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A. Aubry and M. Burzyński

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The Welfare Impact of Global Migration in the OECD Countries*

Amandine Aubry †
IRES, Université catholique de Louvain

Michał Burzyński
IRES, Université catholique de Louvain and KEM, Poznan University of Economics

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Abstract

This paper quantifies the economic impact of global migration between 1990 and 2000 on the welfare of non-migrants living in the OECD countries. We develop a multi-country model accounting for the productivity, labor market, market size and fiscal consequences of migration. We compute the welfare impact of migration by education level, and identify the relative contribution of the four mechanisms. We show that the market size effect is the most important channel and the between-country effects exceed the within-country ones. Most OECD countries benefit from the South-North migration. Intra-OECD migration corresponds to a zero-sum game with only few winners.

JEL Classification : C68, F22, J24

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†Corresponding author: adbaubry@gmail.com. Address: IRES, Place Montesquieu 3, 1348 Louvain-la-Neuve, Belgium.

1 Introduction

Immigration and emigration are sources of welfare costs and benefits for non-movers. Debates are mainly focused on immigration, which has become a key policy issue in many host countries. Indeed, the average share of immigrants in the population of the OECD countries increased from 4.5 in 1960 to 10.6 percent in 2010 (United Nations (2013)). Over the same period, the share of immigrants from developing countries soared from 1.5 to 8 percent. Recent opinion polls reveal that non-migrants in high-income countries see immigration as economically detrimental for them. They fear adverse labour market consequences of immigration, fiscal costs or congestion effects.[1] Natives seem to consider immigration more as a problem rather than an opportunity, whereas emigration from OECD countries is missing from the overall picture. However, emigration coming from OECD countries is both non-negligible and skill-biased. On average, in the year 2000, 7.8 percent of natives from OECD countries emigrated (Docquier et al. (2014)). Emigration-driven losses in human capital may have serious welfare consequences for natives.

The objective of this paper is to quantify the economic impact of the current state of global migration (i.e. immigration of foreigners and emigration of natives) on the welfare of non-migrants living in each OECD country. We use a multi-country framework combining the major mechanisms highlighted in the contemporary literature. This allows us to assess the relative importance of each channel. Moreover, it enables us to identify whether the between-country effects of migration exceed the within-country (redistributive) ones. The latter are the main elements currently shaping public opinion on migration. We evaluate the effects of the recent flows and the total stocks of migrants. Finally, we distinguish between intra-OECD migration, referred to as North-North (or N-N) migration and extra-OECD migration, referred to as South-North (or S-N) migration.

The consequences of emigration have only been investigated in a handful of inquiries, while the majority of studies on immigration have not confirmed that immigrants induce large economic costs for natives. Moreover, economists have usually discussed the effects of migration in single-country, partial equilibrium frameworks. The analysis proposed in this paper combines four channels of transmission of migration shocks:

(i) It has abundantly been shown that the migration of workers has a direct influence on the relative wages of low and high-skilled people as well as on the income gap between older migrants and natives. These effects depend on the elasticities of substitution between types of workers (see Ottaviano and Peri (2012); Borjas (2013); Docquier et al. (2014); Battisti et al. (2014)). We define the *labor market effect* of migration as the change in relative wages due to the change in labour composition only.

(ii) Skill-biased migration can also influence the speed of knowledge accumulation and innovation, leading to a *TFP effect* of migration (i.e. a change in the level of the total factor productivity). The combined wage and TFP effects of immigration are studied in Peri et al. (2014). They find that flows of scientists, technology professionals, engineers and mathematicians have a significantly positive effect on the wages of college-educated non-migrants in the U.S., and almost no effect on the less educated. For the same reasons, origin countries might suffer from the negative consequences of high-skilled emigration.

[1] See The German Marshall Fund of the United States (2013).

(iii) Migration changes the number of net contributors to (and beneficiaries from) the welfare state and other public interventions. This phenomenon is referred to as the *fiscal effect* of migration and has recently been scrutinized in Dustmann et al. (2010), Facchini and Mayda (2012) and Dustmann and Frattini (2013) among others.

(iv) Labor mobility affects the geographic distribution of workers and the aggregate demand for domestic goods, which alters the number of products available for consumption. In a love-of-variety environment, such a change impacts directly the welfare of individuals (see Iranzo and Peri (2009) and di Giovanni et al. (2014)). This phenomenon has been referred to as the *market size effect* of migration. This last channel has been largely disregarded in the literature.

A growing consensus on the way to formalize and quantify these effects has emerged due to the development of new theoretical foundations and the availability of migration data. However, these effects are interdependent and cannot be studied in isolation. Little is known about their relative magnitudes and their interrelations. For example, changes in total factor productivity affect wages, the demand for goods and trade flows. Simultaneously and the changes in wage inequality directly influence the fiscal impact of migration. In addition, geographical disparities in the production of goods govern the interactions between countries through the incentives to trade. Assessing the welfare impact of migration for non-movers requires accounting for these interactions between countries and channels of transmission.[2] To the best of our knowledge, no study has quantified the relative magnitudes of the different migration effect preventing to capture their interactions. This paper aims to fill this gap by building a multi-country, general equilibrium model with heterogeneous labor. The setup is an extension of the model proposed by Krugman (1980), augmented with college and non-college educated workers, redistributive transfers, endogenous total factor productivity and complex labor market interactions between natives and migrants. The paper extends the ideas of the importance of the market size effect proposed by Iranzo and Peri (2009) and builds on the work of di Giovanni et al. (2014). The latter studies the implications of global migration for developed and developing countries in a monopolistic competition model with heterogeneous firms *à la* Melitz (2003). Contrary to them, we assume homogeneous firms in each country and disregard both the production of intermediate goods and the remittances sent by migrants to their country of origin. Assuming heterogeneous firms and intermediate inputs have both advantages and disadvantages. On the one hand, they might provide a more realistic representation of macro and micro features highlighted by the recent trade literature. On the other hand, they require to define firms' preferences towards intermediate goods and demand a precise calibration of the parameters of the distribution of firms' productivity and size. The former is difficult to model in a one sector framework and usually imposes the strong assumption of identical preferences for consumers and firms. The literature is still at its early stage concerning the latter and, due to data limitation, has essentially focused on the United States. Therefore, calibrating a model with heterogeneous firms requires assuming a homogeneous distribution of firms' productivity and size across countries, parameterized on the United States. Although di Giovanni and Levchenko (2013) provide important contributions to the literature on firms'

[2]The analysis is concentrated on the welfare impact for the natives, or non-movers, because this is the group that has the voting power and decides about the shape of immigration and fiscal policies. The gains for migrants are bound to be positive, therefore they are reported in the results, but generally not commented. On the contrary, the old waves of immigrants are the main losers of new immigration because of their sustainability with more recent waves of immigrations.

heterogeneity, we opt for a simpler and open model since our goals is to identify and quantify the main channels through which migration affects the economy as well as to capture their interactions. Indeed, we augment the previous study by modeling the fiscal impact of migration, technological externalities and by considering richer numerical experiments: we analyze the effect of total migration versus recent migration (i.e. migrants arrived between 1990 and 2000), either of S-N or N-N type. Our model allows us to quantify each channel studied in the literature and to compare whether the effect of migration on cross-country reallocation dominates its effect within countries.

The model endogenizes nominal wages, total factor productivity, redistributive transfers from the high-skilled to the low-skilled, trade between country pairs, prices and the numbers of varieties available for consumption. It is calibrated to fit the economic and demographic situations of the 34 OECD countries in the year 2000. The effect of global migration on welfare is then computed using counterfactual experiments, i.e. a total or partial repatriation of migrants to their home countries (i.e. if the legal barriers for migration, for example the visa costs, had been infinitely large). We identify the overall economic impact for the high-skilled and the low-skilled non-movers, and identify the relative contribution of the four main channels described above: the labor market, TFP, market size and fiscal effects.

The main findings of our paper are as follows. For the set of 34 OECD countries in the year 2000, the flow of 1990-2000 migrants increases the welfare of non-movers in most OECD countries (i.e. 21 economies). We observe that the gains are generally greater for the high-skilled than for the less educated. We obtain very similar aggregate patterns when considering the total stocks of migrants, including similar redistributive and wage effects. Overall migration is more beneficial for the high-skilled than for the low-skilled. As far as intra- and extra-OECD migrations are concerned, the inflow of non-OECD migrants in 1990s increases welfare in almost all the OECD countries. On the contrary, intra-OECD migration is a zero-sum game with a few winners (only 14 countries out of 34) and many losers (i.e. 20 countries). This is explained by the concentration of skilled OECD citizens in a limited number of destination countries (i.e. Australia, Luxembourg, Switzerland and the United States). Hence, many OECD countries face a large outflows of their college-educated workers.

Disentangling these changes reveals some interesting results. On the one hand, the welfare impact of migration differs across skill levels. This is the consequence of the labor market and fiscal effects of migration, the signs of which depend on the effect of migration on the proportion of high-skilled in the labor force. On average, the change in labor composition due to global migration reduces the low-skilled wages in the OECD countries, and increases the high-skilled wages. These labor market effects actually dominate the fiscal impact of migration; under our fixed-benefit redistributive scheme, the latter slightly reduces the incomes of the high-skilled. We find that the level of within-country inequality decreases with South-North migration, and increases with North-North migration. On the other hand, the TFP and market size effects identically affect all residents in a given country. Two important results emerge here. First, the size of these two "common" effects dominate the labor and redistributive effects. Hence, our simulations suggest that the between-country welfare implications of migration exceed the within-country ones. With a few exceptions, the TFP effects are negative and important. However, the market size effect counterbalances this negative impact and dominates, in line with di Giovanni et al. (2014). We find that the change in the number of varieties (1.4 percent, on average) is positive and large in

almost all countries (except in traditional emigration countries). Therefore, the second key result is that, although understudied in the literature, the market size effect is quantitatively the most important one. The gains in market size are mainly triggered by the extra-OECD migration. Intra-OECD migration is more a zero-sum game, in which international trade constitutes a channel of transmission of market size gains across countries.

The remainder of the paper is organized as follows. In the next section the theoretical model is derived. In Section 3, we describe the calibration strategy and examine its relevance by comparing its outcomes with the observations of variables that are not perfectly identified. Section 4 shows the analysis of the simulation results. In Section 5 the robustness checks with respect to the key parameters of the model are reported. Section 6 concludes.

2 Model

We develop a multi-country model endogenizing the economic effect of the global migration (i.e. immigration of foreigners and emigration of nationals) on the welfare of natives in the OECD countries. Four channels of influence are going to be distinguished: labor market effects, changes in total factor productivity (TFP), fiscal effects and changes in the mass of horizontally differentiated products available to consumers. We model the labor market and the TFP effects as in Docquier et al. (2014) and the "love-of-variety effect" as Krugman (1980). In particular, Krugman (1980) endogenizes the mass of varieties produced in a country as a function of the market size. By changing the mass and the type of consumers/workers in origin and destination countries, migration affects market size, total productivity, aggregate demand and the product diversity available to consumers. The resulting welfare impact is transmitted across countries by endogenous trade flows.

Our model is static and includes N countries indexed by $i \in \{1, 2, ..., N\}$.[3] Total population in country i is denoted by L_i^T and is divided into four types of individuals: L_i^L low-skilled natives, L_i^H high-skilled natives, L_i^l low-skilled immigrants and L_i^h high-skilled immigrants. We denote the worker's type by $m \in \{H, L, h, l\}$ and we assume that all agents have identical preferences. We use superscript S when aggregating high-skilled natives and foreigners (H, h), and subscript U when aggregating the less educated (L, l). The demographic structure is considered as exogenous, since we aim to quantify the "causal" impact of migration flows on income (as in di Giovanni et al. (2014); Docquier et al. (2014)). Individuals differ only in terms of income and place of residence, governing the access to local and foreign varieties. In this section we describe the preferences and technologies used to endogenize consumers' and firms' decisions. We then characterize the competitive equilibrium of the global economy.

[3] The choice of a static model is made for several reasons. First, we are interested only in the equilibrium states of goods and labor markets in order to provide a simple quantification of welfare. As the changes in population (migration shocks) are exogenous, the transitional dynamics is disregarded. Second, the data constraints (flows of people from 1990 to 2000) require that the results have to be interpreted as a medium-term state, in which the equilibrium number of firms adjusts simultaneously. Furthermore, the distribution of skills and wages, the fiscal policies and productivity react slowly, and the required time ranges up to one working-age generation. Finally, we would like to provide clear-cut results about the importance of the different channels in the welfare impact of migration. Dropping the simplifying assumption about the static environment would require, at least, introducing endogenous human capital formation, innovations, entrepreneurship as well as considering cross-country TFP spillovers and then would significantly complicate the model.

2.1 Preferences and consumers' decisions

The preferences of a representative consumer of type $m \in \{H, L, h, l\}$ living in country i are described by a CES utility function over a continuum of varieties indexed by k:

$$U_i^m = \left(\sum_{j \in N_i} \int_0^{B_i} q_{ij}^m(k)^{\frac{\epsilon-1}{\epsilon}} dk \right)^{\frac{\epsilon}{\epsilon-1}}, \tag{1}$$

where $q_{ij}^m(k)$ stands for the quantity of variety k produced in country j and consumed in country i by an agent of type m. The set of countries that export to country i is denoted by N_i, whereas B_i is the mass of varieties produced in country i. Varieties are imperfect substitutes, characterized by a constant elasticity of substitution equal to $\epsilon > 1$.[4]

The utility function (1) is maximized subject to a standard budget constraint:

$$\sum_{j \in N_i} \int_0^{B_j} p_{ij}(k) q_{ij}^m(k) dk = \tilde{w}_i^m.$$

where $p_{ij}(k)$ defines the price of variety k produced in country j and consumed in country i. $\tilde{w}_i^m$ represents the net (i.e. after-redistribution) nominal wage of a worker of type m who lives in country i. The representative consumer of group m is remunerated according to the type of labor she supplies. The CES preferences induce that she spends all her income on consumption and every available variety faces a positive demand (i.e. $\lim_{q_{ij}^m(k) \to 0} \frac{\partial U_i^m}{\partial q_{ij}^m(k)} = \infty$).

The demand function derived from the first-order condition of this maximization problem writes as:

$$q_{ij}^m(k) = \frac{p_{ij}^{-\epsilon}(k)}{P_i^{1-\epsilon}} \tilde{w}_i^m. \tag{2}$$

where P_i denotes the ideal price index in country i and is defined as:

$$P_i = \left[\sum_{j \in N_i} \int_0^{B_j} p_{ij}(k)^{1-\epsilon} dk \right]^{\frac{1}{1-\epsilon}}. \tag{3}$$

The latter expression reflects the underlying love-of-variety property of the CES utility function (1). Given that $\epsilon > 1$, a greater mass of varieties tends to lower the value of the price index. Intuitively, under CES preferences, the price index should be seen as an indicator of costs of living. Enlarging the mass of varieties reduces P_i and increases individual's welfare (keeping consumer's expenditure unchanged). Indeed, the individual indirect utility function is given by:

$$U_i^m = \left(\sum_{j \in N_i} \int_0^{B_j} \left(\frac{p_{ij}(k)^{-\epsilon}}{P_i^{1-\epsilon}} \tilde{w}_i^m \right)^{\frac{\epsilon-1}{\epsilon}} dk \right)^{\frac{\epsilon}{\epsilon-1}} = \frac{\tilde{w}_i^m}{P_i} \tag{4}$$

with $\frac{\partial P_i}{\partial B_j} < 0$ and so $\frac{\partial U_i^m}{\partial B_j} > 0$.

[4] We follow the traditional Krugman (1980) model by supposing that foreign and domestic products enter symmetrically in the utility function and are subject to the same elasticity of substitution.

From eq. (2), we derive the demand function faced by each firm, $q_i(k)$, and the total expenditure function in country i, X_i:

$$q_i(k) = \sum_{j=1}^{N} \sum_{m} q_{ij}^m(k) \qquad \text{and} \qquad X_i = \sum_{j=1}^{N} \int_0^{B_j} p_{ji}(k) q_{ji}(k) dk. \tag{5}$$

2.2 Technology and firms' decisions

In each country i, there is a mass B_i of firms that operate on a monopolistically competitive market. Therefore, strategic interdependences amongst firms are ruled out. Production requires labor, which is supplied inelastically by the four types of imperfectly substitutable workers. The labor market is perfectly competitive, so that each type of worker is remunerated according to her marginal productivity. Contrary to di Giovanni et al. (2014), we assume that firms are homogeneous in productivity within a country and labor is the unique production factor.

Each firm maximizes its profit, which then leads to the decision whether to enter the market or not, and what price to set once in. For the sake of clarity, we separately describe the two related sides of the profit maximization problem, i.e. the minimization of the unit cost of production for a given level of output, and the determination of the optimal price and output. We first describe the former that enables to highlight the labor demand for each type of worker as well as the aggregate labor demand. We continue with the latter that allows us to derive the pricing rule and the optimal output per firm.

2.2.1 Production function

The production function of firm k in country i is defined as a nested constant-elasticity-of-substitution (CES) function of workers. The upper level production function determines the quantity of high-skilled and low-skilled workers needed to produce $y_i(k)$, and is specified as:

$$y_i(k) = A_i \bar{\ell}_i^T(k) = A_i \left(\theta_i^S \left(\bar{\ell}_i^S(k) \right)^{\frac{\sigma_S - 1}{\sigma_S}} + \left(1 - \theta_i^S \right) \left(\bar{\ell}_i^U(k) \right)^{\frac{\sigma_S - 1}{\sigma_S}} \right)^{\frac{\sigma_S}{\sigma_S - 1}}, \tag{6}$$

where A_i is the country-specific level of total factor productivity (TFP henceforth), $\bar{\ell}_i^T(k)$ is total employment in efficiency units by firm k which divides into $\bar{\ell}_i^S(k)$ and $\bar{\ell}_i^U(k)$, total employment of high-skilled and low-skilled labor in efficiency units. Each factor is defined in terms of efficiency units to account for the inherent productivity of each type of worker and the benefits from interactions between groups. The elasticity of substitution, $\sigma_S \in (1, \infty)$, captures the imperfect substitutability between workers of different education levels. Parameter θ_i^S reflects the relative preference of firms for high-skilled labor.

The economy-wide TFP level, A_i, is endogenous and depends on the average proportion of high-skilled workers in the economy, g_i. We assume a concave functional form:

$$A_i = \bar{A}_i g_i^{\lambda}, \qquad \text{with} \qquad g_i \equiv \frac{L_i^H + L_i^h}{L_i^T}, \tag{7}$$

where λ is the elasticity of A_i with respect to g_i. The TFP level varies with a change in the composition of the labor force.

Moreover, it is well documented that conditional on education, immigrants and natives are imperfect substitutes. Recent papers (such as Ottaviano and Peri (2012); Manacorda et al. (2012)) find imperfect degrees of substitution between these two types of worker. To account for this, we define the efficient labor supply for each level of education as a CES function of native and immigrant employment:

$$\begin{aligned}\bar{\ell}_i^U(k) &= \left[\theta_i^M \left(\ell_i^L(k)\right)^{\frac{\sigma_M-1}{\sigma_M}} + \left(1-\theta_i^M\right)\left(\ell_i^l(k)\right)^{\frac{\sigma_M-1}{\sigma_M}}\right]^{\frac{\sigma_M}{\sigma_M-1}}, \\ \bar{\ell}_i^S(k) &= \left[\theta_i^M \left(\ell_i^H(k)\right)^{\frac{\sigma_M-1}{\sigma_M}} + \left(1-\theta_i^M\right)\left(\ell_i^h(k)\right)^{\frac{\sigma_M-1}{\sigma_M}}\right]^{\frac{\sigma_M}{\sigma_M-1}}.\end{aligned} \tag{8}$$

where the country-specific θ_i^M is a parameter of relative preference for national workers, and $\sigma_M \in (1,\infty)$ is the elasticity of substitution between national and foreign workers.[5]

2.2.2 Optimal labor demand

The before-tax nominal wage rate for a worker of type $m \in \{H, L, h, l\}$ is denoted by w_i^m. Since the labor market is competitive, firms take w_i^m as given. The ideal (composite) wages of efficient low-skilled and high-skilled workers, denoted by W_i^U and W_i^S, and the ideal composite aggregate wage, denoted by W_i, result from the cost minimization described below. As high-skilled workers are usually observed to be more productive, we assume that $W_i^S > W_i^U$; and within each skill category, nationals are usually better paid than immigrants (reflecting, for instance, the imperfect transferability of skills across countries): $w_i^H > w_i^h$ and $w_i^L > w_i^l$.

The optimal labor demand allocated to the production process is determined by a two-stage cost minimization. First, for a given production level $y_i(k)$, each firm chooses the optimal combination of high-skilled and low-skilled workers that minimizes the total labor cost:

$$\min_{\bar{\ell}_i^S(k),\bar{\ell}_i^U(k)} W_i^S \bar{\ell}_i^S(k) + W_i^U \bar{\ell}_i^U(k)$$

$$s.t.\ A_i\left(\theta_i^S\left(\bar{\ell}_i^S(k)\right)^{\frac{\sigma_S-1}{\sigma_S}} + \left(1-\theta_i^S\right)\left(\bar{\ell}_i^U(k)\right)^{\frac{\sigma_S-1}{\sigma_S}}\right)^{\frac{\sigma_S}{\sigma_S-1}} \geq y_i(k).$$

The first-order conditions determine the optimal demand for efficient low- and high-skilled workers in firm k:

$$\bar{\ell}_i^S(k) = \frac{y_i(k)}{A_i}\left(\frac{\theta_i^S W_i}{W_i^S}\right)^{\sigma_S} \qquad \text{and} \qquad \bar{\ell}_i^U(k) = \frac{y_i(k)}{A_i}\left(\frac{(1-\theta_i^S) W_i}{W_i^U}\right)^{\sigma_S}, \tag{9}$$

where W_i is the aggregate wage index and is defined as:

$$W_i = \left[\left(\theta_i^S\right)^{\sigma_S}\left(W_i^S\right)^{1-\sigma_S} + (1-\theta_i^S)^{\sigma_S}\left(W_i^U\right)^{1-\sigma_S}\right]^{\frac{1}{1-\sigma_S}}. \tag{10}$$

Equations (9) show that the demand for each type of worker increases with a given output $y_i(k)$ and decreases with the composite labor cost for this type of worker. Due to the imperfect substitution

[5] We constraint the native-immigrant elasticity to be the same across education. Indeed, to the best of our knowledge, there is no consensus on the elasticities of substitution within each group once we relax this constraint. For instance, Card (2009) finds that less-educated immigrants and natives are closer to perfect substitutes than skilled immigrants and natives. Ottaviano and Peri (2012) find the opposite results.

between the inputs, the labor demand for each skill level is a function of all inputs' prices (through the aggregate wage index W_i). Then, the higher the elasticity of substitution between the two types of workforce, σ_S, the higher the demand for the relatively cheaper type of labor.

Second, each firm chooses the optimal combination of national and foreign workers within each education category, taking the total supply of efficient high and low-skilled labor as given (see eq. (9)). Firms solve the following cost minimization for high-skilled workers:

$$\min_{\ell_i^H(k),\ell_i^h(k)} w_i^H \ell_i^H(k) + w_i^h \ell_i^h(k)$$

subject to

$$s.t. \left(\theta_i^M \left(\ell_i^H(k)\right)^{\frac{\sigma_M-1}{\sigma_M}} + \left(1-\theta_i^M\right)\left(\ell_i^h(k)\right)^{\frac{\sigma_M-1}{\sigma_M}}\right)^{\frac{\sigma_M}{\sigma_M-1}} \geq \bar{\ell}_i^S(k).$$

The optimal labor demands for skilled natives and migrants are then equal to:

$$\begin{aligned} \ell_i^H(k) &= \bar{\ell}_i^S(k)\left(\frac{\theta_i^M W_i^S}{w_i^H}\right)^{\sigma_M} \\ &= \frac{y_i(k)}{A_i}\left(\frac{\theta_i^S W_i}{W_i^S}\right)^{\sigma_S}\left(\frac{\theta_i^M W_i^S}{w_i^H}\right)^{\sigma_M} \end{aligned} \tag{11}$$

and

$$\begin{aligned} \ell_i^h(k) &= \bar{\ell}_i^S(k)\left(\frac{(1-\theta_i^M) W_i^S}{w_i^h}\right)^{\sigma_M} \\ &= \frac{y_i(k)}{A_i}\left(\frac{\theta_i^S W_i}{W_i^S}\right)^{\sigma_S}\left(\frac{(1-\theta_i^M) W_i^S}{w_i^h}\right)^{\sigma_M} \end{aligned} \tag{12}$$

where W_i^S is the remuneration of the efficient high skilled labor composite described by eq. (9), which we refer to as a wage index for the high-skilled:

$$W_i^S = \left[\left(\theta_i^M\right)^{\sigma_M}\left(w_i^H\right)^{1-\sigma_M} + \left(1-\theta_i^M\right)^{\sigma_M}\left(w_i^h\right)^{1-\sigma_M}\right]^{\frac{1}{1-\sigma_M}}. \tag{13}$$

Labor demand and wage index for the low-skilled natives and migrants are derived in a symmetric way and lead to the following wage index:

$$W_i^U = \left[\left(\theta_i^M\right)^{\sigma_M}\left(w_i^L\right)^{1-\sigma_M} + \left(1-\theta_i^M\right)^{\sigma_M}\left(w_i^l\right)^{1-\sigma_M}\right]^{\frac{1}{1-\sigma_M}}. \tag{14}$$

The homogeneity of firms induces that $\ell_i^S(k) = \ell_i^S$ and $\ell_i^U(k) = \ell_i^U$. For the sake of clarity, we will then drop the index k henceforth. Summing these values across all firms gives the aggregate labor demand for each type of worker.

The above described cost minimization problem determines the optimal unit cost of production for each firm:

$$c_i = \frac{w_i^H l_i^H + w_i^h l_i^h + w_i^L l_i^L + w_i^l l_i^l}{y_i} = \frac{W_i}{A_i}, \tag{15}$$

as well as the labor demand for the share of the workforce allocated to the production process and the total labor demand in the economy i. To enter the domestic market, each firm in country i faces a fixed

entry cost, f_i, measured in the units of the efficient labor composite.[6] This cost can be interpreted as an investment that a firm must make in order to differentiate its product. Therefore, the aggregated demand for labor also includes the one for those workers who are employed for investment purposes. The amount of efficient labor required to create a mass B_i of firms (i.e. the fixed cost of entry) equals $B_i f_i$. Their total cost amounts to $B_i f_i W_i$. The total share of efficient labor devoted to creating firms is then $\xi \equiv \frac{f_i B_i W_i}{W_i \bar{L}_i^T} = \frac{1}{\epsilon}$ and the remaining share $1-\xi$ (i.e. $\frac{\epsilon-1}{\epsilon}$) of workers is employed to produce the final good.[7] Therefore, the efficient labor per firm, $\bar{\ell}_i^T$, can be written as

$$\bar{\ell}_i^T = \frac{\epsilon - 1}{\epsilon} \frac{\bar{L}_i^T}{B_i}, \tag{16}$$

Consequently, given that the share of labor allocated to the firm creation is constant, the total efficient labor demand in the economy is defined as:

$$\bar{L}_i^T = B_i \left(f_i + \bar{\ell}_i^T \right).$$

The labor market clearing conditions imply that the aggregate labor demand for each type of worker $m \in \{L, H, l, h\}$ equals the exogenously given country endowment L_i^m.

$$\begin{aligned}
L_i^L &= \bar{L}_i^T (1-\theta_i^S)^{\sigma_S} \left(\theta_i^M\right)^{\sigma_M} (W_i)^{\sigma_S} \left(W_i^U\right)^{\sigma_M - \sigma_S} (w_i^L)^{-\sigma_M}, \\
L_i^H &= \bar{L}_i^T \left(\theta_i^S\right)^{\sigma_S} \left(\theta_i^M\right)^{\sigma_M} (W_i)^{\sigma_S} \left(W_i^S\right)^{\sigma_M - \sigma_S} \left(w_i^H\right)^{-\sigma_M}, \\
L_i^l &= \bar{L}_i^T (1-\theta_i^S)^{\sigma_S} (1-\theta_i^M)^{\sigma_M} (W_i)^{\sigma_S} \left(W_i^U\right)^{\sigma_M - \sigma_S} (w_i^l)^{-\sigma_M}, \\
L_i^h &= \bar{L}_i^T \left(\theta_i^S\right)^{\sigma_S} (1-\theta_i^M)^{\sigma_M} (W_i)^{\sigma_S} \left(W_i^S\right)^{\sigma_M - \sigma_S} (w_i^h)^{-\sigma_M}.
\end{aligned} \tag{17}$$

2.2.3 Optimal price and output

The firm's profit maximization determines the price and quantity produced per firm. Each firm differentiates its product. Indeed, the love-of-variety assumption induces that every variety is consumed, consequently, two firms do not manufacture the same product. At the same time, since we assume a continuum of firms, the effect of the pricing rule of each firm on the demand for another's product is negligible. Therefore, each firm faces a residual demand curve with a constant elasticity of substitution equal to ϵ and then chooses the same markup $\epsilon/(\epsilon-1)$ which yields the following pricing rule:

$$p_i = \frac{\epsilon}{\epsilon - 1} c_i = \frac{\epsilon}{\epsilon - 1} \frac{W_i}{A_i}. \tag{18}$$

Where c_i is the marginal cost of production defined by eq. (15). Moreover, a firm from country i can export its product to country j, but faces an iceberg trade cost $\tau_{ij} > 1 \; \forall \; i \neq j$ if it does. Hence, the price paid by consumers in country j for the goods produced in country i equals to $p_{ij} = p_j \tau_{ij} \; \forall i \neq j$. Due to the love-of-variety property of the preferences, each firm exports to all foreign markets as long as

[6] We assume that firms have perfect information about the costs of entry, thus they will be indifferent between paying the one-time investment cost $\bar{f}_i$ and the amortized, discounted, per-period portion of this cost $f_i = \bar{f}_i / d_i$. In a dynamic framework, d_i would be the expected age of a firm operating in country i.

[7] We assume that both the marginal entrepreneur and the marginal worker are remunerated identically, so that those two agents are indifferent between being employed and starting a firm.

the trade cost is finite.

The output per firm, y_i, is determined by the profit maximization and the free entry condition. Indeed, as long as the profits are positive, new firms will enter the market causing profits to fall, until they are driven to zero. In equilibrium, the profit of each firm is equal to zero:

$$\pi_i = (p_i - c_i)\, y_i - W_i f_i = 0, \tag{19}$$

By replacing the price by its value defined in eq. (18) in the zero profit condition, we derive the output per firm:

$$y_i = (\epsilon - 1) A_i f_i. \tag{20}$$

Finally, we derive the mass of varieties B_i produced in economy i as a function of the country size. To do so, we define the total production in economy i, that is $B_i y_i$. We then substitute eq. (16) for $\bar{\ell}_i^T$ into eq. (6) and equalizes it to the value defined in eq. (20).

$$B_i y_i = B_i A_i \bar{\ell}_i^T = A_i \tfrac{\epsilon-1}{\epsilon} \bar{L}_i = B_i (\epsilon - 1) A_i f_i,$$

The mass of varieties produced in a given country is then equal to:

$$B_i = \frac{\bar{L}_i^T}{\epsilon f_i}. \tag{21}$$

This result is similar to the one derived by Krugman (1980). The equilibrium number of firms in a particular country is proportional to the size of the country, $\bar{L}_i^T$ and inversely proportional to the fixed cost, f_i. In line with the recent literature (see Helpman et al. (2008)), we assume a country specific entry cost. Therefore, a reallocation of the population across countries may change the aggregate mass of varieties. Indeed, if the workforce moves to countries with lower entry cost, the aggregate mass of varieties increases, potentially enhancing the global welfare.

Given the zero profit condition, the good market clearing condition implies that the total spending X_i defined in eq. (5) equals the value of domestic production. Finally, aggregating the country-pair-specific expenditure, $p_{ij} q_{ij}$ from eq. (2), we obtain a simple representation of export from country j to country i that enables to estimate the trade cost τ_{ij}:

$$\frac{X_{ij}}{X_j} = \frac{X_i \left(P_i / \tau_{ij}\right)^{\epsilon-1}}{\sum_{h=1}^{N} X_h \left(P_h / \tau_{hj}\right)^{\epsilon-1}}. \tag{22}$$

The Walras law guarantees the equilibrium of the balance of payments for each country i (i.e. $\forall i \in N$: $\sum_j X_{ij} = \sum_j X_{ji}$).

2.3 Redistribution

Our model accounts for redistributive taxes and transfers. We assume that a proportional tax is levied on high-skilled workers (both nationals and foreigners) to increase the income of all low-skilled workers. We denote the tax rate on the high-skilled workers' nominal income and the subsidy rate for the low-skilled ones by t_i and b_i, respectively. Therefore, the after tax income of a high-skilled worker is equal

to $\tilde{w}_i^m = (1 - t_i)w_i^m$ for $m \in \{H, h\}$ while the one of a low-skilled individual after the transfer equals $\tilde{w}_i^m = (1 + b_i)w_i^m$ for $m \in \{L, l\}$. The government budget constraint writes as:

$$t_i \left(w_i^H L_i^H + w_i^h L_i^h\right) = b_i \left(w_i^L L_i^L + w_i^l L_i^l\right). \tag{23}$$

In our numerical analysis, we assume a fixed-benefit redistributive scheme, as in Facchini and Mayda (2012). Hence, the tax rate adjusts to balance the government budget. One can observe that by changing the ratio of high-skilled to low-skilled workers in origin and destination countries, migration affects the number of beneficiaries and contributors to the redistributive scheme.

An alternative way of modelling the effect of migration on public participation could account for the effect of migration on the provision of public goods as Battisti et al. (2014). If the quantity of public goods is not affected by the population size (e.g. national defense), immigration allows sharing the cost of these goods among a larger number of individuals, while emigration has the opposite effect. If the cost of providing public goods increases with population size (e.g. fire protection services, justice), these effects depend on the externalities caused by net migration. Disregarding public goods, our model is likely to provide conservative estimates of the redistributive effects of intra-OECD migration (i.e. the gains from immigration and the costs from emigration) and of the gains from extra-OECD immigration.

2.4 Competitive equilibrium

The monopolistic competitive equilibrium is a set $\{A_i, w_i^m, W_i, W_i^S, W_i^U, c_i, q_i, p_i, P_i, B_i, t_i\}_{i \in N}$ such that for a set of common parameters $\{\epsilon, \lambda, \sigma_S, \sigma_M\}$, a set of country-specific parameters $\{\theta_i^S, \theta_i^U, \bar{A}_i, f_i, b_i\}_{i \in N}$, the matrix of country-pair trade costs $[\tau_{ij}]_{i,j \in N}$ and country-specific efficient labor endowments $\bar{L}_i^T$, $\bar{L}_i^U$ and $\bar{L}_i^S$, the following conditions are satisfied:

(i) consumers maximize utilities,

(ii) firms maximize profits,

(iii) good and factor markets clear,

(iv) profits in the economy equal zero,

(v) the government budget is balanced in each economy $i \in N$,

and are reflected by the set of equations: $\{(2), (3), (7), (10), (13), (14), (15), (17), (18), (21), (23)\}$.

2.5 Welfare decomposition

The proposed model enables to decompose the indirect utility function of an individual of type m in country i (defined as the real wage in eq. (4)) as the following:

$$\frac{dU_i^m}{U_i^m} = \frac{dw_i^m}{w_i^m} - \frac{dP_i}{p_i} + \frac{d(1 - t_i^m)}{(1 - t_i^m)}.$$

The total change in welfare is then divided into five economic channels altered by migration: the labor market and the TFP effects (which influence the nominal wages), the market size and the general equilibrium effects (which have an impact on the price indexes) and the fiscal effect (that alters the tax rate on the income of the high-skilled). The formal decomposition is depicted in detail in Figure 1.

The labor market (or nominal wage) effect is the most common channel highlighted in the literature. A change in the size and in the composition of the labor force must affect the wages of heterogeneous agents, due to the fact that low and high-skilled workers as well as natives and migrants are imperfect substitutes. By changing the skill structure of the labor force, migration changes the marginal productivity of non-migrant workers. In particular, low-skilled immigrants increase the wage of skilled workers and reduce the wage of their counterpart. Emigration leads to opposite effects.

The fiscal effect forms another channel that is identified in our model. Using eq. (23), we quantify the extent to which migration affects the tax rate imposed on the high-skilled. The latter operates through a change in the number of beneficiaries and contributors to the fiscal scheme. Those first two channels determine the effects of migration within a country.

However, migration may also affect each economy as a whole and may then reallocate resource across countries. Indeed, a larger supply of high-skilled workers may positively influence the productivity. This process is referred to as the TFP effect, which impacts the nominal wages of all types of workers in the same way. According to eq. (7), if migration (i.e. immigration and emigration) leads to a higher proportion of the well-educated workers in the population, the total productivity improves, which leads to a rise in the nominal wages of all types of workers.

Beyond the traditional wage effects, the presented model derives recently uncovered gains from migration that may affect global welfare (including countries subject to emigration). Net immigration does not only modify the structure of the workforce, but also stimulates domestic demand. A change in demand may alter the number of varieties available for consumption (see eq. (21)). This channel is captured by a fall in the price index (3). Due to the presence of trade costs, this increase in demand is biased towards domestic varieties (if the wage differences across countries do not offset this advantage). Indeed, in eq. (3), each variety is weighted by its price (including the trade cost). Other things equal, an increase in the mass of varieties produced in country i leads to a fall in the price index. Moreover, global migration may increase the total available mass of varieties, if the population moves towards more efficient economies (i.e. countries with lower entry costs), as shown in eq. (21). Therefore, in the presence of trade, the sending countries could gain from migration if the aggregate mass of varieties increases. The market size effect is challenging to quantify, because the changes in the price index capture not only the shifts in the masses of varieties but also the alteration of nominal wages. We isolate the welfare gains from varieties by computing the change in the price index keeping all other variables (i.e. wages and taxes) constant.

As nominal wages affect the marginal costs and prices, interdependencies arise between the channels. The difference between the total effect and the sum of the labor market (coming from both nominal wages and TFP) and the market size effects, taken in isolation, is referred to as the general equilibrium effect. This channel represents the impact of nominal wages on the price indexes.

3 Calibration and validation

We solve the multi-country general equilibrium model described in Section 2 for the 34 OECD countries and the Rest of the World (ROW), i.e. the aggregation of all non-OECD countries. To do so, we use

stocks and net flows (i.e. the difference between the stock in 2000 and the one in 1990) of migrants from Artuc et al. (2014). They are disaggregated by education level, origin and destination countries. Table 8 describes the size and structure (by education level and origin) of the labor force in each country. We explain below how we calibrate the parameters of the model. Four of them are common to all countries and are calibrated using insights from the literature, whereas five of them are country-specific. Bilateral trade costs are specific to each country pair and are empirically estimated.

3.1 Common parameters

The model includes four common parameters, $\{\epsilon,\ \lambda,\ \sigma_S,\ \sigma_M\}$. The elasticity of substitution between varieties of goods, ϵ, was estimated by Feenstra (1994) in the range of [2.96; 8.38] and by Broda and Weinstein (2006). We take $\epsilon = 4$. The elasticity of the TFP with respect to the proportion of college graduates in the labor force, λ, has been estimated in many papers. It ranges from 0 in Acemoglu and Angrist (2001) to 0.75 in Moretti (2004). We use an intermediate value of $\lambda = 0.3$. Finally, we follow Docquier et al. (2014) in setting the values of σ_S and σ_M. We take their intermediate value within the range of elasticities found in the literature: $\sigma_S = 1.75$ and $\sigma_M = 20$. The sensitivity of our results to the parameter values is investigated in Section 5.3.

3.2 Country-pair parameters

It is well established that bilateral trade costs $[\tau_{ij}]_{i,j\in N}$ play a major role in shaping trade patterns. In line with Anderson and van Wincoop (2003), our micro-founded bilateral trade flows are fully compatible with a standard gravity model, which can be properly estimated. To construct the matrix of bilateral trade costs $[\tau_{ij}]_{i,j\in N}$, we first estimate the following log-linearized regression of bilateral trade flows, derived from eq. (22):

$$\begin{aligned}\ln(X_{ij}) \quad = \quad & \beta_0 + \lambda_i + \phi_j + \beta_1 \ln(Dist_{ij}) + \beta_2 Border_{ij} + \beta_3 Leg_{ij} + \beta_4 Lang_{ij} + \beta_5 Col_{ij} \\ & + \beta_6 CU_{ij} + \beta_7 FTA_{ij} + u_{ij},\end{aligned}$$

where λ_i and ϕ_j are fixed effects for the importing and the exporting countries respectively. They capture the country-specific GDP level and the price index defined in eq. (22). Trade barriers, τ_{ij}, are explained by standard bilateral variables that affect the volume of exports. This set of controls includes the geographic distance ($Dist$) between the two countries and dummies for common border ($Border$), legal system (Leg), common language ($Lang$), colonial ties (Col), common currency (CU) and the existence of regional trade agreement (FTA).

Data on trade flows for the year 2000 and distances are taken from the CEPII gravity dataset.[8] The standard errors are adjusted for heteroskedasticity. Our sample is composed of the OECD countries and

[8] This dataset does not disentangle trade flows from Belgium and Luxembourg. We then collect the data for those two countries. Trade flows are from the UN Comtrade Statistics Database, RTA from the the WTO web site and data on common legal origins of the two countries are available from Andrei Shleifer's website. Finally, trade flows between Australia and Luxembourg, and Turkey and Luxembourg are not reported for the year 2000. As Belgium is the most similar country to Luxembourg, we predict trade flows between those countries using the Belgian observations.

other large trade partners, therefore zero trade flows are negligible in our sample.[9] Consequently, our estimation does not suffer from either omitted variables bias or selection bias as highlighted by Helpman et al. (2008). We compute the bilateral trade cost as:

$$\tau_{ij} = \hat{\beta}_1 ln(Dist_{ij}) + \hat{\beta}_2 Border_{ij} + \hat{\beta}_3 Legal_{ij} + \hat{\beta}_4 Language_{ij} + \hat{\beta}_5 Colonial_{ij} + \hat{\beta}_6 CU_{ij} + \hat{\beta}_7 FTA_{ij}$$

As trade costs are derived from geographical characteristics and common institutional setting of both countries, they are symmetric for each pair of countries (i.e. $\forall i, j\ \tau_{ij}{=}\tau_{ji}$). The estimations range in $\tau_{ij} \in [4.8; 11.1]$, and the average trade cost weighted by the trade value equals 2.2 (notice that $\tau_{ii} = 1$).

3.3 Country-specific parameters

The model includes five country-specific parameters, $\{f_i, \theta_i^S, \theta_i^U, b_i, \bar{A}_i\}_{i \in N}$.

As for the fixed cost of entry, f_i, we use the Doing Business database and the World Development Indicators from the World Bank. We construct an indicator from three measures of the entry cost: the number of days needed to fulfill the formal requirements to establish a firm, the cost of starting a business (as a percentage of GDP per capita), and the share of new firms registered. Then, the indicator is normalized by the minimum value (achieved by Norway). The value per se of the fixed cost is of less importance for our quantitative results because we concentrate on percent changes between two equilibria and not on the level (see Section 5.4). Multiplying all the f_i's by a constant alters the mass of varieties in all the countries, but has no impact on the magnitude of effects expressed as a percent variation in welfare between the reference and counterfactual scenarios. Finally, the values of the fixed cost are obtained in the range of 1 to 3.64.[10]

The firms' preferences for each group of workers (i.e. θ_i^S, θ_i^M) are computed using the data on income disparities by education level and origin. Wage ratios are given by the following expressions:

$$r_i^S = \frac{w_i^H L_i^H + w_i^h L_i^h}{L_i^H + L_i^h} \Big/ \frac{w_i^L L_i^L + w_i^l L_i^l}{L_i^L + L_i^l} \qquad r_i^M = \frac{w_i^L L_i^L + w_i^H L_i^H}{L_i^L + L_i^H} \Big/ \frac{w_i^l L_i^l + w_i^h L_i^h}{L_i^l + L_i^h}.$$

The data on the wage ratio between college graduates and the less educated, r_i^S, are taken from Hendricks (2004), while the data on the wage ratio between immigrants and non-migrants, r_i^M, come from Büchel and Frick (2005). Combining these sources with data on the relative population shares from Artuc et al. (2014), we compute firms' preference parameters as follows:

$$\theta_i^S = \frac{r_i^S}{1 + r_i^S} \qquad \theta_i^M = \frac{r_i^M}{1 + r_i^M}.$$

This procedure ensures that θ_i^S and θ_i^M match the actual labor income shares in each country.

[9] Apart from 34 OECD countries, we consider the Rest of the World (ROW). For all of the gravity variables ROW is a weighted average of the 10 largest non-OECD countries: Argentina, Brazil, China, Algeria, Egypt, Indonesia, India, Russia, Saudi Arabia, South Africa. We compute the trade volume by summing exports of all those non-OECD countries.

[10] Entry costs play a key role in defining the efficiency gains from migration. As the majority of workers move from the high entry cost countries to the more advanced ones, these variables are at the foundations of the magnitude of the market size effects and the global welfare effects of migration. This feature of the model links our findings with a classical Heckscher-Ohlin mechanism which forces the productive factors to move from the regions where they are abundant to the ones where they are scarce.

As far as redistributive transfers are concerned, b_i is calibrated to match perfectly the effect of the welfare state on the Gini inequality index. We use the "before/after redistribution" ratio of Gini indexes provided by Immervoll and Richardson (2011). Finally, the TFP residual, $\bar{A}_i$, is identified to fit the zero-profit equilibrium conditions, country by country.[11]

3.4 Model fit

In order to establish the relevance of the calibration, we examine whether it matches some actual observations. In our model, the variable B_i may be interpreted as an indicator of the market size (being a function of the efficient labor force, $\bar{L}_i^T$), and is highly correlated with the actual population level (0.98).

The TFP residuals, gathered in the vector $[\bar{A}_i]_{i\in N}$, are calculated from the equilibrium conditions, and can be compared to the measures of labor efficiency. The cross-country correlation between the TFP variable A_i and actual data on labor productivity is equal to 0.61. One has to remember that the computed residual and TFP values incorporate more than just the level of technology or labor productivity (for example, these variables may be additionally affected by: the quality of institutions, infrastructure, legislation, quality of education and social capital).

The nominal wages predicted by the model are in line with the actual data. The composite wage rates $[W_i]_{i\in N}$ are correlated with the cross-section average annual wages published by OECD, giving a correlation rate of 0.80.[12]

The trade matrix that is constrained by the gravity eq. (22) and the trade balance requirements plays a key role for the calibration of our model. Substituting the values of GDPs, price indexes and calibrated iceberg trade costs to eq. (22) gives a full trade matrix between the OECD countries, which fits the actual trade data fairly well. We obtain a correlation of 0.99 for the total matrix of the trade values (including the values of internal consumptions) and 0.95 for the bilateral trade shares.[13] Accounting only for the bilateral, between-countries trade flows, that is for $X_{ij}\ \forall i \neq j$, the correlation is 0.83.

4 Results

In the quantitative exercise, the set of countries includes the 34 OECD economies and the Rest of the World (ROW) in the year 2000. To quantify the impact of migration on welfare, we compare the observed utility levels (i.e. changes in real net-of-tax wage) with counterfactual values, obtained when migrants are sent back to their home countries. To assess the relative impact of global migration, changes in utility are expressed as percentage deviations from the no-migration counterfactual for each type of worker:

$$\frac{\Delta U_i^m}{U_i^m} = \frac{(U_i^m)_{Reference} - (U_i^m)_{Counterfactual}}{(U_i^m)_{Counterfactual}}.$$

Hence, a positive (or negative) deviation implies a welfare gain (or loss) from global migration.

[11] For a detailed description of the calibration and simulation algorithms, see Appendix.

[12] There were no data for Chile, Iceland, Israel, Mexico, New Zealand, Slovenia and Turkey. We also omit the ROW composite.

[13] Trade share for a given country i are calculated as ratios between the value of export from country i to another country j divided by the GDP of country i.

In the benchmark analysis, the counterfactual consists of repatriating all the migrants that arrived to their destination countries between 1990 and 2000. There are two reasons to focus on current migration. First, recent migrants are less assimilated and likely to exhibit stronger complementarities with native workers on the labor market. On the contrary, the immigration stock includes old waves of better assimilated immigrants who have gradually become closer substitutes to natives (as a matter of comparison, we simulate a repatriation of the total stock of migrants in Section 5). Second, it is worth noticing that the empirical studies of the interactions between immigrant and native workers are usually based on the recent flows of workers. Finally, recent legal migrants are more educated than older immigrants. Focusing on newer immigration enables to shed light on the current patterns of global migration.

We first present the results of the simulations concerning the welfare impact of global migration on all types of workers. Two groups of migrants are distinguished: the intra-OECD (N-N) and the extra-OECD (S-N) migrants.[14] Extra-OECD immigration is usually perceived as a massive inflow of uneducated people trying to gain access to the labor markets and welfare systems of rich countries. Intra-OECD migration is less frequently seen as problematic in opinion polls.[15] Second, the welfare decomposition described in section 4.1 describes the relative contribution of the labor market, TFP, fiscal and market size effects, as well as the residual general equilibrium channel. Finally, we highlight the role of international trade in propagating welfare changes across countries.

4.1 Welfare of non-migrants

Table 2 gives the percentage deviations in utility, for all types of workers, after repatriating all, N-N and S-N migrants to their homelands. Countries are ordered by decreasing magnitude of the total welfare effect. Focusing on aggregate welfare effects for all non-migrants (column 1), the average OECD country experiences a net gain from global migration. It is worth noticing that more countries are winning (i.e. 21 economies) than losing (i.e. 13 countries) in the set of OECD economies.

Nevertheless, the aggregate effect varies substantially across countries. A handful of OECD countries are able to reap large benefits from migration: Australia (+5.1%), Switzerland (+3.6%), Iceland (+3.4%), Canada (+3.2%) or Luxembourg (+3.1%).[16] More generally, economies benefiting from global migration are industrialized nations with relative large inflows of immigrants. On the contrary, welfare losses are obtained for the traditional emigration countries, i.e. new members of the European Union, Mexico or Portugal. In the last two cases, global migration reduces net-of-tax real wages by about 3 to 4 percent.

The welfare impact also varies across labor types. Columns 2 to 5 report utility changes for each type of worker, high-skilled and low-skilled natives as well as older waves of immigrants. In economies where aggregate effects are detrimental, college graduates are less adversely affected than the less educated. In contrast, considering the richer economies, the low-skilled are benefiting more than the college-educated. These redistributive implications are driven by the effect of global migration on the skill composition of the labor force. Finally, economically speaking, older waves of migrants are less likely to benefit from recent migration.

[14] Section 5 discusses further the comparability of these two experiments.
[15] See Transatlantic Trends 2013.
[16] Israel (exceptionally large inflows of immigrants) and Estonia (exceptionally large outflows of emigrants) are treated as outliers and are not commented here.

The next two sets of results in Table 2 identify the specific effects of N-N (columns 6 to 10) and S-N (columns 11 to 15) migrants. The bulk of the benefits from global migration are driven by S-N migration, in line with di Giovanni et al. (2014) and Iranzo and Peri (2009). This is particularly the case in English-speaking countries (such as Canada, the United Kingdom, Ireland, the United States) but also in some European states (such as France or Germany). On average, the presence of the extra-OECD immigrants has a strong, positive impact on the overall real wages of non-migrants.

On the contrary, the welfare effects of N-N migration are very unequal. In the majority of countries, intra-OECD migration reduces welfare. This is due to the fact that college-educated OECD citizens tend to concentrate in a limited number of destination countries (Australia, Switzerland, Luxembourg, the United States). Hence, many economies lose a large portion of their high-skilled labor force. The average welfare effect of intra-OECD migration for non-migrants is negative. This effect is particularly detrimental for the less educated.

4.2 Disentangling welfare changes

We decompose the aggregate welfare effect by channels. The results are presented in Table 3 and Figure 2 for college graduates and the less educated.

In general, redistributive (skill-specific) effects are small. The labor market effect accounts for a small fraction of the total impact and the fiscal effect is even smaller, and negligible in many countries. On the contrary, aggregate (country-specific) effects are large. The TFP effect is the second most important channel determining the welfare impact of global migration; while the market size effect is the dominant one. We then conclude that the between-country implications of global migration exceed the within-country (redistributive) ones. We now explain our findings in detail:

(i) *Labor market effects are heterogeneous and limited* - the labor market effects of migration have been largely investigated in the literature. They are perceived to be a key channel of transmission of migration shocks in opinion polls: many respondents claim that immigration reduces their wage or employment probability. Our analysis shows that labor market effects are important in a limited number of countries (see columns 4 and 9). In emigration countries, the low-skilled are adversely affected by the the brain drain: the effect on the nominal wage equals -3.0% in Portugal, -1.9% in Poland or -1.4% in Slovakia. In the most attractive countries, the large inflows of college-educated immigrants increases the nominal wage of the less educated ($+3.6\%$ in Australia, $+2.5\%$ in Canada or $+2.1\%$ in Switzerland). However, in the majority of countries, the effect is small and positive for the less educated, in line with the recent literature (Ottaviano and Peri (2012), Docquier et al. (2014)).

(ii) *Fiscal effects are small* - changes in the composition of the labor force affect the redistributive schemes in both sending and receiving countries. The fiscal effect has also received attention in the literature, and is perceived to be important in opinion polls. In general, immigration from non-OECD countries reduces the fiscal burden on non-migrants, while selective emigration increases it (see column 11). However, our results reveal that the magnitude of the fiscal effect is very small in most countries (the average effect is nil). Exceptions are Australia, where the net-of tax real wage of college-educated natives increases by 0.7%, or Ireland and Poland, where it decreases by 0.5%.

(iii) *With a few exceptions, the TFP effects are negative and important* - we assume the TFP level depends on the proportion of college graduates in the labor force. We have seen that intra-OECD migration concentrates human capital in a limited number of countries. Given the assumed values of elasticity, substantial TFP and welfare gains are obtained for the most attractive destinations (+2.1% in Australia, +1.9% in Switzerland, +0.8% in Canada, and so on). Many other economies suffer from a net brain drain, which is partly compensated by extra-OECD migration. A typical example is New Zealand, attracting many high-skilled workers from non-OECD countries, but seeing many talented people leaving to Australia. Countries such as Ireland, Portugal, Greece and Mexico are losing even more. There is a third group of countries characterized by a limited brain drain but large low-skilled immigration rates (Austria, Germany, Denmark and so on). Overall, global migration reduces the proportion of college graduates in the majority of OECD countries (21 out of 34).

(iv) *Market size effects are dominant* - migration also modifies the size of the domestic and foreign markets, i.e. the geographic production of the demand for goods and services. Market size directly affects firm's creation. In the standard love-of-variety framework, the utility of consumption rises due to an increase in the number of varieties of products. This phenomenon has been largely disregarded in the literature and is possibly an important missing ingredient in the overall analysis of welfare consequences of migration. Our simulations show that it is positive in almost all countries (except in traditional emigration countries), in line with Iranzo and Peri (2009) and di Giovanni et al. (2014). Moreover, at the consensual level of the elasticity of substitution between varieties, it is the main channel of transmission of migration shocks. On average (see columns 3 and 8), it accounts for more than half of the aggregate welfare change. It is mainly driven by extra-OECD migration. The benefits are large in the main destinations of immigrants (+1.7% in Australia, +1.9% in Canada or +1.0% in Switzerland) and in small countries (+3.7% in Ireland, +2.6% in Luxembourg, +2.6% in Austria). As far as intra-OECD migration is concerned, the reallocation of demand to countries with smaller fixed cost of entry induces global efficiency gains. However, the effects are quantitatively small.

(v) *General equilibrium effects are small* (see columns 5 and 10) - interdependencies between wages, unit costs of production and prices have a negligible impact on welfare changes.

4.3 Role of international trade

International trade is a channel through which the market size effect is transmitted across countries. An increase in the mass of varieties in one country (due to a positive net migration shock) influences, *ceteris paribus*, the quantity of available varieties in all of its trade partners. Therefore, international trade may account for mitigating potential losses encountered by the sending countries.

To control for the role of international trade in propagating the gains from migration, we conduct the same counterfactual simulations assuming closed economies. We start with setting all the country-pair-specific trade costs equal infinity ($\forall i, j \; i \neq j \; \tau_{ij} = \infty$), such that the bilateral trade flows are zeroed in the reference scenario ($\forall i, j \; i \neq j \; X_{ij} = 0$). After calibrating the model for 35 autrakic economies, the standard counterfactual migration shocks are imposed for each country. Then, the welfare effects without international trade are compared to the benchmark results and shown in Figure 3. The international

exchange of goods enables to reallocate the positive spillovers induced by migration from winning to losing economies, as it can be noticed in Figure 3. The workers living in countries which lose after migration shocks, observe an additional, positive welfare shift due to the presence of trade. Accordingly, the winning countries gain less in comparison to the no-trade scenario. These effects are larger, the smaller and less opened are the analyzed economies. Consequently, one observes that trade smooths the welfare impact of migration.

Finally, notice in Figure 3 that the welfare effects with and without trade are similar. Such pattern results from the assumption of a single tradable sector in the economy. The effect of the trade barriers on the economy is magnified by the assumption that every good is traded. The presence of a non-tradable sector would probably increase the divergence of the results between the two scenarios (i.e. with and without trade). Moreover, the computation of the trade costs is likely to affect the results since it relies on a gravity framework and consequently on the geographical distances between countries. Therefore, the average trade cost is quite high so that the actual trade scenario is closer to the autarky counterfactual than to the free trade scheme. However, new trade theory models have been built to show the importance of trade barriers to explain the border puzzle. We then follow this literature to make the most realistic calibration.

4.4 Global gains from migration

To conclude the reporting of results, we briefly mention the global gains from migration. To do so, we use a utilitarian criterion and sum the utility of each representative consumer m across countries (including the rest of the world) weighted by the group of individuals of type m.[17] So far we focus on the welfare impact on natives because of their importance in shaping public policies and the recent debates on migration. However, worldwide economics gains are larger than the welfare impact on natives since the movers migrate towards more efficient economies leading to productivity gains. The extra-OECD migration has increased the worldwide real GDP by 1.56% while the mobility within the OECD stimulates the global economy by 0.47%. The difference between both is characterized by the productivity differences between the origin and destination countries.

5 Robustness checks

We conduct four robustness exercises. First, we simulate the welfare effect of a repatriation of the total stock of migrants (rather than recent migration flows) to their home country. Compared to the previous section, this sheds light on the relative impact of past migration. Second, we assess the comparability of our both scenarios; the intra-OECD (N-N) and the extra-OECD (S-N) migrants. Third, we analyze the sensitivity of our results to the choice of common parameters. Finally, we study the robustness of the results to the calibration of fixed entry cost.

[17] We remember that in our model, the indirect utility function of a representative consumer m is defined as the real wage. Therefore, by doing so, we actually compute the change in the global real GDP.

5.1 Migration flows versus stocks

As stated above, perceptions about migration are increasingly negative in the OECD countries. Respondents see immigrants as uneducated people from less developed countries, competing with low-skilled natives on the labor markets and trying to gain access to the welfare state. The perceived economic costs are not confirmed by our analysis of the welfare impact of recent migration flows, in particular the effect of extra-OECD immigration flows. We then investigate whether these perceptions could reflect a negative welfare impact of older waves of immigration.

The welfare effects of total migration stocks are presented in Table 4. Overall, total migration increases real wages by 0.6% in OECD countries and this net gain is mainly driven by extra-OECD migration. Compared to migration flows, three differences emerge. First, the magnitude of the welfare effect is greater, which is due to the fact that the repatriation shock is also larger. Second, the contrast between intra-OECD and extra-OECD migration is more pronounced. We identify 9 winners and 25 losers from intra-OECD migration (compared to 21 and 13 with migration flows). Third, the redistributive effects are more important: on average, the real wages of college graduates increase by +1.5% whereas the less educated lose 0.1%. However, in the richer countries both high-skilled and low-skilled workers benefit from global migration. Hence, the welfare consequences of migration stocks are similar to those obtained in Table 2. This is illustrated in Figure 4, which compares the welfare effects of migration stocks and flows. The effects are clearly positively correlated. Only a few countries are adversely affected by migration stocks while positively affected by migration flows (Austria, United Kingdom, Czech Republic or Ireland).

The decomposition of the welfare effects, described in Table 5, delivers some interesting results. Redistributive effects are more important. Contrary to recent flows, the older waves of migration are responsible for a decrease in the share of college graduates in the labor force (except in selective countries such as Australia or Canada). Hence, the labor market effect is detrimental for the low-skilled and beneficial for the high-skilled. However, the latter group is adversely affected by the fiscal effect. In addition, the TFP level decreases in the majority of countries. These results are more in line with popular perceptions.

However, what is interesting here is that these negative effects are compensated by the market size effect. The latter remains the main channel of transmission of migration shocks, and is much more visible and perceptible than the redistributive effects discussed above. On average, it increases real wages of non-migrants by +1.1%. The largest market size effects are observed in Australia (12.5%), Switzerland (6.7%) or Canada (8.2%). Again, the between-country effects of migration exceed the within-country ones.

Even though our results barely change when considering the stocks of migrants, they help us to understand how the public opinion might have been shaped. The University of Oxford has recently published a study on attitudes toward immigration in the United Kingdom (Blinder (2012)). In this survey almost 3/4 of British people favor reducing immigration. Our analysis suggests that the welfare of British citizens has been reduced by the old waves of immigrants and emigrants. However, it has increased with the recent waves of net migration. Inappropriate policy reforms may be adopted if they

are motivated by attitudes and opinions formulated as a consequence of older migration flows.

5.2 Comparability of the two scenarios

We implement two types of experiments; the intra-OECD (N-N) and the extra-OECD (S-N) migration in order to evaluate the effect of both types of migration. From a methodological point of view, one can question the comparability of those two scenarios since they characterize two different types of situations. Indeed, the extra-OECD migration is made up of immigration to the OECD countries while the intra-OECD migration consists of both immigration and emigration. Moreover, since we consider the net flows of migration, our interpretation of the recent brain drain within the OECD countries rely on the structure of the migration for each country. In other words, we impute the loss of welfare to emigration because we observe that the welfare of countries with large outflows of their workforce is adversely affected but we do not assess it. To answer to those potential drawbacks, we conduct a counterfactual simulations only considering either immigration or emigration within the OECD. We first consider only the immigration. We simulate the counterfactual by removing all immigrants without sending them back to their country of origin (i.e. eliminating immigrants from the world population). Then, we do the same with emigration within the OECD, repatriating emigrants without reducing the population of their host country (i.e. increasing the world population by creating artificial non-migrants). We build the counterfactual experiment by creating additional stayers in their country of origin. Those two additional scenarios are more comparable from a methodological point of view to the experiment considering the extra-OECD migration. However, the results can only be compared for each country. Indeed, the population size of the country has been artificially modified, inducing an irrelevant market size effect. The results are shown in Table 6. This experiment confirms the results described above. First, note that considering immigration only leads to welfare gains, while considering only emigration induces welfare losses. In other words, the market size effect dominates the other mechanisms that adversely affect the welfare of natives. Second, we verify that countries experiencing large inflows of workers (such as Australia, Luxembourg, Switzerland and United Kingdom) face large gains from immigration and small losses from emigration. Countries subject to large outflows of their workforce face large losses from emigration that dominate the gains from immigration. The effect is stronger when considering the stocks of migration. Note that the gains and losses are of less magnitude for high-skilled workers.

5.3 Sensitivity to parameters

We now investigate the sensitivity of our results with respect to the choice of parameters. In Table 1, the reference values of the parameters as well as the lower and upper-bounds used in the robustness checks are highlighted.

Table 7 reports the percent deviations in the unweighted average of the main endogenous variables of the model, induced by a repatriation of the stocks of extra-OECD or intra-OECD migrants. In parentheses, the effects on the standard deviation of each variable are also collected. We use the stock simulations because they give more important effects. Similar conclusions were obtained with the migration-flow counterfactuals. For each variable of interest, we provide three numbers. The middle column reports the

Table 1: Parameters' values in the robustness checks

Description of the parameter	Lower bound	Default value	Upper bound
Elasticity of substitution between varieties, ϵ	3.0	4.0	5.0
Elasticity of TFP w.r.t the ratio of skilled workers to total labor, λ	0.2	0.3	0.4
Elasticity of substitution btw high and low-skilled workers, σ_S	1.5	1.75	2
Elasticity of substitution btw natives and immigrants, σ_M	15	20	100

change obtained with the default value of the parameter. The left (respectively right) column describes the results obtained using a lower-bound (upper-bound) value of the parameter.

The elasticity of substitution between varieties, ϵ, has no impact on the changes in the mass of varieties, TFP, and wage inequality between college graduates and the less educated. However, a greater value of ϵ reinforces the market size effect, i.e. changes in prices P and nominal wage, W. Higher elasticity of TFP to human capital, λ, reinforces the TFP effects, which translates into greater changes in nominal wages. The number of varieties and wage disparities within countries are not affected. The elasticity of substitution between low- and high-skilled workers impacts the GDP levels and the wage disparities between college graduates and the less educated. It has also a minor effect on the number of varieties, since B is a linear function of $\bar{L}^T$. A greater σ_S reduces wage inequality within countries and the Gini index. Finally, a lower elasticity of substitution between natives and migrants increases the benefits from migration, both in terms of market size and overall welfare effects. The labor market is slightly affected, which has an impact on the price levels and inequality. Finally, these changes have no direct impact on the TFP variations.

5.4 Sensitivity to fixed costs of entry

Several robustness checks on this parameter were conducted.[18] We reached the conclusion that the fixed cost of entry has an impact only on the equilibrium levels of our endogenous variables. The values of f_i indirectly determine the GDP levels and bilateral trade flows. However, the value of the entry cost has no influence on the percentage deviations in these variables after imposing migration shocks, because for a given f_i: $\Delta B_i/B_i = \Delta \bar{L}_i^T/\bar{L}_i^T$. So the change in the real wage is the same independently from the entry cost. Therefore, our conclusions about the welfare impact of migration are robust to the values of this parameter.

However, it is true that the definition of the fixed costs in units of efficient labor has an impact on the size of the global gains from migration. Indeed, Iranzo and Peri (2009) define the fixed costs in the form of output that cannot be sold. They capture then richer effects of migration on productivity since, on average, migrants move to more productive economies. Therefore, the productivity of the country does not only change due to a variation in the labor composition but also because immigrants become more productive in the receiving country due to better technology. However, we follow the standard literature in the "new new trade theory model" by measuring the fixed costs in units of labor. It enables us to keep our model simple and to provide clear-cut results about the importance of the different channels.

[18] These include using the number of days to register a business as a proxy for the costs, as in di Giovanni et al. (2014).

Measuring the fixed cost in units of output complicates the model and would only reinforce our main conclusion that the between-country effects exceed the within-country (redistributive) ones.

6 Conclusion

The current challenging economic and demographic situation faced by many OECD countries has kindled debates over migration policy. Natives in the developed countries predominantly see immigration as a source of costs and adverse economic consequences, not as a stimulus for further growth and welfare gains. They perceive immigrants as a burden on social services, who decrease the wages and deteriorate the access to local labor markets. Simultaneously, the problem of emigration is less visible in the overall analysis.

This paper revisits the economic impact of global migration on the welfare of non-migrants in the OECD, leaving aside its non-economic consequences (its impact on crime, trust, cultural diversity, and so on). We aim to consider this issue in a framework that allows to account for interdependences between the main mechanisms highlighted in the hitherto literature. To reach this goal, a multi-country, general equilibrium model is developed, which enables to quantify the aggregate welfare effects of net migration for the natives in the OECD countries. In our approach, the following channels are distinguished and quantified: the labor market, the TFP, the fiscal and the market size effects, along with the residual, general equilibrium effect of migration. The objective is to understand which of these factors dominate and which are less important.

The total migration flow of 1990-2000 migrants increases the welfare of non-movers in most OECD countries (i.e. 21 economies). However, the gains from migration are unequally distributed across countries. Few of them reap the benefits from large immigration, while many encounter a sizable outflow of labor and suffer from substantial falls in natives' welfare. Our results confirm the findings by Iranzo and Peri (2009) and di Giovanni et al. (2014), that the gains from greater variety of consumption goods account for the majority of the changes in welfare. Immigrants not only increase the supply of labor (which, ceteris paribus, may bring negative consequences for the natives), but also consume in the destination countries, which affects the demand for labor and goods - increasing the number of varieties of products. Determining the magnitude of this positive effect in the case of immigration (and negative in the case of emigration), gives evidence that the recent conjecture about the importance of this channel may be supported by quantitative results.

In line with Docquier et al. (2014) the impact of the nominal wage (labor market) effect is less important. Furthermore, the recent observations by the OECD (2013) that the fiscal impact of immigration is close to zero, are strongly confirmed. All in all, the results provide evidence that migration mainly affects between-country inequality, and has a moderate effect on within-country situation. Finally, the model highlights the role of international trade in distributing gains from migration across countries. According to the results, international trade brings an additional, positive welfare effect of migration, mainly for the small countries.

Contrary to the expectations formulated by the public opinion, economic gains from migration are driven by labor mobility coming from non-OECD countries and are mitigated by the migration within

the OECD. Indeed, the intra-OECD labor mobility is characterized by the emergence of a brain drain in many developed economies, which diminishes the market size and the productivity. Moreover, countries should not fear immigration but rather emigration. Migration within the OECD (characterized by larger emigration rates) increases inequality, while the extra-OECD migration reduces the wage gaps by expanding the number of high-skilled contributors to the social system.

The results convince that countries should focus on shaping both immigration and emigration policies. In fact, the outflow of their human capital may bring substantial welfare losses for some OECD nations. Adverse effects such as a growing within and between-country inequality, are mistakenly imputed to S-N immigration, while they result from the outflow of the high-skilled workers to the richest OECD countries. The developed countries should, therefore, aim at preserving their stock of human capital by stimulating the education of their workers and by triggering qualitative immigration.

To conclude, our paper provides a positive view of the welfare effects of international migration even though we follow conservative assumptions. Indeed, our results would probably generate larger gains from migration if we modeled the effect of migration on the provision of public goods and on the trade costs. Battisti et al. (2014)'s model relax the former by endogeneizing the effect of migration on the public goods. The latter has been subject to a large literature. However, there is no consensus on the value of the elasticity of trade costs with respect to migration. Relaxing both assumptions would probably increase the welfare gains from migration. Therefore, we choose to underestimate gains from migration by modeling a simpler framework that provides clear cut results and that is calibrated using accepted values of parameters. Relaxing those assumptions remains a fruitful avenue for future research in the quest of understanding the economic impact of global migration.

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Table 2: The Welfare Effects of the Flows of Migrants

Country	Total effect					Extra-OECD					Intra-OECD				
	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$
OECD	**0.5**	**0.4**	**0.6**	**-0.8**	**-2.1**	**0.9**	**1.1**	**0.7**	**0.2**	**-0.5**	**-0.4**	**-0.7**	**-0.0**	**-1.1**	**-1.6**
Israël	22.6	33.8	8.0	33.0	2.4	20.6	30.7	7.6	29.7	2.9	2.0	3.1	0.4	3.3	-0.4
Australia	5.1	7.4	1.7	7.5	0.1	2.6	3.4	1.5	2.9	0.8	2.5	4.1	0.2	4.6	-0.7
Switzerland	3.6	5.3	1.7	5.3	-0.4	1.4	1.6	1.2	1.1	0.6	2.2	3.6	0.5	4.2	-1.0
Iceland	3.4	4.1	2.0	2.3	-1.3	2.3	2.7	1.3	1.6	0.0	1.1	1.4	0.7	0.7	-1.3
Canada	3.2	4.9	1.7	4.6	-0.2	3.3	4.6	2.0	3.8	0.4	0.0	0.3	-0.3	0.9	-0.6
Luxembourg	3.1	2.6	3.6	1.0	0.6	0.5	0.2	0.9	-0.2	0.6	2.5	2.4	2.7	1.3	0.0
Austria	2.4	2.1	2.9	-1.4	-2.0	0.9	0.8	1.2	-0.8	-0.3	1.5	1.3	1.7	-0.6	-1.7
United Kingdom	2.4	3.0	1.6	2.7	-1.9	2.7	3.5	1.5	2.9	-0.4	-0.3	-0.5	0.1	-0.2	-1.5
Czech Rep.	1.7	2.1	0.5	2.1	-3.8	0.5	0.6	0.2	0.6	-0.5	1.2	1.5	0.3	1.5	-3.2
Ireland	1.6	0.6	3.5	-1.3	-2.2	2.6	2.9	2.0	2.4	1.1	-1.0	-2.3	1.5	-3.7	-3.3
New Zealand	1.4	1.7	1.0	1.3	-0.9	1.1	1.2	0.8	0.8	-0.1	0.4	0.5	0.2	0.5	-0.8
Sweden	1.4	1.7	1.0	1.0	-1.8	1.3	1.5	1.0	0.4	-0.8	0.1	0.3	-0.1	0.6	-1.0
United States	1.4	1.0	1.7	-1.0	-0.6	1.1	1.2	1.0	0.2	-0.7	0.3	-0.2	0.6	-1.2	0.1
Norway	1.3	1.4	1.3	-0.6	-1.4	0.7	0.6	0.7	-1.0	-0.3	0.7	0.7	0.6	0.3	-1.0
Spain	1.1	1.0	1.3	-2.0	-2.3	1.2	1.4	1.0	-0.7	-1.1	-0.1	-0.4	0.3	-1.3	-1.1
Belgium	1.0	1.0	0.9	0.4	-2.0	0.7	0.8	0.7	0.2	-0.6	0.2	0.2	0.3	0.2	-1.4
France	0.8	1.0	0.5	1.0	-2.1	0.6	0.8	0.5	0.4	-1.0	0.2	0.3	0.0	0.6	-1.1
Turkey	0.8	1.3	-0.1	0.3	-3.9	0.8	1.1	0.2	0.7	-1.8	-0.1	0.1	-0.4	-0.4	-2.1
Germany	0.6	0.4	0.8	-1.0	-1.9	0.4	0.5	0.3	0.0	-0.9	0.2	0.0	0.5	-1.0	-1.0
Japan	0.2	0.2	0.2	-2.0	-2.8	0.2	0.2	0.2	-1.9	-2.0	0.0	0.0	0.0	-0.1	-0.8
Denmark	0.0	-0.3	0.6	-2.4	-2.4	0.3	0.2	0.5	-1.5	-1.0	-0.3	-0.6	0.1	-1.0	-1.4
Hungary	-0.2	-0.3	-0.1	0.8	-1.1	-0.2	-0.3	-0.1	0.1	-0.5	0.0	0.0	0.0	0.6	-0.6
Finland	-0.3	-0.9	0.5	-4.8	-4.6	0.2	0.2	0.3	-1.4	-1.2	-0.5	-1.1	0.2	-3.4	-3.4
Italy	-0.5	-1.0	0.1	-3.5	-2.4	0.3	0.3	0.3	-1.8	-1.1	-0.8	-1.4	-0.3	-1.7	-1.3
Chile	-1.0	-1.3	-0.4	-3.3	-3.6	-0.2	-0.2	-0.1	-2.1	-1.9	-0.8	-1.1	-0.3	-1.1	-1.6
Greece	-1.3	-1.9	-0.3	-2.1	-0.6	-0.1	-0.2	0.0	-0.4	-0.2	-1.2	-1.8	-0.3	-1.8	-0.5
Slovania	-1.5	-1.7	-1.1	-1.8	-1.9	0.5	0.8	0.2	0.8	-0.1	-2.0	-2.5	-1.2	-2.6	-1.7
Rep. of Korea	-1.6	-2.3	-0.7	-1.9	-1.6	0.0	0.0	0.0	0.3	-0.6	-1.6	-2.3	-0.7	-2.2	-1.0
New Zealand	-1.8	-3.1	1.0	-4.6	-0.8	3.1	3.6	2.1	2.5	1.1	-4.9	-6.7	-1.1	-7.1	-1.9
Slovak Rep	-2.1	-2.7	-0.5	-6.4	-6.0	0.3	0.3	0.2	-0.7	-1.0	-2.4	-3.0	-0.7	-5.7	-5.0
Poland	-2.9	-3.7	-1.3	-1.9	-0.7	-0.3	-0.4	-0.3	1.0	0.4	-2.6	-3.3	-0.9	-2.9	-1.1
Mexico	-3.5	-4.0	-2.7	-4.6	-5.4	0.1	0.1	0.0	0.1	-0.7	-3.5	-4.2	-2.7	-4.7	-4.7
Portugal	-4.3	-5.7	-2.3	-10.5	-6.6	0.6	0.7	0.6	-3.6	-1.9	-4.9	-6.4	-2.9	-6.9	-4.8
Estonia	-10.2	-11.8	-7.0	-9.3	-5.7	-8.2	-9.1	-6.3	-6.4	-4.5	-2.0	-2.7	-0.6	-2.9	-1.2
ROW	-1.8	-2.3	-0.7	-3.4	-3.4	-1.8	-2.3	-0.7	-3.4	-3.4	0.0	0.0	0.0	0.0	0.0

For all the countries the table presents three sets of results. The set "Total effect" shows the percent changes in real wages after a repatriation of recent 1990-2000 migrants. "Non-OECD" gathers the results after a repatriation of recent 1990-2000 migrants from non-OECD (South-North). "OECD" presents the results after a repatriation of recent 1990-2000 migrants from OECD (North-North). We show the percent change in real wages: for the natives, low-skilled natives, high-skilled natives, low-skilled migrants and high-skilled migrants respectively. OECD stands for the average for all the OECD countries (except Israël and Estonia).The average is provided for illustrative purposes only. Indeed, the migration and the country size distributions are skewed. Therefore, the unweighted average is likely to be driven by small countries. However, a population-weighted average of percentage deviation would not be more informative and is more difficult to interpret. ROW stands for the Rest of the World, that is all the non-OECD countries. The countries are ranked in decreasing order.

Table 3: The Decomposition of the Overall Welfare Effect, Flows of Migrants

Country	Low skilled natives					High skilled natives					
	$\frac{\tilde{w}^L}{P}$	A	MSE	W	GE	$\frac{\tilde{w}^H}{P}$	A	MSE	W	GE	T
OECD	**0.4**	**-0.2**	**0.5**	**-0.1**	**0.2**	**0.6**	**-0.2**	**0.5**	**0.2**	**0.2**	**0.0**
Australia	7.4	2.1	1.7	3.6	0.0	1.7	2.1	1.7	-2.7	0.0	0.7
Austria	2.1	-0.5	2.6	0.7	-0.7	2.9	-0.5	2.6	1.7	-0.7	-0.2
Belgium	1.0	0.0	0.7	0.1	0.1	0.9	0.0	0.7	0.0	0.1	0.1
Canada	4.9	0.8	1.9	2.5	-0.2	1.7	0.8	1.9	-0.8	-0.3	0.1
Chile	-1.3	-0.5	-0.4	-1.0	0.5	-0.4	-0.5	-0.4	0.1	0.5	-0.1
Czech Rep.	2.1	1.0	0.3	0.4	0.4	0.5	1.0	0.3	-1.8	0.4	0.6
Denmark	-0.3	-0.4	0.5	-0.5	0.2	0.6	-0.4	0.5	0.6	0.2	-0.1
Estonia	-11.8	-2.6	-5.2	-6.0	2.0	-7.0	-2.6	-5.2	-0.2	1.9	-0.9
Finland	-0.9	-0.6	0.4	-0.9	0.2	0.5	-0.6	0.4	0.7	0.2	-0.1
France	1.0	0.4	0.2	0.0	0.4	0.5	0.4	0.2	-0.7	0.4	0.1
Germany	0.4	-0.1	0.6	-0.2	0.1	0.8	-0.1	0.6	0.2	0.1	0.0
Greece	-1.9	-0.9	-0.2	-1.2	0.4	-0.3	-0.9	-0.2	0.7	0.4	-0.3
Hungary	-0.3	-0.1	0.0	-0.5	0.4	-0.1	-0.1	0.0	-0.3	0.4	-0.1
Israël	33.8	11.2	5.1	16.5	1.0	8.0	11.2	5.1	-12.0	0.0	3.7
Ireland	0.6	-2.3	3.7	0.6	-1.4	3.5	-2.3	3.7	4.0	-1.4	-0.5
Iceland	4.1	1.7	0.9	1.1	0.3	2.0	1.7	0.9	-1.4	0.3	0.4
Italy	-1.0	-0.6	0.2	-0.9	0.3	0.1	-0.6	0.2	0.4	0.3	-0.1
Japan	0.2	0.0	0.2	-0.3	0.4	0.2	0.0	0.2	-0.3	0.4	0.0
Luxembourg	2.6	-0.4	2.6	1.0	-0.5	3.6	-0.4	2.6	2.1	-0.5	-0.1
Mexico	-4.0	-0.8	-2.7	-2.1	1.5	-2.7	-0.8	-2.7	-0.7	1.4	0.0
Netherlands	1.7	0.4	0.8	0.4	0.2	1.0	0.4	0.8	-0.5	0.2	0.2
New Zealand	-3.1	-1.8	0.2	-1.7	0.2	1.0	-1.8	0.2	2.9	0.1	-0.4
Norway	1.4	0.1	1.0	0.2	0.0	1.3	0.1	1.0	0.1	0.0	0.0
Poland	-3.7	-1.5	-0.9	-1.9	0.6	-1.3	-1.5	-0.9	1.1	0.6	-0.6
Portugal	-5.7	-2.2	-1.2	-3.0	0.7	-2.3	-2.2	-1.2	1.5	0.6	-1.0
Rep. of Korea	-2.3	-0.7	-0.7	-1.6	0.6	-0.7	-0.7	-0.7	0.2	0.6	-0.2
Slovak Rep	-2.7	-1.4	-0.3	-1.4	0.4	-0.5	-1.4	-0.3	1.4	0.4	-0.6
Slovania	-1.7	-0.3	-0.9	-1.1	0.7	-1.1	-0.3	-0.9	-0.4	0.7	-0.1
Spain	1.0	-0.2	1.1	0.1	-0.1	1.3	-0.2	1.1	0.5	-0.1	0.0
Sweden	1.7	0.5	0.7	0.4	0.2	1.0	0.5	0.7	-0.5	0.2	0.1
Switzerland	5.3	1.9	1.0	2.1	0.3	1.7	1.9	1.0	-1.8	0.3	0.3
Turkey	1.3	0.6	0.0	0.2	0.5	-0.1	0.6	0.0	-1.3	0.5	0.1
United Kingdom	3.0	0.8	1.0	1.0	0.2	1.6	0.8	1.0	-0.6	0.1	0.3
United States	1.0	-0.2	1.4	0.0	-0.2	1.7	-0.2	1.4	0.7	-0.2	0.0
ROW	-2.3	-0.9	-0.5	-1.3	0.5	-0.7	-0.9	-0.5	0.7	0.5	-0.4

For all the countries the table presents the decompositions of the changes in real wages of low-skilled and high-skilled natives (due to a repatriation of recent 1990-2000 migrants). The first and sixth columns show the overall welfare effect. The column A represents the TFP effect, MSE is the market size effect, W is the labor market effect, GE is the general equilibrium effect and T represents the fiscal effect. OECD stands for the average for all the OECD countries (except Estonia and Israël), ROW stands for the Rest of the World, that is all the non-OECD countries. The countries are ordered alphabetically.

Table 4: The Welfare Effects of the Stocks of Migrants

Country	Total effect					Extra-OECD					Intra-OECD				
	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$	$\frac{W}{P}$	$\frac{\tilde{w}^L}{P}$	$\frac{\tilde{w}^H}{P}$	$\frac{\tilde{w}^l}{P}$	$\frac{\tilde{w}^h}{P}$
OECD	**0.3**	**-0.4**	**1.4**	**-8.8**	**-6.8**	**1.9**	**2.1**	**1.7**	**-2.2**	**-1.8**	**-1.7**	**-2.5**	**-0.2**	**-6.6**	**-5.0**
Israël	30.2	39.2	18.9	25.4	7.6	29.5	39.4	16.6	26.9	7.2	0.8	-0.2	2.4	-1.6	0.4
Australia	19.1	22.3	14.7	13.9	7.1	9.5	12.1	5.8	10.0	2.5	9.6	10.1	8.9	3.9	4.5
Estonia	11.0	12.3	8.8	-12.7	-12.7	14.6	16.8	10.3	-7.9	-10.2	-3.5	-4.5	-1.5	-4.8	-2.5
Canada	11.0	12.8	9.4	5.3	1.9	7.2	9.0	5.6	5.4	1.3	3.8	3.8	3.9	0.0	0.5
Switzerland	8.3	7.9	8.8	-0.3	-0.5	2.8	2.9	2.8	1.1	1.2	5.5	5.1	6.0	-1.4	-1.7
New Zealand	6.7	7.0	6.2	-0.7	-2.9	6.5	7.7	4.4	4.8	2.0	0.1	-0.7	1.8	-5.5	-4.9
Luxembourg	5.9	3.2	9.3	-7.8	-3.0	1.0	0.6	1.6	-0.1	0.9	4.8	2.6	7.8	-7.7	-3.9
United States	3.6	2.3	4.4	-4.7	-2.8	2.4	2.4	2.4	-0.5	-2.5	1.2	-0.2	2.1	-4.2	-0.4
Netherlands	2.4	1.1	4.7	-6.1	-2.9	3.2	2.9	3.6	-1.1	0.1	-0.8	-1.9	1.0	-5.0	-3.0
Spain	2.1	2.4	1.8	-5.2	-5.5	2.2	2.6	1.7	-2.8	-2.6	-0.1	-0.2	0.1	-2.4	-2.8
Sweden	2.0	1.3	3.2	-5.9	-4.0	1.8	1.8	1.8	-0.8	-1.1	0.3	-0.5	1.5	-5.1	-2.9
Norway	1.3	1.0	1.7	-6.0	-6.1	1.2	1.1	1.3	-2.3	-0.8	0.1	-0.1	0.4	-3.7	-5.4
Belgium	0.9	-0.5	2.9	-8.2	-4.6	1.3	1.2	1.5	-0.6	-1.1	-0.4	-1.7	1.4	-7.7	-3.4
Turkey	0.5	1.1	-0.6	-8.2	-8.2	1.6	2.0	0.9	-6.0	-4.2	-1.1	-0.9	-1.5	-2.2	-4.0
France	0.3	-0.6	1.6	-7.5	-5.6	1.0	0.8	1.3	-2.4	-2.7	-0.7	-1.4	0.3	-5.1	-2.8
Japan	0.0	-0.2	0.3	-7.0	-6.6	0.2	0.3	0.2	-3.4	-3.2	-0.2	-0.4	0.0	-3.7	-3.4
Germany	-0.4	-1.3	1.0	-9.1	-6.3	0.8	0.9	0.8	-0.8	-2.0	-1.2	-2.2	0.2	-8.3	-4.2
Iceland	-0.9	-2.1	1.7	-9.3	-7.1	3.2	3.7	2.2	1.0	0.1	-4.1	-5.8	-0.5	-10.3	-7.2
United Kingdom	-1.1	-2.3	0.7	-9.9	-7.5	4.4	5.3	3.1	-0.1	-1.3	-5.5	-7.6	-2.5	-9.8	-6.2
Finland	-1.5	-1.6	-1.3	-9.0	-9.1	0.3	0.2	0.4	-2.1	-1.4	-1.8	-1.9	-1.7	-7.0	-7.7
Slovenia	-1.6	-3.1	0.8	-16.2	-10.3	2.1	1.4	3.1	-11.0	-6.6	-3.6	-4.5	-2.3	-5.2	-3.7
Czech Rep.	-1.7	-2.5	0.8	-11.3	-7.2	0.7	0.8	0.6	-0.3	-1.4	-2.4	-3.3	0.1	-11.0	-5.8
Denmark	-1.9	-3.0	0.1	-9.9	-7.4	0.4	0.2	0.8	-3.2	-1.6	-2.3	-3.2	-0.7	-6.7	-5.7
Greece	-2.6	-3.4	-1.1	-15.1	-10.0	1.5	1.4	1.8	-9.4	-5.1	-4.1	-4.8	-2.9	-5.7	-4.9
Italy	-2.7	-3.6	-1.7	-13.1	-9.1	0.8	0.9	0.8	-7.6	-3.5	-3.5	-4.4	-2.4	-5.6	-5.6
Chile	-2.9	-3.8	-1.2	-12.1	-8.3	-0.3	-0.4	-0.2	-7.3	-3.9	-2.6	-3.4	-1.0	-4.8	-4.4
Rep. of Korea	-2.9	-4.1	-1.6	-15.5	-8.8	0.1	0.1	0.1	-10.7	-3.7	-3.0	-4.2	-1.7	-4.8	-5.0
Austria	-3.5	-6.0	-0.1	-12.9	-8.3	0.5	-0.1	1.4	-3.3	-0.7	-4.1	-5.9	-1.6	-9.6	-7.6
Ireland	-4.1	-4.7	-2.8	-15.4	-13.9	2.7	3.2	1.8	2.5	0.7	-6.8	-7.9	-4.6	-17.9	-14.6
Slovak Rep	-4.9	-5.6	-3.3	-13.3	-11.6	0.2	0.2	0.2	-1.5	-1.4	-5.1	-5.8	-3.5	-11.8	-10.2
Mexico	-5.0	-5.6	-4.2	-13.2	-12.1	0.2	0.4	0.1	-1.7	-1.9	-5.3	-6.0	-4.3	-11.6	-10.2
Poland	-5.9	-7.7	-2.1	-16.4	-12.7	0.9	0.9	1.0	-6.5	-8.1	-6.9	-8.6	-3.1	-9.9	-4.7
Portugal	-6.0	-6.6	-5.3	-16.4	-13.0	0.7	0.9	0.5	-7.3	-3.4	-6.7	-7.5	-5.7	-9.1	-9.7
Hungary	-6.4	-7.9	-2.9	-14.8	-10.7	-0.2	-0.3	0.0	-2.7	-2.2	-6.1	-7.6	-3.0	-12.1	-8.6
ROW	-3.6	-4.5	-1.5	0.0	0.0	-3.6	-4.5	-1.5	N.A.	N.A.	0.0	0.0	0.0	0.0	0.0

For all the countries the table presents three sets of results. The set "Total effect" shows the percent changes in real wages after a repatriation of all migrants. "Non-OECD" gathers the results after a repatriation all migrants from non-OECD (South-North). "OECD" presents the results after a repatriation of all migrants from OECD (North-North). We show the percent change in real wages: for the natives, low-skilled natives, high-skilled natives, low-skilled migrants and high-skilled migrants respectively. OECD stands for the unweighted average for all the OECD countries (except Estonia and Israël). ROW stands for the Rest of the World, that is all the non-OECD countries. The countries are ranked in decreasing order.

Table 5: The Decomposition of the Overall Welfare Effect, Stocks of Migrants

Country	Low skilled natives					High skilled natives					
	$\frac{\tilde{w}^L}{P}$	A	MSE	W	GE	$\frac{\tilde{w}^H}{P}$	A	MSE	W	GE	T
OECD	**-0.4**	**-1.1**	**1.0**	**-0.8**	**0.5**	**1.4**	**-1.1**	**1.0**	**1.4**	**0.5**	**-0.4**
Australia	22.3	2.9	12.5	10.3	-3.4	14.7	2.9	12.5	2.2	-3.7	0.8
Austria	-6.0	-3.5	0.8	-3.5	0.2	-0.1	-3.5	0.8	4.0	0.2	-1.6
Belgium	-0.5	-1.6	2.4	-1.1	-0.2	2.9	-1.6	2.4	3.0	-0.2	-0.7
Canada	12.8	0.8	8.2	5.9	-2.2	9.4	0.8	8.2	2.5	-2.3	0.1
Chile	-3.8	-1.4	-1.2	-2.6	1.3	-1.2	-1.4	-1.2	0.5	1.2	-0.4
Czech Rep.	-2.5	-2.0	0.6	-1.6	0.5	0.8	-2.0	0.6	2.6	0.4	-0.9
Denmark	-3.0	-1.6	-0.1	-2.1	0.8	0.1	-1.6	-0.1	1.5	0.8	-0.4
Estonia	12.3	1.8	4.9	5.4	0.2	8.8	1.8	4.9	1.4	-0.2	0.8
Finland	-1.6	-0.2	-1.3	-1.6	1.5	-1.3	-0.2	-1.3	-1.2	1.5	0.0
France	-0.6	-1.2	1.5	-1.1	0.2	1.6	-1.2	1.5	1.5	0.2	-0.4
Greece	-3.4	-1.2	-1.3	-2.2	1.4	-1.1	-1.2	-1.3	0.5	1.4	-0.4
Germany	-1.3	-1.1	0.7	-1.4	0.5	1.0	-1.1	0.7	1.2	0.5	-0.3
Hungary	-7.9	-3.1	-2.0	-4.2	1.4	-2.9	-3.1	-2.0	2.4	1.3	-1.6
Ireland	-4.7	-1.9	-3.0	-1.8	2.0	-2.8	-1.9	-3.0	0.4	1.9	-0.2
Iceland	-2.1	-0.9	-0.1	-2.0	0.9	1.7	-0.9	-0.1	2.4	0.8	-0.5
Israël	39.2	8.0	13.4	18.6	-0.9	18.9	8.0	13.4	-2.4	-2.7	2.5
Italy	-3.6	-1.1	-1.5	-2.5	1.5	-1.7	-1.1	-1.5	-0.3	1.5	-0.2
Japan	-0.2	-0.2	0.2	-1.0	0.9	0.3	-0.2	0.2	-0.6	0.9	0.0
Luxembourg	3.2	-2.7	6.3	1.2	-1.5	9.3	-2.7	6.3	8.0	-1.4	-0.8
Mexico	-5.6	-0.9	-4.1	-3.3	2.7	-4.2	-0.9	-4.1	-1.7	2.6	-0.1
Netherlands	1.1	-1.7	3.6	-0.1	-0.7	4.7	-1.7	3.6	4.1	-0.7	-0.6
New Zealand	7.0	0.2	4.3	3.1	-0.6	6.2	0.2	4.3	2.2	-0.7	0.2
Norway	1.0	-0.2	1.1	-0.4	0.5	1.7	-0.2	1.1	0.3	0.5	-0.1
Poland	-7.7	-3.4	-1.6	-3.9	1.3	-2.1	-3.4	-1.6	3.2	1.2	-1.4
Portugal	-6.6	-1.0	-4.8	-3.7	2.9	-5.3	-1.0	-4.8	-2.0	2.8	-0.4
Rep. of Korea	-4.1	-1.1	-1.6	-2.9	1.5	-1.6	-1.1	-1.6	-0.2	1.5	-0.2
Slovak Rep	-5.6	-1.5	-2.8	-3.2	1.8	-3.3	-1.5	-2.8	-0.2	1.8	-0.7
Slovenia	-3.1	-2.1	0.5	-2.0	0.5	0.8	-2.1	0.5	2.6	0.5	-0.7
Spain	2.4	0.3	1.3	0.3	0.5	1.8	0.3	1.3	-0.4	0.5	0.1
Sweden	1.3	-0.9	2.6	-0.2	-0.2	3.2	-0.9	2.6	2.1	-0.2	-0.3
Switzerland	7.9	-0.1	6.7	3.1	-1.7	8.8	-0.1	6.7	4.0	-1.7	0.0
Turkey	1.1	0.7	-0.5	-0.4	1.3	-0.6	0.7	-0.5	-2.2	1.3	0.2
United Kingdom	-2.3	-1.3	0.0	-1.9	1.0	0.7	-1.3	0.0	1.6	0.8	-0.4
United States	2.3	-0.7	3.7	-0.1	-0.7	4.4	-0.7	3.7	2.2	-0.7	-0.1
ROW	-4.5	-1.8	-1.2	-2.8	1.2	-1.5	-1.8	-1.2	1.1	1.2	-0.8

For all the countries the table presents the decompositions of the changes in real wages of low-skilled and high-skilled natives (due to a repatriation of all migrants). The first and sixth columns show the overall welfare effect. The column *A* represents the TFP effect, *MSE* is the market size effect, *W* is the labor market effect, *GE* is the general equilibrium effect and *T* represents the fiscal effect. OECD average stands for the weighted average for all the OECD countries (except Estonia and Israël), ROW stands for the Rest of the World, that is all the non-OECD countries. The countries are ordered alphabetically.

Table 6: The Welfare Effect, Immigration Vs Emigration within the OECD

Country	Migration Flows				Migration Stocks			
	Low skilled		High skilled		Low skilled		High skilled	
	IM $\frac{\tilde{w}^L}{P}$	EM $\frac{\tilde{w}^L}{P}$	IM $\frac{\tilde{w}^H}{P}$	EM $\frac{\tilde{w}^H}{P}$	IM $\frac{\tilde{w}^L}{P}$	EM $\frac{\tilde{w}^L}{P}$	IM $\frac{\tilde{w}^H}{P}$	EM $\frac{\tilde{w}^H}{P}$
Australia	6.1	-1.4	1.6	-0.9	17.1	-4.5	14.6	-3.6
Austria	4.2	-2.2	3.6	-1.2	8.3	-11.5	7.9	-7.3
Belgium	3.0	-2.2	1.9	-1.1	5.5	-5.6	7.8	-4.7
Canada	2.7	-1.8	0.8	-0.6	10.9	-5.0	9.9	-4.2
Chile	1.3	-1.9	1.3	-1.1	4.6	-6.6	4.6	-4.2
Czech Rep.	3.3	-1.2	1.9	-1.0	6.3	-7.8	6.6	-4.8
Denmark	1.9	-1.9	1.6	-0.9	5.5	-7.1	5.6	-4.8
Spain	2.6	-2.3	2.0	-1.1	6.8	-5.3	5.8	-4.3
Estonia	1.8	-3.9	1.6	-1.6	5.3	-8.2	5.1	-5.1
Finland	1.9	-2.4	1.7	-0.9	5.3	-5.6	5.3	-5.4
France	2.3	-1.4	1.5	-1.0	5.0	-4.9	5.8	-4.1
Germany	1.9	-1.4	1.8	-0.8	5.3	-5.9	6.3	-4.5
Greece	1.3	-2.5	1.3	-1.0	5.4	-8.5	5.0	-6.3
Hungary	1.4	-0.9	1.3	-0.8	4.9	-10.8	4.9	-6.3
Iceland	5.2	-3.0	2.8	-1.5	13.7	-14.5	8.8	-6.8
Ireland	13.7	-12.2	-4.2	-1.6	23.8	-20.1	15.3	-13.5
Israël	6.1	-2.3	2.1	-1.1	9.6	-7.4	-8.7	-4.5
Italy	1.8	-2.6	1.5	-1.2	5.8	-8.5	5.1	-6.0
Japan	1.4	-0.9	1.3	-0.8	4.8	-3.9	4.7	-3.4
Luxembourg	5.9	-2.6	4.3	-1.0	11.2	-6.1	16.4	-5.5
Mexico	1.6	-5.2	1.3	-3.4	5.4	-9.7	4.7	-7.5
Netherlands	3.1	-2.0	1.8	-1.0	8.5	-8.0	8.0	-5.1
New Zealand	0.7	-6.9	1.6	-2.1	20.8	-13.8	12.1	-7.1
Norway	2.8	-1.5	1.9	-0.7	8.1	-6.2	6.5	-4.5
Poland	1.3	-4.1	1.2	-1.6	4.8	-11.7	4.8	-6.4
Portugal	2.2	-7.8	1.7	-4.0	6.4	-11.7	5.5	-9.4
Rep. of Korea	1.3	-3.1	1.3	-1.4	4.7	-7.4	4.5	-4.9
Slovak Rep.	1.8	-4.2	1.5	-1.7	5.3	-9.3	4.9	-6.9
Slovenia	1.6	-3.4	1.4	-2.1	5.4	-8.2	5.2	-6.0
Sweden	2.6	-1.7	1.4	-1.0	6.6	-5.4	7.2	-4.1
Switzerland	7.5	-3.0	2.6	-1.4	18.8	-8.9	14.0	-5.2
Turkey	2.3	-1.6	1.5	-1.3	5.9	-5.2	4.9	-5.0
United Kingdom	4.5	-4.2	2.4	-1.7	9.5	-13.9	7.1	-7.5
United States	1.2	-0.8	1.9	-0.7	4.5	-3.4	6.8	-3.3

For all the countries the table presents three sets of results for both the flows and the stocks of migrants from OECD countries (North-North). The set "IM" shows the percent changes in real wages after removing immigrants. "EM" gathers the results after adding emigrants in their country of origin. The percent change in real wages are shown by level of education. The countries are ordered alphabetically.

Table 7: Robustness Check with Respect to the Parameters

ϵ		GDP			B			P			W			A			$\tilde{w}^H/\tilde{w}^L$			Gini		
S-N	6.8	7.1	10.1	6.4	6.4	6.4	-2.8	-2.0	1.3	0.2	0.4	3.3	0.5	0.5	0.5	-1.1	-1.1	-1.1	0.6	0.6	0.6
	(12.4)	(12.8)	(12.3)	(9.4)	(9.4)	(9.4)	(1.7)	(1.6)	(2.8)	(2.3)	(2.5)	(2.8)	(1.7)	(1.7)	(1.7)	(3.6)	(3.6)	(3.6)	(3.0)	(3.0)	(3.0)
N-N	-2.5	-2.3	-0.6	-1.1	-1.1	-1.1	0.2	0.4	2.0	-1.6	-1.3	0.4	-1.2	-1.2	-1.2	2.9	2.9	2.9	3.0	3.0	3.0
	(10.7)	(10.8)	(10.4)	(9.3)	(9.3)	(9.3)	(2.0)	(1.7)	(2.9)	(1.7)	(1.7)	(2.6)	(0.9)	(0.9)	(0.9)	(2.2)	(2.2)	(2.2)	(4.4)	(4.4)	(4.4)

λ		GDP			B			P			W			A			$\tilde{w}^H/\tilde{w}^L$			Gini		
S-N	6.9	7.1	7.3	6.4	6.4	6.4	-2.0	-2.0	-2.0	0.2	0.4	0.5	0.3	0.5	0.7	-1.1	-1.1	-1.1	0.6	0.6	0.6
	(12.1)	(12.8)	(13.4)	(9.4)	(9.4)	(9.4)	(1.5)	(1.6)	(1.6)	(2.0)	(2.5)	(3.0)	(1.1)	(1.7)	(2.3)	(3.6)	(3.6)	(3.6)	(3.0)	(3.0)	(3.0)
N-N	-2.3	-2.3	-2.5	-1.1	-1.1	-1.1	0.0	0.4	0.5	-1.3	-1.3	-1.6	-0.8	-1.2	-1.6	2.9	2.9	2.9	3.0	3.0	3.0
	(10.7)	(10.8)	(10.9)	(9.3)	(9.3)	(9.3)	(1.6)	(1.7)	(1.7)	(1.5)	(1.7)	(1.9)	(0.6)	(0.9)	(1.2)	(2.2)	(2.2)	(2.2)	(4.4)	(4.4)	(4.4)

σ		GDP			B			P			W			A			$\tilde{w}^H/\tilde{w}^L$			Gini		
S-N	7.2	7.1	7.0	6.5	6.4	6.4	-2.0	-2.0	-2.0	0.4	0.4	0.4	0.5	0.5	0.5	-1.3	-1.1	-1.0	0.2	0.6	0.9
	(13.1)	(12.8)	(12.5)	(9.7)	(9.4)	(9.3)	(1.6)	(1.6)	(1.5)	(2.5)	(2.5)	(2.5)	(1.7)	(1.7)	(1.7)	(4.2)	(3.6)	(3.2)	(3.4)	(3.0)	(2.9)
N-N	-2.5	-2.3	-2.3	-1.2	-1.1	-1.0	0.3	0.4	0.2	-1.5	-1.3	-1.5	-1.2	-1.2	-1.2	3.3	2.9	2.5	3.3	3.0	2.8
	(10.8)	(10.8)	(10.7)	(9.3)	(9.3)	(9.2)	(1.7)	(1.7)	(1.6)	(1.7)	(1.7)	(1.7)	(0.9)	(0.9)	(0.9)	(2.6)	(2.2)	(1.9)	(4.4)	(4.4)	(4.5)

σ_M		GDP			B			P			W			A			$\tilde{w}^H/\tilde{w}^L$			Gini		
S-N	7.8	7.1	5.5	6.7	6.4	6.0	-1.6	-2.0	-2.9	0.9	0.4	-0.7	0.5	0.5	0.5	-1.1	-1.1	-1.2	0.6	0.6	0.2
	(13.1)	(12.8)	(12.4)	(9.6)	(9.4)	(9.2)	(1.6)	(1.6)	(1.5)	(2.5)	(2.5)	(2.5)	(1.7)	(1.7)	(1.7)	(3.6)	(3.6)	(3.9)	(3.2)	(3.0)	(2.5)
N-N	-1.7	-2.3	-4.1	-0.9	-1.1	-1.7	2.7	0.4	-0.7	-1.0	-1.3	-2.6	-1.2	-1.2	-1.2	2.9	2.9	3.0	2.9	3.0	2.3
	(11.0)	(10.8)	(10.4)	(9.4)	(9.3)	(9.0)	(1.7)	(1.7)	(1.6)	(1.7)	(1.7)	(1.7)	(0.9)	(0.9)	(0.9)	(2.2)	(2.2)	(2.2)	(4.1)	(4.4)	(2.9)

The robustness check is done for four parameters: the elasticity of substitution between varieties: ϵ, the elasticity of TFP with respect to the ratio of skilled workers to total labor: λ, the elasticity of substitution between high and low skilled workers: σ, and the elasticity of substitution between natives and migrants: σ_M. In each group of columns we show the percent changes in key endogenous variables (the averages across 34 OECD countries and the standard deviation in the parenthesis below) after imposing a migration shock on the stock of migrants (either S-N or N-N). Each of these groups consists of three results, in the left (right) hand side column we assume low (high) values of the analyzed elasticity (keeping everything else as in the benchmark scenario, which is reported in the middle column). The values of the elasticities are as follows: $\epsilon \in \{3, 4, 5\}$, $\lambda \in \{0.2, 0.3, 0.4\}$, $\sigma \in \{1.5, 1.75, 2\}$, $\sigma_M \in \{15, 20, 100\}$.

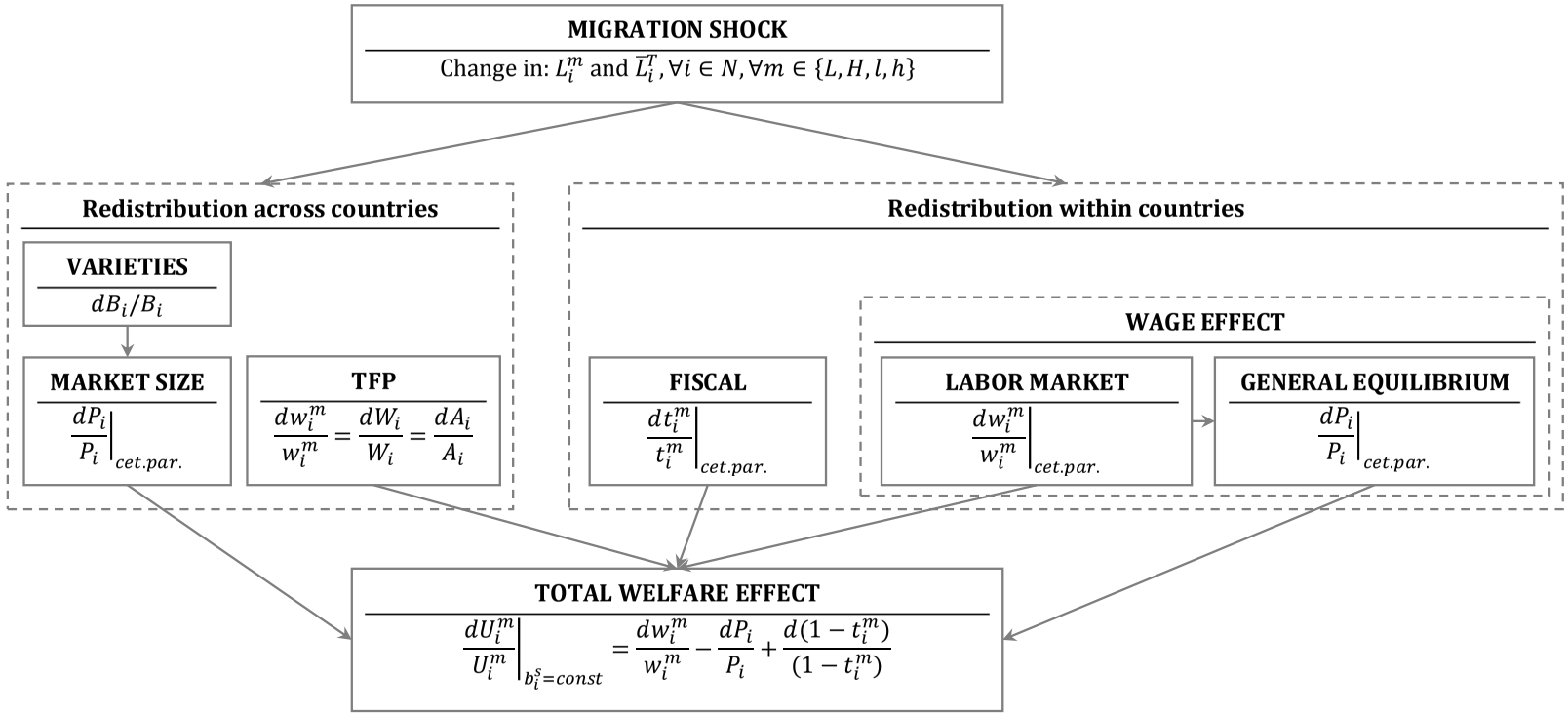

Figure 1: The decomposition of the total welfare effect of migration.

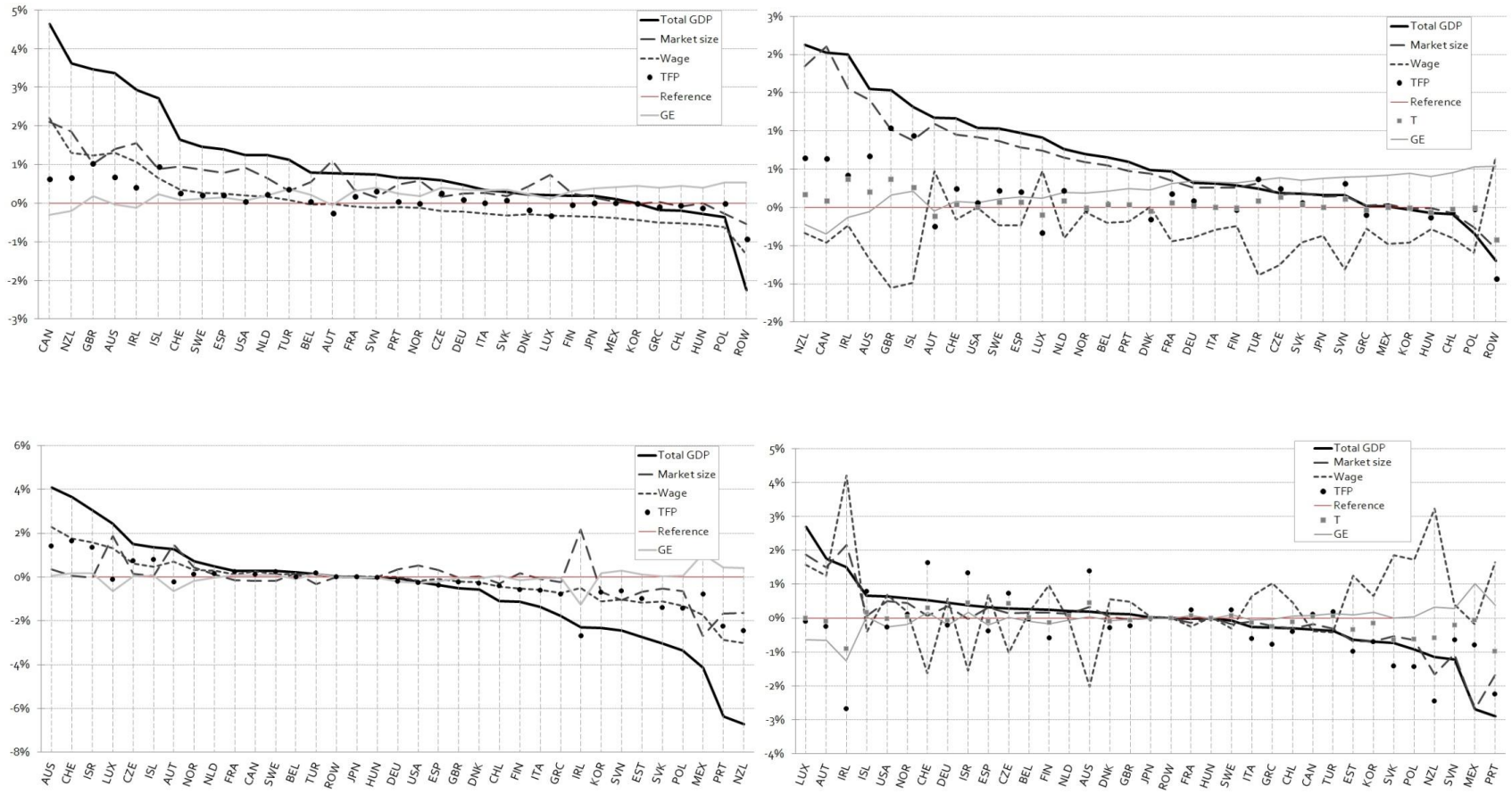

Figure 2: The decomposition of the overall welfare impact of the flows of migrants.

The panel presents four decompositions of the overall welfare effects of the flows of migrants for the natives, assuming the shock on: low-skilled non-OECD migrants (left hand side upper graph), high-skilled non-OECD migrants (right hand side upper graph), low-skilled intra-OECD migrants (left hand side lower graph) and high-skilled intra-OECD migrants (right hand side lower graph). The thick solid line marks the total welfare effect, the broken solid line represents the market size effect, the broken thin line marks the labor market (nominal wage) effect, the black dots mark the TFP effect, the light gray solid line marks the general equilibrium effect and the gray squares mark the fiscal effect.

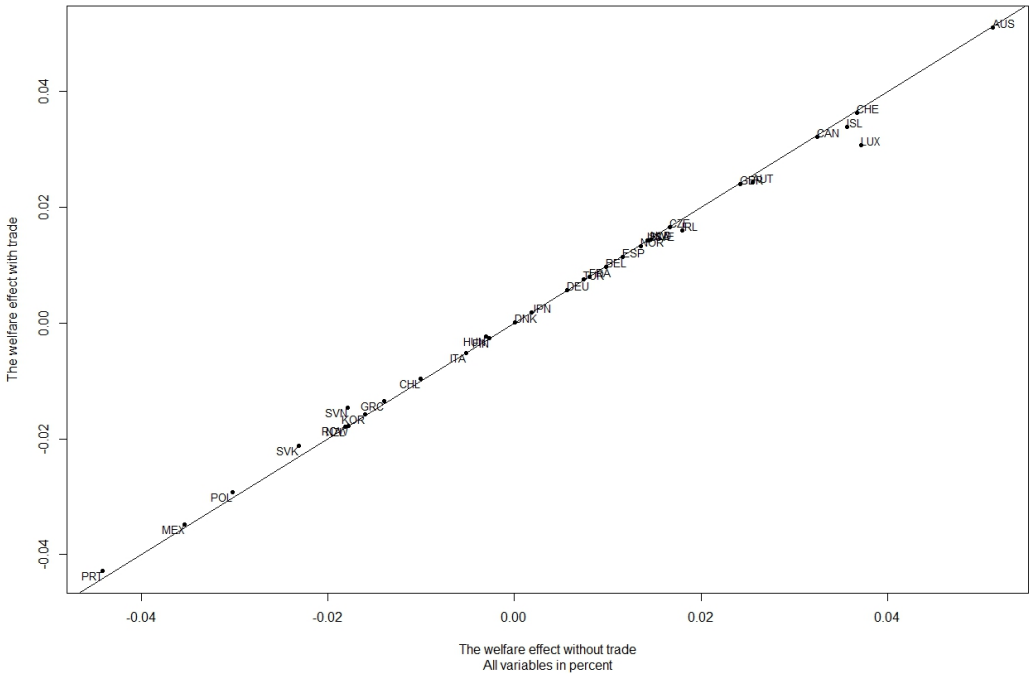

Figure 3: The additional welfare effects of flows of migration due to international trade.

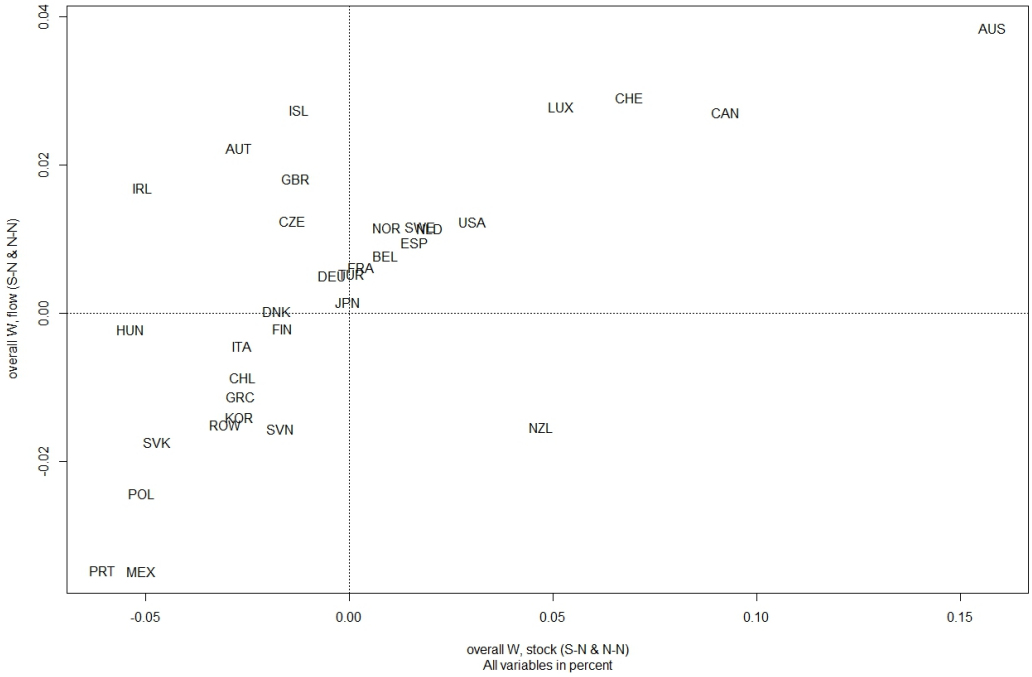

Figure 4: The overall welfare gains of migration in stock and flow.

A Calibration algorithm

The TFP residual, $\bar{A}_i$, is identified to fit the zero-profit equilibrium conditions, country by country. Due to the fact that for all i the profit functions depend on N price indexes (which are dependent on both nominal wages and TFP levels), the vector $[\bar{A}_i]_{i\in N}$ must be computed iteratively. We proceed by defining for every i an initial value assigned to $\bar{A}_i$, labeled by $\bar{A}_i^0$, which allows to compute the vector of prices: $[p_i]_{i\in N}$ and the vector of price indexes: $[P_i]_{i\in N}$. We take the vector of GDP's: $[X_i]_{i\in N}$ as given and we solve the N zero profit conditions (19). We then obtain $\bar{A}_i^{sol}$ as a solution of the system leading to new values for p_i's and P_i's. The computations continue for iterations $t = 1, 2, ...$ until $\sum_{i\in N}\left(A_i^{sol,t} - A_i^{sol,t-1}\right)^2$ is sufficiently small.

B Simulation algorithm

The migration shock alters the labor supplies L_i^m and consequently the aggregated efficient labor stock $\bar{L}_i^T$. This in turn translates into changes in the TFP levels, A_i, and the mass of varieties, B_i by eq. (7) and eq. (21) respectively.

The other endogenous variables are determined iteratively, using the set of zero-profit equilibrium conditions (which, once again, for a particular country, are functions of all wage indexes: W_i, for $i \in N$). We first assign initial values to the vector of composite wage indexes: $[W_i^0]_{i\in N}$. This determines $[X_i]_{i\in N}$ and $[p_i]_{i\in N}$ by eq. (5) and eq. (18). The latter, coupled with the equilibrium values of B_i's, determines the price indexes: $[P_i]_{i\in N}$. The system of N zero profit conditions is solved for N unknowns, W_i^{sol}. Then, the values of p_i's and P_i's are recomputed taking the new vector of wage indexes. The computations continue for iterations $t = 1, 2, ...$ until $\sum_{i\in N}\left(W_i^{sol,t} - W_i^{sol,t-1}\right)^2$ is sufficiently small. Furthermore, due to the fact that the proportions of low/high-skilled, natives and migrants are now different, the labor market clearing wages for each type of workers are adjusted such that they aggregate to the new wage index, W_i. The equilibrium levels of the endogenous variables: X_i, P_i and the trade matrix $[X_{ij}]_{i,j\in N}$ are then computed using the equilibrium solutions for B_i and W_i.

Table 8: The Structure of the Labor Force

Code	Benchmark					Stock of S-N migrants					Stock of N-N migrants					Flow of S-N migrants					Flow of N-N migrants				
	Total L^T	Share L^L	Share L^H	Share L^l	Share L^h	Total L^T	Share L^L	Share L^H	Share L^l	Share L^h	Total L^T	Share L^L	Share L^H	Share L^l	Share L^h	Total L^T	Share L^L	Share L^H	Share L^l	Share L^h	Total L^T	Share L^L	Share L^H	Share L^l	Share L^h
Australia	12.41	50.7	21.3	15.3	12.7	11.11	56.8	23.9	11.7	7.6	10.47	60.9	26.4	5.8	6.9	12.04	52.3	22.0	14.5	11.2	12.46	50.6	21.6	16.9	10.8
Austria	5.81	73.5	12.7	12.1	1.7	5.46	78.4	13.6	6.7	1.2	5.75	78.5	15.1	5.8	0.6	5.59	76.2	13.2	9.2	1.3	5.52	76.8	13.6	8.6	0.9
Belgium	7.26	62.4	25.0	10.1	2.5	7.01	65.1	26.0	7.3	1.5	6.96	68.0	27.8	3.2	1.0	7.16	63.4	25.4	9.2	2.0	7.24	62.5	25.6	10.0	1.8
Canada	20.70	39.3	38.3	9.2	13.2	18.28	44.6	43.5	5.3	6.6	19.38	43.7	43.6	4.8	7.8	19.68	41.4	40.3	8.3	10.1	20.82	38.6	38.7	10.2	12.6
Switzerland	5.09	64.3	12.0	18.5	5.2	4.76	68.9	13.0	14.0	4.2	4.45	76.4	15.9	6.2	1.5	4.96	65.9	12.3	17.0	4.7	5.20	63.5	12.4	20.2	4.0
Chile	8.64	84.0	15.8	0.2	0.0	8.70	84.1	15.8	0.1	0.0	8.81	83.3	16.4	0.2	0.0	8.67	84.0	15.8	0.2	0.0	8.68	83.7	16.0	0.2	0.0
Czech Rep.	7.02	84.1	10.1	5.1	0.7	6.95	85.1	10.3	4.2	0.4	6.91	87.4	11.4	1.0	0.2	7.02	84.2	10.1	5.1	0.6	7.04	84.3	10.2	5.1	0.3
Germany	60.33	68.4	23.8	6.1	1.7	59.07	70.1	24.5	4.4	1.0	59.50	71.7	25.8	1.8	0.7	59.88	69.0	24.1	5.6	1.3	59.47	69.2	24.4	5.1	1.3
Denmark	3.74	73.4	20.5	5.0	1.1	3.64	75.6	21.2	2.6	0.7	3.79	75.1	22.1	2.5	0.4	3.68	74.7	20.9	3.6	0.8	3.72	73.6	21.0	4.7	0.8
Spain	28.82	83.3	11.2	4.4	1.0	28.08	86.4	11.6	1.6	0.4	28.98	84.8	11.7	2.9	0.6	28.36	84.9	11.5	3.0	0.7	28.46	83.9	11.6	3.7	0.8
Estonia	0.92	62.8	11.9	17.4	7.9	0.76	82.0	17.6	0.2	0.2	0.97	62.9	13.4	16.4	7.3	1.11	52.9	10.6	26.2	10.3	0.94	62.7	12.9	16.9	7.6
Finland	3.58	71.9	25.7	1.8	0.6	3.55	72.5	25.9	1.2	0.4	3.79	73.0	26.2	0.6	0.2	3.56	72.4	25.9	1.3	0.4	3.54	72.0	26.5	1.2	0.3
France	40.55	70.4	20.4	7.6	1.5	38.90	73.7	21.4	4.1	0.7	39.53	73.6	21.8	3.8	0.8	40.17	71.0	20.7	7.2	1.1	40.82	70.2	20.5	8.1	1.2
United Kingdom	40.35	76.5	14.8	5.7	3.1	38.53	80.7	15.8	2.1	1.4	42.02	77.1	17.7	3.5	1.7	39.77	77.6	15.1	5.2	2.1	40.30	76.1	15.6	6.0	2.3
Greece	7.72	80.1	14.3	4.8	0.8	7.46	84.2	15.0	0.5	0.2	8.39	80.4	15.1	3.9	0.6	7.72	80.2	14.4	4.6	0.8	7.71	79.7	14.7	4.7	0.8
Hungary	6.99	87.4	11.9	0.6	0.1	6.99	87.5	12.1	0.4	0.1	7.28	86.5	13.2	0.2	0.0	7.00	87.3	12.0	0.6	0.1	6.99	87.3	12.0	0.7	0.1
Ireland	2.32	73.6	14.6	7.0	4.8	2.28	74.9	14.9	6.2	4.0	2.77	78.1	20.5	0.7	0.7	2.24	74.5	15.0	6.3	4.1	2.15	73.5	18.9	5.2	2.4
Iceland	0.17	76.1	11.7	8.4	3.8	0.17	79.8	12.4	5.2	2.7	0.18	80.1	15.4	3.3	1.2	0.17	78.0	12.0	7.0	3.0	0.17	77.4	12.4	7.4	2.7
Israel	3.32	41.4	13.2	30.0	15.4	2.58	70.6	17.6	7.9	3.8	3.16	45.4	16.4	25.1	13.0	3.16	49.0	14.1	30.2	6.7	3.38	41.1	13.7	31.5	13.6
Italy	42.78	89.5	8.3	1.8	0.3	42.28	91.0	8.5	0.3	0.1	44.95	89.6	8.8	1.4	0.2	42.56	90.1	8.4	1.2	0.3	42.50	89.5	8.6	1.7	0.3
Japan	92.34	75.3	23.7	0.7	0.3	91.97	75.7	23.8	0.4	0.1	92.29	75.5	24.0	0.4	0.1	92.05	75.6	23.8	0.5	0.2	92.31	75.3	23.7	0.7	0.2
Rep. of Korea	29.37	74.0	25.6	0.2	0.1	29.34	74.2	25.7	0.0	0.1	30.56	73.1	26.6	0.2	0.1	29.41	74.0	25.6	0.2	0.1	29.75	73.4	26.2	0.2	0.1
Luxembourg	0.30	46.9	20.3	25.6	7.2	0.29	49.0	21.2	23.1	6.7	0.24	66.0	28.7	4.4	1.0	0.29	48.2	20.9	24.1	6.9	0.28	50.5	22.8	22.0	4.8
Mexico	46.20	88.6	11.1	0.2	0.2	46.18	88.7	11.1	0.1	0.1	52.46	88.3	11.5	0.1	0.1	46.21	88.6	11.1	0.2	0.2	49.87	88.3	11.4	0.2	0.1
Netherlands	11.11	65.5	18.4	12.6	3.5	10.19	71.6	20.3	6.2	1.9	10.88	69.9	21.2	7.1	1.8	10.94	66.5	18.7	11.7	3.0	11.10	65.5	18.9	12.7	3.0
Norway	3.06	73.1	19.7	5.2	2.1	2.97	75.5	20.3	2.7	1.4	3.05	75.6	21.2	2.6	0.7	3.01	74.4	20.0	3.8	1.7	3.02	73.5	20.1	4.9	1.5
New Zealand	2.43	61.9	17.0	12.3	8.8	2.24	67.5	18.6	7.8	6.1	2.48	68.1	23.8	5.0	3.2	2.33	64.4	17.7	10.3	7.6	2.53	60.9	19.5	11.1	8.6
Poland	24.66	86.4	10.7	2.5	0.4	24.22	88.3	11.0	0.6	0.1	25.75	85.7	12.1	1.9	0.3	24.87	85.6	10.6	3.3	0.5	24.77	85.6	11.2	2.7	0.4
Portugal	7.08	89.5	8.4	1.7	0.4	7.12	90.9	8.6	0.3	0.2	8.25	89.6	9.0	1.2	0.2	7.02	90.5	8.6	0.7	0.2	7.21	89.0	9.2	1.5	0.3
Slovak Rep	3.43	88.0	11.5	0.4	0.1	3.43	88.1	11.5	0.3	0.1	3.79	87.7	12.1	0.1	0.0	3.42	88.1	11.5	0.3	0.1	3.45	87.6	12.1	0.2	0.1
Slovenia	1.37	75.8	13.0	9.9	1.3	1.25	84.4	14.6	0.8	0.2	1.46	76.6	13.8	8.5	1.0	1.38	75.9	12.9	10.0	1.2	1.42	75.9	13.4	9.5	1.2
Sweden	6.22	63.5	24.4	9.0	3.1	5.92	66.8	25.7	5.7	1.8	5.95	68.0	26.9	3.7	1.4	6.05	65.2	25.1	7.5	2.2	6.27	63.2	24.7	9.5	2.6
Turkey	33.70	89.9	8.0	1.6	0.4	33.29	91.3	8.2	0.3	0.2	35.55	90.4	8.1	1.2	0.3	33.64	90.2	8.1	1.5	0.3	34.20	90.1	8.1	1.5	0.3
United States	183.75	41.2	45.7	7.5	5.6	171.47	44.2	49.0	4.5	2.3	172.79	43.9	48.8	3.5	3.7	178.22	42.5	47.1	6.3	4.1	180.23	42.0	46.6	6.3	5.1
ROW	2426.19	93.8	6.1	0.1	0.0	2453.28	93.5	6.5	0.0	0.0	2426.19	93.8	6.1	0.1	0.0	2436.40	93.6	6.3	0.1	0.0	2426.19	93.8	6.1	0.1	0.0

Source: Docquier et al. (2014). For all the countries we present five set of data. The set "Benchmark" shows the reference demographic structure of countries. "Stock of S-N migrants" ("Stock of N-N migrants") presents the structure of labor after imposing an exogenous migration shock on the stock of non-OECD (OECD) migrants. "Flow of S-N migrants" ("Flow of N-N migrants") presents the structure of labor after imposing an exogenous migration shock on the flow of non-OECD (OECD) migrants in years 1990-2000. The table contains the following variables: Total labor supply (Total L^T) in millions of people, the share of low-skilled natives (Share L^L) in percent, the share of high-skilled natives (Share L^H) in percent, the share of low-skilled foreigners (Share L^l) in percent, the share of high-skilled foreigners (Share L^h) in percent. ROW stands for the Rest of the World, that is the sum for all the non-OECD countries.

Institut de Recherches Économiques et Sociales
Université catholique de Louvain

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique

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