Migrant remittances flows within an Inter-Country Input-Output Framework

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1. Introduction

Migrant remittances matter, especially to many lower and lower-middle income countries. Indeed, they can signify more than 10% of their GDP. This can be far more than most industries or economic activities. To the people of Kyrgyzstan, Tonga, Tajikistan, Haiti or Nepal, remittances constitute around 30% of their GDP (World Bank, 2018). For more than 1 billion people who live in countries with less 4000 US$ GDP *per capita*, money received from their relatives and friends who live abroad can be vital to obtain basic necessities. The political and media attention given to migration issues, and consequently remittances, is in many cases biased and, to say the least, insufficiently based on scientific arguments. Indeed, workers or pensioners in richer countries sacrifice a share of their potential savings to improve the life of those in their home country. The UN (2018) estimates that 75% of remittances are used for immediate needs such as food, shelter and healthcare; the remaining 25% are used to invest in education or savings. Remittances shape local, regional or national production as they change household consumption and, consequently, national production (Jahjah et al., 2003; Castaldo and Reilly, 2015).

When compared with other transboundary flows, such as Official Development Aid (ODA) or Foreign Direct Investment (FDI), remittances have arisen as a prime income stream for less developed countries. Figure 1 compares the weight of ODA, FDI and migrant remittances in the lower and lower-middle income countries GDP since 1970.

Figure 1: Remittances have surpassed ODA and FDI in the share of GDP supplied to low and lower-middle countries
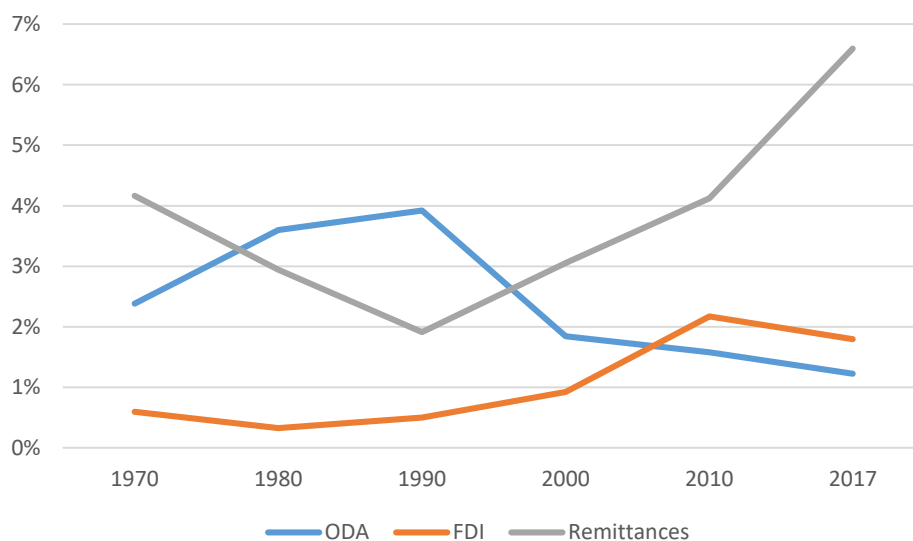
Source: World Bank (2018)

While remittances can be quite important to some developing nations, they are a minor direct loss to high income countries (approximately 0.5% of their GDP). So, migrant remittances can play a significant role in reducing world inequalities. They help to accomplish Sustainable Development Goals (Adams and Page, 2003; UN, 2018). The Global Forum on Remittances, Investment and Development, structured several recommendations around pillars that include the need to "acknowledge the full spectrum of migrant contributions" or "improve remittance-related data to foster effective policies" (UN, 2018).

Herein we examine remittances in an innovative way. We assess their economic impacts at the international or regional level. The World Bank, UN and other international institutions have been improving the availability of remittances data. But, research to date has focused on the remittances direct effects, neglecting the role of international dependencies among industries and countries. A country does not benefit from remittances if the income earned is only spent on imported products. In such case, the origin nation of the imported products benefits economically. This is the reality of many less developed economies. And, suggests following flows of transactions beyond the direct effects becomes critical to properly allocate the total economic effects of remittances. Indeed, the all set of flows should be integrated in a framework that assesses them in the context of the general equilibrium effects generated, namely the spillovers and feedback effects among national economies (Timmer et al., 2012; Dietzenbacher et al., 2013). The advent of inter-country input-output models enables such work. Interestingly, transboundary income flows, such as remittances, remain inadequately handled as noted as early as Rose and Stevens (1991). Our research has two major goals, one that is methodological and involves extending the World Input-Output Database (WIOD), namely, to include migrant remittances. The other addresses how remittances shape national economies through value chains. This work points to the potential of further elaboration of transboundary income flows in inter-country tables such as the conversion of savings into investments in other nations.

2. Migrant Remittances: Definition and Data

Trade is typically a major source of national income. But to some less developed economies, migrant remittances are even more important. The IMF (2007) and the OECD (2006) define migrant remittances as the sum of three different sections of the balance of payments:

- Gross earnings of workers residing abroad for less than twelve months, including the value of in-kind benefits (part of the compensation of employees);
- Monetary transfers sent home from workers residing abroad for more than a year;
- Net wealth transfers of migrants who move (permanently) from one country of employment to another.

While this definition may seem clear, it is less so in practice. Perhaps not surprisingly those that reconcile data observe several difficulties emerge that affect the quality of the remittance data and, therefore, its comparability across countries (World Bank, 2009). Some national banks record remittances as "compensation of employees", but others do not distinguish migrant transfers from "other current transfers from other sectors" [1].

Nevertheless, all studies and reports underline remittances increase in volume and relative importance worldwide. Yang (2011) reports that, since the late 1990s, and according to the available

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[1] So, despite the different methods proposed to establish a common way to estimate migrant remittances OECD and IMF warns that remittances data *per country* have serious limitations and the estimates should be interpreted with some degree of caution. For more, please see Taylor (1999), Daianu (2002) and Ratha (2003).

statistics, remittances sent home by international migrants had already exceeded official development aid. The growth rate of remittances in real terms has been impressive: in the decade preceding the 2008 financial crisis (1999–2008), the average annual real growth rate of remittances was 12.9 percent. This compares to the 11.0 percent annual real growth rate of foreign direct investment and exceeds the 5.8 percent annual real growth rate of official development assistance.

Clearly, remittances deserve more attention from the international community. The Statistic Division of the World Bank produces a singular contribution: an annual bilateral remittances matrix. Departing from the balance of payments data, the World Bank provides a temporal series of matrices, starting in 2010. Each matrix relates remittances flows among the 188 World Bank member countries, plus 26 other economies, for which authorities report separate social and economic statistics (World Bank, 2016). The World Bank estimates rely upon international migration data for the period 1960–2013 provided by UN Population Division (2013) as complemented by more recent national censuses. But, the World Bank has to deal with several data difficulties, as credible national data on bilateral remittances are generally not available (Ratha and Shaw, 2007). This is because some countries do not report sources of remittances inflows and either because other countries underestimate outflows due to internal restrictions on international transfers or because of the irregular status of migrants. The World Bank therefore estimates the inflow and outflows of international transfers by allocating remittances received by using the distributions of their national out-migrants destination countries[2]. Needless to say, the integration of remittances into broader economic frameworks is a research gap that this article begins to address.

The World Bank estimates more than 247 million people (3.4 percent of the world population) live outside their countries of birth. The Mexico–United States path is the most heavily trodden migration corridor in the world. The Russia–Ukraine path is the second largest, followed by Bangladesh–India, and Ukraine–Russia path. In economic terms worldwide remittance estimates exceeded $601 billion (approximately 1% of world GDP), in 2015. Of that, the World Bank estimates that developing countries receive about $441 billion (nearly three quarters), nearly three times the volume from official development assistance. Figure 1 shows the Top 10 remittance recipients in $US billions for the year of 2015.

**Figure 1: Top ten countries in migrant remittances inflows in 2015 ($US billions)**

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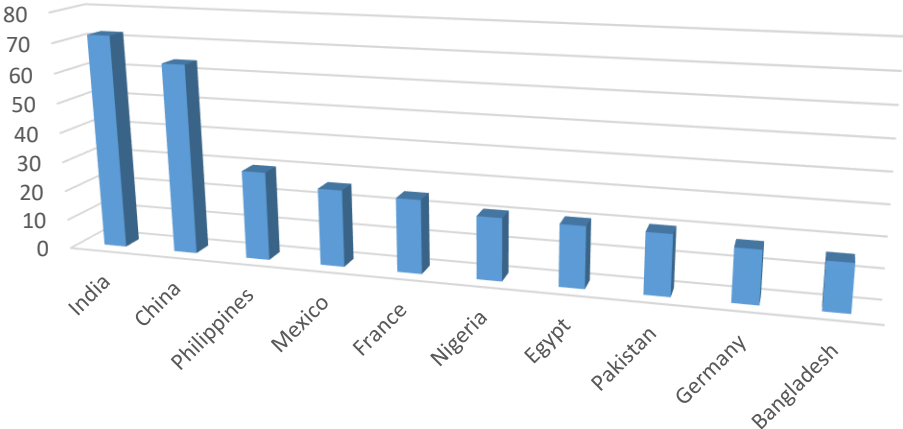
[2] According to Ratha and Shaw (2007), this proxy poses some difficulties because some migrants move to countries with lower per capita income than the origin country.

Interestingly, the top 10 recipient countries account for more than 50% of all remittances. A glance at the top 10 countries that receive more migrant remittances reveals many large developing economies. India and China alone receive more than 20% of worldwide remittances. While not among the top 10, remittances comprise more than 25 percent of the national GDP in very small economies like Tajikistan, the Kyrgyzstan, Nepal, Tonga, Moldova and Liberia.

Figure 2: Tope ten countries in migrant remittances outflows in 2015 ($US billions)
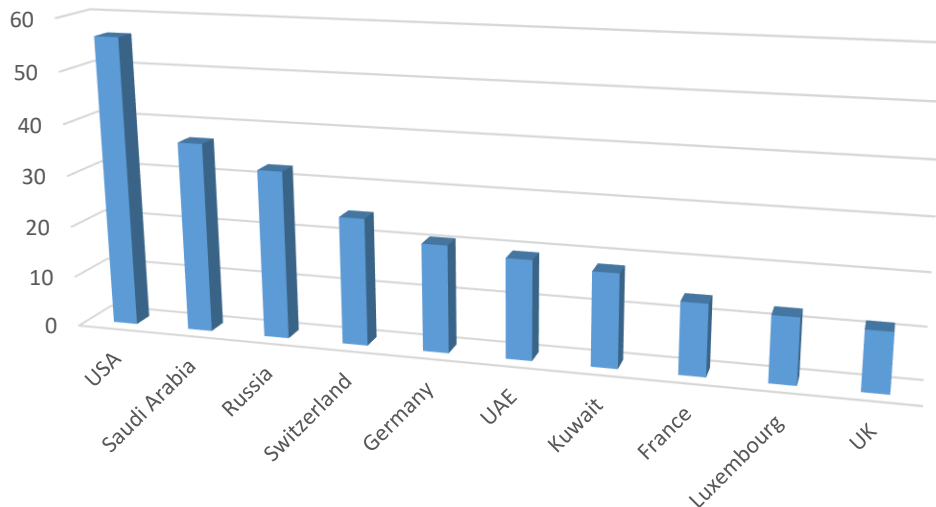
Figure 2 shows that among counties the United States is the top remittance-sender. It alone accounts for about 10% of all remittance outflows. Interestingly, three Middle-East economies are among the top 10 sending countries. Combined, migrants in Saudi Arabia, United Arab Emirates and Kuwait have more remittances outflows than the U.S., according to World Bank estimates, and account for 12% of all remittance flows. Russia is another relevant remittance-sending economy, mainly because of flows to former Soviet states. Perhaps unsurprisingly, small wealthy economies have relatively higher remittance outflows as a share of their GDPs. In 2015, remittances outflows were more than 10% of the GDP for Luxembourg, Marshall Islands, Oman, Lebanon, Kuwait, Maldives and Malta.

In absolute terms, there are seven paths that represent flows of more than 10 US$ billions per year. The most important is that between the U.S. and Mexico (25 $US billions). By degree of importance, the other most relevant paths are U.S.-China, Hong Kong-China, UAE-India, U.S.-India and Saudi Arabia – India.

It is important to understand that migrant remittances can arise due to different motivations and contexts. Docquier and Rapoport (2005), OECD (2006) and Jena (2018) discuss several reasons why households in richer countries opt to send money to their relatives back home. The reasons run from "pure altruism" (to help others in their former country), "pure self-interest" (they will eventually benefit from their "investment" in their home country) or complying with an explicit family agreement (as insurance or a loan made between the migrant and his/her relatives). Regardless of the reasons, migrant remittances

can have important effects on the national income distributions and, consequently, on household consumption (Taylor and Wyatt, 1996; Ratha and Shaw, 2007; Bang et al., 2016).

More recently, Manic (2017) recognized that the resulting shock in demand, promoted by increasing remittances, can resonate within an economy differently and alter regional or national economic dynamics, including the spatial distribution of capital. Similar phenomenon also happens internationally. For certain, the international economic consequences of remittances are likely to be far more complex than their simple direct effects. Only a framework that includes a comprehensive set of international and inter-sectoral linkages, however, can shed some light on the impacts of such economic phenomena.

3. Incorporating Remittances in a WIOD 'closed' framework

In order to assess the economic impact of migrant remittances, we first incorporate migrant remittance flows into the WIOD framework. WIOD is a symmetric multiregional input-output (I-O) framework that describes the linkages among 56 industries and their final consumption (decomposed in five different components: households, expenditure by nonprofit organizations serving households, government, gross fixed capital formation and changes in inventories and values) among 43 national economies plus the "Rest of the World" (Dietzenbacher et al., 2013). While WIOD socio-economic accounts include the compensation of employees and other components of domestic primary income, they include no other transboundary income flows; so, gross inflows and outflows of income equal net flows. Rose and Stevens (1991) note that transboundary transactions beyond those for commodities and services have never been adequately addressed. This remains the case for WIOD and other recent inter-country I-O databases. But some suggestions have been made vis-à-vis I-O and other regional science literature. As an example, the following noted such flows have a relevant economic impact: the income flows as interregional commuting flows (Hewings et al. 2001; Ferreira et al., 2018), inheritances and intergenerational flows in favor of the elders or the youngers (Laitner, 1997; Kohli and Künemund, 2003; Gamburd, 2015) and foreign direct investment, international aid and migrant remittances (Manic, 2017). Herein, we suggest a method that introduces remittances into inter-country input-output accounts and, hence, modelling. This approach might be applied to other transboundary flows and, thereby, shed some light on interdependencies beyond those embodied in international trade.

As in any symmetric input-output table, those of WIOD can be transformed to estimate the direct plus indirect impacts of changes in the final demand while accounting for spillover and feedback effects. Indirect effects are estimated through the estimation of what is commonly called an 'open' matrix (Miller and Blair, 2009). In this particular Leontief matrix type, intermediate consumption is endogenous while all final consumption is exogenous. Miller and Blair (2009: 34) suggests that "in the case of households, especially, this "exogenous" categorization is something of a strain on basic economic theory". Indeed, when production changes, household income also changes, and this naturally affects consumption. As a consequence, many analysis 'close' the model with regard to household consumptions and its domestically generated income. Figure 3 shows the traditional structure of such a 'closed' I-O, extended for the multi-country case, as in WIOD.

Figure 3: 'Closed' I-O model

Industries	Household Final Consumption	Other Final Consumption	Total

	Z_{ij}^{qr}	C_i^{qr}	$f *_i^{qr}$	x_i^q
Industries	Z_{ij}^{qr}	C_i^{qr}	$\mathbf{f} *_i^{qr}$	x_i^q
Labor and Other Domestic Income	ℓ_j^{qr}	**0**	**0**	$\boldsymbol{\ell}^q$
Savings and Other Transboundary Income Flows	**0**	s^r	**0**	**s**
TOTAL	x_j^r	$\boldsymbol{\ell}^r$	$\mathbf{f} *^r$	

The upper left quadrant is composed by the $\mathbf{Z}_{ij}^{qr}$ elements and refers to the intermediate consumption and represents the international (and national) trade among 56 industries located in 44 economies. $\mathbf{Z}_{ij}^{qr}$ represents the input consumption of industries j located in the country r from products produced by the industry i located in country q. When q and r are the same, we refer to intra-country trade and when i and j are the same it is intra-industry trade. The income vector ($\boldsymbol{\ell}_j^{qr}$) represents the income paid by industries j in country r to households residing in country q.[3] In the 'common' I-O application, cells in $\boldsymbol{\ell}_i^{qr}$ matrix are only filled in its diagonal. which means that no international income flows exist. Thus, the income earned by households of each country totally originates from industries within its borders. Vectors x_j^r and $\boldsymbol{\ell}^r$ equal transposed x_i^q and $\boldsymbol{\ell}^q$

Also inside the bold border, the $\boldsymbol{c}_i^{qr}$ matrix corresponds to the household final consumption in country r. Like in $\mathbf{Z}$ matrix, the $\mathbf{C}$ admits the existence of international dependencies ($\boldsymbol{c}_i^{qr}$). So, households living in r consume products produced in the industry i in country q. Accordingly, the $\mathbf{f}^*$ corresponds to the total final consumption less household consumption (which is incorporated in $\mathbf{C}$). So, $\mathbf{f}^*$ and $\mathbf{C}$ are allocations of total final demand in 'open' I-O models. Finally, the share of household income ($\boldsymbol{\ell}^r$) that is not included in the model is represented in the $\boldsymbol{s}^r$ vector.

The 'core matrix' defined by the bold border is the one that will give origin, after the adequate algebraic procedures, to the Leontief matrix ($\mathbf{L}$). In the 'closed' input-output table, the input coefficient matrices are estimated by dividing the intermediate consumption ($\mathbf{Z}_{ij}^{qr}$) and the distributed incomes ($\boldsymbol{\ell}_j^{qr}$) by the total output per industry (x_j^r) plus the elements of the household consumption column ($\mathbf{C}$) by the total income earned by the "household sector" (l^r). The matrix that results from that procedure is matrix $\mathbf{A}$. This matrix can also be partitioned in different submatrices.

$$\mathbf{A} = \begin{bmatrix} \mathbf{A_{11}} & \mathbf{A_{12}} \\ \mathbf{A_{21}} & \mathbf{0} \end{bmatrix} \qquad (1)$$

As described in Lahr and Miller (2001), the standard representation of an n-sector and n-country input-output technical coefficients matrix are shown in the upper left square matrix, identified as $\mathbf{A_{11}}$. The $\mathbf{A_{12}}$ represents the submatrix of household consumption coefficients. Finally, the $\mathbf{A_{21}}$ represents the income coefficients by industry and country. Then, the Leontief matrix is estimated as following.

$$\mathbf{L} = (\mathbf{I} - \mathbf{A})^{-1} \qquad (2)$$

where $\mathbf{I}$ is the identity matrix with the same dimension as matrix $\mathbf{A}$. The matrix $\mathbf{L}$ can also be presented in its partitioned form,

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[3] Some representations of 'closed' input-output models display a "GVA" in the place where $\boldsymbol{\ell}^q$ appears in Figure 3. In fact, in this study, we have assumed that the full GVA is, ultimately, distributed to households.

$$L = \begin{bmatrix} \Phi & \Phi A_{12} \\ A_{21}\Phi & (I + A_{21}\Phi A_{12}) \end{bmatrix} \tag{3}$$

where $\Phi = (I - A_{11} - A_{12}A_{21})^{-1}$. Final demands and gross outputs can be partitioned similarly, so that

$$\mathbf{f} = \begin{bmatrix} f_1 \\ f_2 \end{bmatrix} \text{ and } \mathbf{x} = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

And,

$$\begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \mathbf{L}.\begin{bmatrix} f *_1 \\ f *_2 \end{bmatrix} \tag{4}$$

In this case, x_1 represents the industries output, the $f *_1$ the final exogenous demand direct towards industries, the x_2 represents the total household income and the $f *_2$ is equal to zero, once there is any final demand directed towards income.

Inspired by Rose and Stevens (1991) and Li et al. (1999), the novelty of this work is to close WIOD with respect to remittances in an input-output database. In the future, similar methods can be applied to include other kind of income flows, say those related to household savings. The values introduced are those obtained after adapting the World Bank bilateral migrant remittances matrix to the 43 economies of the WIOD database[4]. The new structure of the model is presented in Figure 4[5].

Figure 4: 'Closed' I-O model with migrant remittances

	Industries	Household Final Consumption	Other Final Consumption	Total
Industries	Z_{ij}^{qr}	C_i^{qr}	$f *_i^{qr}$	x_i^q
Household Domestic Income plus migrant remittances	ℓ_j^{qr}	M^{qr}	0	h^q
Savings and Other Transboundary Income Flows less remittances	0	σ^r	0	σ
TOTAL	x_j^r	h^r	$f *^r$	

The new nonzero partition **M** is then added. This partition is composed of elements that consist of M^{qr}, remittances benefitting country q and with origin in country r. In **M**, the diagonal matrix is filled with null values (where $q = r$), except in the case of the "Rest of the World". The inclusion of this partition does not change industries' outputs in each country (x_i^q equal to x_j^r). But, h^r is the new total household income flows that now also includes of gross inflow of remittances **M** among countries. s^r in Figure 3

adjusts and gives place to σ^r that does not include remittances as those are now incorporated inside the bolded border.

Remittances represent an income of country q with origin in the country r, they are also a 'kind' of expenditure made by households in r country. As a result, household consumption coefficients in the new coefficient matrix ($\mathbf{A}'$) are now smaller to national and international consumption dependencies (directed towards industries) as more income in each country is being distributed internationally (but directly to the households). Those remittances effects in each country depend on the balance between the reduction in coefficients and the rise due to remittances. This causes the multiplier effects to change, as well as the new Leontief inverse, $\mathbf{L}'$. Otherwise, the exogenous final consumption ($\mathbf{f^*}$) is kept stable, as well as the industries' output per country. So, accordingly

$$\mathbf{x}' = \mathbf{L}' . \mathbf{f^*} \tag{5}$$

or, instead

$$\begin{bmatrix} x_1 \\ x_2' \end{bmatrix} = \mathbf{L}' . \begin{bmatrix} f *_1 \\ f *_2 \end{bmatrix} \tag{6}$$

With different total income distribution, the same previous shock will have a different economic distribution among the world economies, differently affecting each industry in each country. As represented by Lahr and Miller (2001), the insertion of a new submatrix where instead it was a null quadrant will now change the partitioned Leontief matrix, that now becomes

$$\mathbf{L}' = \begin{bmatrix} \gamma & \gamma A_{12} (I - A_{22})^{-1} \\ A_{21}\gamma(I - A_{22})^{-1} & (I + A_{21}\gamma A_{12}(I - A_{22})^{-1}) \end{bmatrix} \tag{7}$$

where $\gamma = (I - A_{11} - A_{12}(I - A_{22})^{-1}A_{21})^{-1}$.

The A_{22}, presented in equation (7) now represents the submatrix $\mathbf{M}$ region in the input coefficients matrix in Figure 4. And will have effects in the multipliers presented in all the matrix.

Summing up, the effects enhanced through remittances depend on the equilibrium between the following structural changes: (1) the reduction in the household consumption coefficients; (2) income earned via the production activity engaged in the other economies; and, (3) the income that flows out to expand the consumption of households in other economies. In practical terms, two examples are presented. First, a given shock in the US economy now will, in this scheme of things, favor more Mexico's economy through the entrance of monetary flows (besides those already considered via trade) that are directly sent to Mexican households. Or second, a shock in the economy of Luxembourg will have an expansionist effect in Portugal, due to its large migrant community living in the country, and a contractionary effect in US, as the imports of Luxembourg from the U.S. (measured as a share of the income) reduce and the residual remittances flows from Luxembourg to the U.S. do not compensate that decrease. Finally, as all of these factors are integrated in the WIOD table, the results are really determined by the intricate interconnections established between nations and sectors of the world economy.

Finally, I-O has the potential to integrate a much larger comprehensive set of transboundary flows. This work is still a modest contribution, as many other flows are not hereby integrated. Nevertheless, the innovative integration of remittances extension shall open new avenues to the future integration of some other relevant variables and dimensions.

4. Results

To assess the impacts of migrant remittances, our goal consists of comparing the change in the GVA after the inclusion of this new flow in our model. The impacts generated by the production of any given industry or any country affect the world economy differently. Indeed, as Rose and Stevens (1991) highlight, the inclusion of an additional flow in an I-O framework affects the multiplier estimates. To simplify the interpretation of the results and analyze the specific impacts of bilateral relations between two economies, we estimate the effects in an economy of a 1% change in exogenous final demand ($f*^p$) directed towards country p, for each one of the economies considered in the WIOD. So, given that

$$x_i^p = \mathbf{L}.\,f*^p \text{ and } x_i^{qp\prime} = \mathbf{L}'.\,f*^p \tag{8}$$

So, when in the both cases the economy p is affected by the same shock ($f*^p$) and in one case, the result for output in country q will be x_i^{qp}, when no remittances are included in the model and otherwise $x_i^{qp\prime}$ (with remittances). This represents the output of the industry i located in country q following a shock in p. So, the contribution of remittances to change the economic linkages are given by the differences between the initial output obtained without remittances and the new output obtained in the second estimation. So,

$$\omega^{qp} = \sum x_i^{qp} - \sum x_i^{qp\prime} \tag{9}$$

ω^{qp} is the impact of remittances in the total output of country q incorporated in 1% of country p exogenous final demand. But, as the value added is a better measure of a sector's contribution to an economy, the output values (at the industry level) are multiplied by the value added coefficients in order to obtain the migrant remittances contributions in terms of Gross Value Added (GVA).

It is important to underline that this I-O application departs from the WIOD and extends far beyond the 'simpler' analysis of direct remittances presented in the World Bank Statistics. So, the effect on national economies not only considers the balance between inflows and outflows, as in World Bank Statistics, but also all the interdependencies established between countries at the intermediate and household consumption level and, ultimately, as collected in the GVA coefficients. Figure 5 shows the top 15 bilateral remittances impacts occurring after a 1% change of total final demand in each given economy.

**Figure 5: Top 15 remittances impacts in GVA due to 1% change in exogenous final demand (10^6 US\$)**
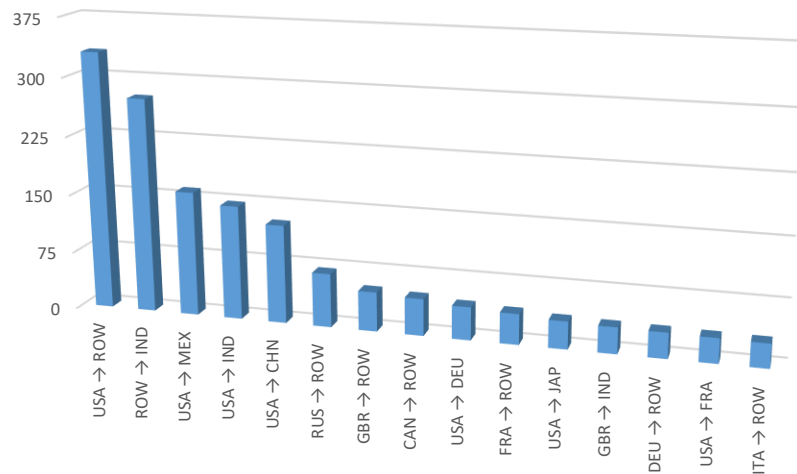
Accordingly, a 1% total final demand shock in the U.S. increases the Rest of the World GVA by about 350 million US$. Indeed, as shown in Figure 5, impacts of migrant remittances at international level are most sensitive, in absolute terms, to changes in the U.S. economy. Indeed, a change by 1% in the US final demand affects the GDP of economies in Mexico (by 160 million US$), India (by 140 million US$) and China (by 120 million US$) most and also more marginally the economies of Germany, Japan and France. The Rest of the World economy is the one that depends most on migrant remittances since 1% change in the final demand of countries such as, Russia (69 million US$), Great Britain (51 million US$), Canada (48 million US$), France (39 million US$), Germany (33 million US$) and Italy (31 million US$) can generate significate remittances flows that benefit this 'region' economy.

Despite the flows established between some of the world largest economies, migrant remittances can be of great importance to smaller economies that have ex-patriots spread around the world. Indeed, Figure 6 shows the most critical top 15 changes in GVA dependencies, in relative terms[6], when migrant remittances are included in the model.

Figure 6: Top 15 relative remittances impacts in GVA due to 1% change in final demand

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[6] In order to exclude more residual flows, the flows presented in Figure 5 represent a minimum of 1 million US$.
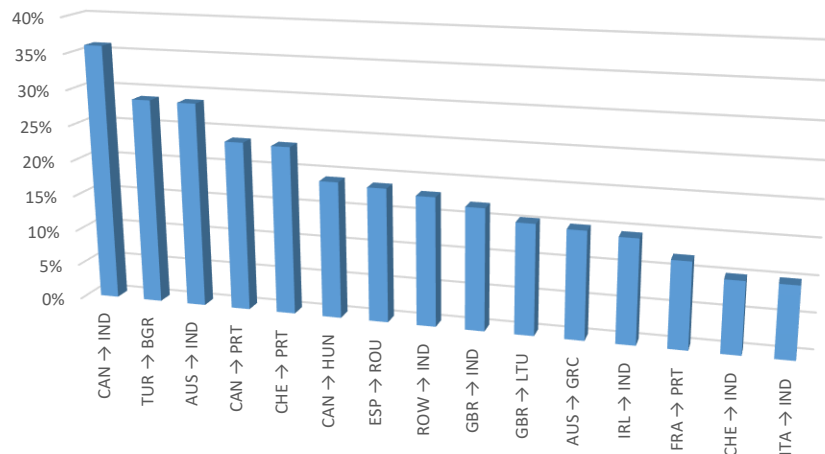
Accordingly, after including migrant remittances, a 1% change in final demand in Canada has an 36% additional impact on India's economy when compared with the scenario without remittances. This is not a unique case. India now also benefits more from changes in the final demand from the economies of Australia, the Rest of the World, Great Britain and, even, the Ireland. Another example is Portugal. Compared with former effects of 1% final demand in Canada, Switzerland or France, the specific effects in the Portuguese economy are now higher in 24%, 23% and 12%, respectively. Countries of eastern Europe also benefit somewhat from remittances. Bulgaria's embodied GVA in 1% of Turkish final demand is 29% high while a change in 1% of Spanish final demand enhances Romania's GVA by 19% more than without remittances. These results, highlight how remittances have the potential to grossly alter the extension of international interdependencies.

Summing up, the impacts generated by all related changes also help us to better understand the international effects of migrants on national economies. Assuming, the total impact of remittances in countries GVA, Table 1 shows the countries that induce a higher increase in other countries GVA as a share of their own national GVA and in contrast, those that benefit relatively more from remittances, as a share of its own national GVA.

Table 1: Top economies inducing and benefitting (in relative terms) due to remittances

Countries that induce an higher increase in remittances (measured as a share of their own GVA)		Countries that benefit more from remittances (measured as a share of their own GVA)	
Canada	1.12%	India	2.94%
Australia	0.84%	Mexico	1.39%
Russia	0.79%	Portugal	1.03%
France	0.70%	Malta	0.95%
Switzerland	0.66%	Bulgaria	0.91%

So, as it is possible to understand, in economies that stimulate large remittances outflows, the leakage to other national economies due to remittances is more important in the case of Canada. But, the increasing international outflow of these richer countries is offset by important gains in smaller more-fragile economies as India, Mexico, Portugal, Malta and Bulgaria. Besides the results presented in Table 1, it is important to highlight that the Rest of the World benefits approximately 0.5% of its GVA due to

remittances. This aggregate result hides some important effects of migrants' remittance for African, Asian or South American countries.

Finally, to better understand the consequences of incorporating remittances in a more comprehensive framework, U.S. results highlight one major finding of this application. As we noticed before, migrant remittances correspond to household income that is "transferred" abroad. This initial shock then generates a set of spillover and feedback effects resulting from increasing need of inputs in the economy. In the case of the U.S., the amount of effects that return to the national economy more than compensates the contractionary effect of resulting from national household coefficient consumption. This is mostly because U.S. benefits of its trading position with other national economies worldwide and their need to import American products to satisfy an increasing demand. This somehow unexpected result shows, at least, that remittances and international interdependencies are, at least, far more complex than some political discourse wants us to believe.

5. Conclusion

This paper shows that international transboundary income flows are quite important nowadays. In particular, we show that migrant remittances can strongly influence international dependencies. Indeed, it seems in some cases, the net result of the remittance interdependencies can be counter-intuitive, as in the case of the USA. In others, we find the size of remittance pathways are more than offset by the trade spillovers and feedbacks arising from the magnitude of consumer demand generated in migrants' home countries—the case of remittance sent by migrants now based in the United States.

Despite the veracity in the approach presented herein, we warn about believing too strongly in the country-to-country details of our findings. This is because the World Bank's data matrix on remittances knowingly contains discrepancies, with biases that are not perfectly understood. Most of the discrepancies are due to differences in the reporting of migration data across countries, which are similar in nature to those incurred by WIOD developers for the cases of trade and investment flows.[7] A prime of example of such discrepancies is that incurred when, say, second-generation French citizens of Algerian descent return to their ancestral homeland. Part of the labor compensation of such French immigrants to Algeria are assigned by the World Bank as remittances to France, a sizeable flow for which is unlikely to arise. So much more work must be done on remittance flows within the typical macro- and micro-economic frameworks before we can accept any conclusive findings.

Unfortunately, biased political discourse likely demotivates some public bodies from undertaking more-detailed studies of international remittances. Yet such discourse brings international migration issues to the foreground. Moreover, the continued free movement of capital will encourage ever-more international migration. This means remittance volume is likely to continue to climb and become even a more critical issue in international trade and macroeconomics studies. So regardless of the direction and flavor of any political discourse, a better understanding of the full impacts of remittances can certainly help policymakers design more effective laws and plans for their countries. Perhaps a more lucid view of the full ramifications of the financial transfers to and from a migrant's home country can dampen or even eliminate some of the ethnic prejudices now escalating in some developed countries.

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[7] "Such discrepancies arise because of differences in definition and reporting time" (World Bank, 2016, p. xv). For example, "some countries compile data based on citizenship of the migrant worker rather than their residency status. Further, data are shown entirely as either compensation of employees or personal transfers, although they should be split between the two categories if the [IMF] guidelines were correctly followed" (World Bank, 2016, p. xvii).

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