

Further work is required to determine the skill levels of migrant labor, particularly amongst developing countries or within regions where unskilled migration is likely to be more prevalent. More data on the skill shares of migrant labor in developing host countries is required to undertake more analysis of migration by skill. Moreover, this preliminary investigation of migration patterns also suggests that further research to examine the relationships in the data using econometrics would be beneficial.

[14] We assume that all other income (from capital, land etc) accrues to permanent residents of the region and not to migrant labor.

While it is clear from the data that migration is regional, and people migrate to both developed and developing economies, 75% of migrant labor moves to countries with higher or unchanged real wages relative to their home countries. Hence wages are likely to be an important factor in the decision of whether and where to migrate, particularly for unskilled migrant labor. Further research on the extent to which migrant labor catch-up, in terms of productivity and wages, to the resident population will also help to improve data on the wages and incomes of migrant labor and hence the analysis of potential gains from migration.

Finally in terms of remittances we find substantial differences in the share of remittances to income across countries. These differences may reflect the poor quality of remittances data, difficulties in tracking all remittances flows or the omission of important FDI flows by migrant labor. Quality data on remittances and investment flows stemming from migration are key to any analysis of the gains or losses from temporary or permanent migration. Hence further improvements on tracking remittance and other income flows (such as FDI) back to the home region are essential for improving analysis.

Further data and analysis on a global scale is still required. For instance the data does not capture annual migration flows, but the sum of all persons born in *country i* but living in *country j* minus those who left minus those who died. Hence we cannot comment on duration of stay or the motivation of the migrants (job opportunities, family unification, refugees).

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