



GTAP-Migration (GMig2) for GTAP 11

by

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Abstract

GMig2, the GTAP migration extension, is a globally consistent database of bilateral population, labor by skill, wages, and remittances that can be used for economic modeling of international migration issues. Although new databases have significantly improved access to migration data, information on the skills of migrant labor is incomplete and bilateral remittance data are unavailable. This paper examines the underlying data available and then outlines the assumptions and techniques used to construct bilateral data on migrant labor by skills, remittances, and wages.

1 Introduction

The GMig2 Data Base is an extension of the GTAP Data Base, which incorporates international bilateral migration and bilateral remittances. GMig2 is consistent with the latest GTAP 11 Data Base (Aguiar et al., 2022) in its regional and sector coverage. As such, it represents 141 countries and 19 aggregate regions. Each of these economies reflect 65 sectors for the reference year 2017.

The GTAP data base has been extensively used in global CGE models to analyze trade and environmental issues. Similarly, the GMig2 Data Base could be used with other models. The following body of work has been used with the GMig2 model, which explicitly tracks the movement of workers and estimates the level of remittances (Walmsley, Winters, and Ahmed, 2007) or other model extensions derived from GMig2. This framework has been used for various studies relating to migration corridors in North America (Hinojosa-Ojeda, 2012; Aguiar and Walmsley, 2014), Europe (Ko, 2017; Angiolini et al., 2022), East and South East Asia (Walmsley, Aguiar, and Ahmed, 2017; Corong and Aguiar, 2019), South Asia (Ahmed and Walmsley, 2009; Ghani and Morgandi, 2023), as well as other global migration issues (Willenbockel et al., 2015; Mit'ková and Kralova, 2023; Abbas, Nejati, and Taleghani, 2024).

2 Data Sources

In addition to the GTAP Data Base and the global bilateral matrix of foreign population data by United Nations (2015) and we also use UN's population data to calibrate to GTAP's latest reference year. Figure 1 shows the share of migrants in countries, where countries in the Middle East have a migrant population that exceeds 65% of their total population. On the other hand, when looking at migrant population by country as a share of total migrants, we observe that at the top we have the US, the EU, Middle East, Canada and Australia, see Figure 2. We also obtain remittance data from the World Bank and participation rates from the LABORSTA database website (ILO, 2024). Skill splits are estimated from data obtained from LABORSTA and Docquier et al. (2011).

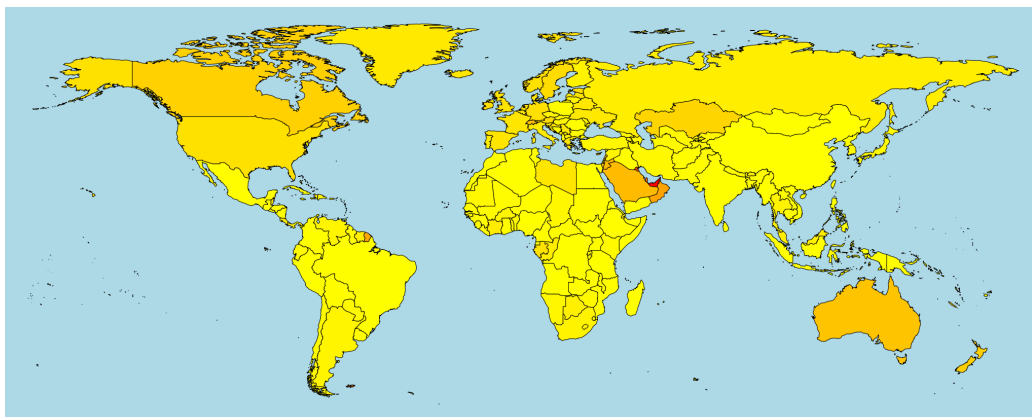


Figure 1: Immigration share of total population (2015)*

*The darker the color the larger the share of migration over population.

Source: GMig2 Data Base.

Migration labor force data and total remittances are constructed for 251 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.

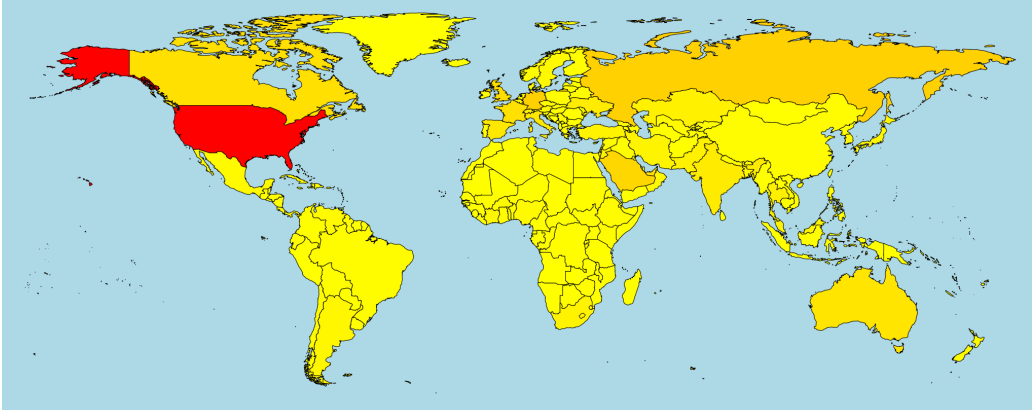


Figure 2: Immigration population share across countries (2015)*

*The darker the color the larger the share of migrants.

Source: GMig2 Data Base.

3 Global Migrant Labor Force

The Özden et al. (2011) database is based on foreign born and does not distinguish between those in the labor force and those who are not. To convert population data to labor forces, additional data on participation rates are collected from LABORSTA (ILO, 2024). Then it is 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. This is likely to be an overestimate of migrant workers because many may have migrated when they were young and have had their children in the host country; also some migrants will be temporary and hence have not brought their families. Unfortunately, there are no data on the extent to which workers migrate with their families or not.

In the GMig2 database, the migrant labor force abroad is first estimated using the labor force participation rate in the country of origin multiplied by the number of migrants in the destination country:

$$\frac{LF_{r,c}}{POP_{r,c}} = \frac{LF_r}{POP_r} \quad (1)$$

where: r is the home region or country of origin and c is the host region, LF is

labor force and POP is population. For example, if in the US, the participation rate is 45%, then 45% of all US migrants in Mexico are of working age. Then, this number is calibrated so that the total labor force in the destination country matches the official statistics. For motivation and details, see Walmsley, Ahmed, and Parsons (2007).

The wage data are derived by the type of labor within each host region using the GTAP value of labor at the different valuations (for details, refer to Walmsley, Ahmed, and Parsons (2007)). The wage rate of migrant workers with skill i from region r in region c ($W_{i,r,c}$) is assumed to be equal to the home wage in region r ($W_{i,r,r}$) plus a proportion (β) of the difference between the wages (host and home):

$$W_{i,r,c} = W_{i,r,r} + \beta(W_{i,c,c} - W_{i,r,r}) \quad (2)$$

We consider two betas in this equation, beta is 0.75 when host wage ($W_{i,c,c}$) is greater than home wage and 0.2 otherwise.

The final piece of information is the remittances data. As mentioned above, we collect this information from the World Bank (www.knomad.org). We then follow Walmsley, Ahmed, and Parsons (2007) to derive a bilateral remittance matrix assuming a constant share of remittances to income:

$$\frac{RM_{r,c}}{YS_{r,c}} = \frac{RM_r}{YS_r} \quad (3)$$

where: RM are remittances, YS is income earned by permanent residents of r temporarily residing in c (or aggregated across all locations c). This income is based on the wages and the number of migrants built previously. All other incomes (from capital, land, et cetera) are assumed to accrue to permanent residents.

Taxes are paid by both foreign-born and domestic residents. Tax revenues accrue to the regional household, as in the GTAP model (Hertel, 1997; Corong et al., 2017), but are included only in the income of permanent residents, hence permanent residents gain the benefits from the public goods purchased with tax revenues.

Finally, savings information from the GTAP Data Base is updated to account for remittances. The second macroeconomic condition mentioned in Aguiar et al. (2022) ensures that the savings-investment balance is equal to the trade balance:

$$S - I = X - M \quad (4)$$

where S is Savings, I is Investment net of depreciation, X represents exports, and M represents imports. In GMig2, this macroeconomic condition must include remittances received and paid, for each country/region:

$$S - I = X - M + RM_{received} - RM_{paid} \quad (5)$$

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