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ABSTRACT:

This paper analyzes international migrations when migrants invest part of their income in their origin country. This investment contributes to increase capital intensity and wages in the origin country, thus reducing the scope for migrating. We show that a non-total migratory equilibrium can exist if the foreign wage is not too high, and/or migratory and transfer costs are not too low. Exogenous shocks, such as an increase in the foreign wage, lead to an increase in optimal remittances per migrant, and a higher wage in the origin country. Yet the net effect on the equilibrium number of migrants is positive. Hence, in equilibrium, optimal remittances and number of migrants are positively related. We use data from twenty five countries from Eastern Europe and Central Asia in 2000 in order to test for this implication of our model. OLS and bootstrap estimates put forward a positive elasticity of the number of migrants with respect to remittances per migrant. Policy implications follow.

Key-Words:

- Investment motive
- Migration
- Migratory policy
- Remittances

RESUME :

L'article étudie la migration économique dans le cadre d'un modèle où les migrants peuvent investir une partie de leur épargne dans le pays d'origine. En particulier, un équilibre avec migration partielle est faisable. Dans ce cas, on démontre et teste empiriquement une relation positive entre nombre de migrants et le montant du transfert par migrant.

Mots-clés :

- Migration
- Motif d'investissement
- Politique migrante
- Transfert des migrants

JEL Classification : F22, F24, J61, O15

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Abstract

This paper analyzes international migrations when migrants invest part of their income in their origin country. This investment contributes to increase capital intensity and wages in the origin country, thus reducing the scope for migrating. We show that a migratory equilibrium can exist if the foreign income is not too high, and/or migratory and transfer costs are not too low. Exogenous shocks, such as an increase in the foreign income, lead to an increase in optimal invested remittances per migrant, and a higher wage in the origin country. Yet the net effect on the equilibrium number of migrants is positive. Hence, in equilibrium, optimal invested remittances and number of migrants are positively related. We use data from twenty five countries from Eastern Europe and Central Asia in 2000 in order to test for this implication of our model. OLS and bootstrap estimates put forward a positive elasticity of the number of migrants with respect to estimated invested remittances per migrant. Policy implications follow.

Mots-clef: Migration, Remittances, Investment motive, Migratory Policy.
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1 Introduction

International migration is one of the most important factors affecting economic interaction between developed and developing countries in the 21st century. In 2005, nearly 191 million people, representing 3% of the world population, live and work in a country different from the one where they were born or where they own citizenship. Among these migrants, we are particularly interested in migrants moving for economic reasons. In general, neoclassical economics explains these migrations as the result of an elementary cost/benefit analysis: individuals decide to migrate if the net discounted gain from migration is positive; the most important driving force is thus the wage differential between the origin and the destination country. More recently, the new economics of labor migration submitted the idea according to which migration is the normal response of individuals to various market deficiencies in developing countries and might not be driven only by the wage differential (Stark, 1991). In this context, individuals can choose to migrate in order to overcome failures of labor, credit or insurance markets.

Connected to economic migration are the ever growing flows of resources transferred by migrants towards their origin countries, the so-called remittances. Substantial empirical evidence has shown that remittances have a significant impact on the developing world. Nowadays, they constitute the second largest source of currencies for these countries, slightly behind foreign direct investments but before official development aid. In 2007, they amounted to more than 355 billion US$ of which 265 billion was directed towards developing countries.[1]

Migrants can remit to their families and communities in their origin country for several reasons. Rapoport and Docquier (2006) list a series of motives that could explain the existence of remittances: altruism, exchange (purchase of various types of services, repayments of loans. . .), strategic motive (positive selection among migrants, signaling), insurance (risks diversification) and investment. Specialists' consensus is that in general a combination of all these motives is the driver of remittances in real life. However, since it is difficult to mix in the same model several motives, in general economists focus on one of them and study in depth its implications. For

[1] See the World Bank website: http://www.worldbank.org/.

instance, in models where insurance or altruism is the main motive, recipient households should modify their labor supply (Azam and Gubert, 2005; Chami et al., 2005; Naiditch and Vranceanu, 2009). If investment is the main motive, the impact on labor supply should be smaller, but labor demand might be impacted.

This paper analyses the existence and properties of migratory equilibria in the case where a significant share of the remittances sent back home by migrants are invested in capital formation. Several recent empirical studies have brought support to the assumption according to which investment is one of the main motivations to remit. Ratha (2003) argues that remittances are more and more often invested in capital formation, especially in low-income countries. He also points out that the amount and the volatility of the flow of remittances rose much more in the nineties, once developing countries had removed the barriers to international movements of capital. In his view, this brings additional support to the investment assumption. Lucas (1985) estimated that in five sub-Saharan African countries, emigration (towards South-African mines) had, in the short run, reduced work supply and harvests but that, in the long run, it permitted to improve agricultural productivity and to accumulate cattle, mainly due to the investment of remittances. Woodruff and Zenteno (2007) estimate that remittances coming from the United States represent close to $1/5^{th}$ of investments in urban micro-enterprises in Mexico. Likewise, the majority of Egyptian migrants returning to their origin country at the end of the 1980s started their own firms using repatriated savings from abroad (McCormick and Wahba, 2004). Comparisons between countries prove that remittances are affected by the investment climate in recipient countries in the same manner as capital flows, though to a much lesser degree. Between 1996 and 2000, for example, remitted amounts averaged 0.5% of GDP in countries with a corruption index (as measured by the index of the International Corruption Research Group) higher than the median level, compared to 1.9% in countries with a corruption index lower than the median level. Countries that were more open (in terms of their trade/GDP ratio) or more financially developed (M2/GDP) also received larger remittances (Ratha, 2003). In Eastern Europe, Leon-Ledesma and Piracha (2004) showed that remittances have a positive impact on productivity and employment, both directly and indirectly through their effect on capital formation.

Other authors have studied migratory equilibria in a framework not very different from ours, but did not consider the possibility that migrants' remittances can drive up the stock of capital in the origin country. For instance, Galor (1986) worked out a two-country model with overlapping generations; he shows that if natives of each country are homogeneous, the whole population of the developing country will permanently emigrate in the long run, because permanent migration cannot induce a wage raise in the origin country strong enough to make migration a dominated strategy. Galor's result depends on his assumption that all productive factors are perfectly mobile between countries: if one factor was fixed, labor productivity in the developing country would increase much more with migration (Karayalcin, 1994). Moreover, in Galor's model, permanent migration of individuals implies permanent migration of capital, since each worker represents a potential source of capital for the country where he lives, given his savings. This implicit assumption holds no more if migrants can invest remittances in the origin country. Djajic and Milbourne (1988) also study migratory equilibria but in the case of temporary migration, with a predetermined stock of capital. Carrington, Detragiache and Vishwanath (1996) study migration in a dynamic model where migratory costs decrease with the number of migrants. They then show that even if migration depends on the differential between wages, migratory flows can increase when this differential decreases (because costs decline), and they lay down conditions for a steady migratory equilibrium. In their model too, the stock of capital is given.

A few recent papers study the potential impact of remittances on migration, but not specifically in the case of invested remittances. For instance, some scholars suggest that remittances could have a negative impact on migration. In an elementary framework, remittances contribute to the income of left home family members; then, if large enough, they can discourage additional household members to migrate (van Dalen et al., 2005). Stark (1995) works out an imperfect information model, with high and low productivity migrants, whose productivities cannot be observed directly by the would-be employers in the rich country. Hence the highly productive migrants would send remittances home to the low productivity workers in order to prompt them to stay. Some other researchers suggest that the link between remittances and migration could be positive. This positive relationship can be obtained in a loan repayment model, where the

migrant committed himself to reimburse his family who paid for the up-front cost of migration, and to help other family members to migrate in the future; this rationale seems to be supported by an empirical study on Pakistani data (Ilahi and Jafarey, 1999). Finally, remittances could be interpreted as signals of financial attractiveness of destination countries and thus, trigger chain migration; this effect seems to be supported by two empirical studies, one conducted with data on Egypt, Turkey and Morocco for households with family members living abroad (van Dalen et al., 2005), and the other using longitudinal data from Bosnia and Herzegovina (Dimova and Wolff, 2009). In a different set-up, Stark and Wang (2002) analyze a problem where skilled and unskilled migrants are partially complementary inputs; hence skilled workers' wages increase with the number of unskilled workers. Then skilled migrants may decide to subsidize unskilled workers' wage, in order to attract them to the host country. In the same line of reasoning, skilled workers might send remittances to unskilled workers to help them pay for the migratory cost.

In this paper, we build a very simple model aiming at characterizing migratory equilibria, based on the elementary neo-classical trade-off between discounted gain if migrating and discounted gain if staying. We emphasize the relationship between invested remittances, migration and wages in the origin country. To keep the analysis as simple as possible, we abstract from the consequences of migration on the destination country; in particular, we assume that a migrant's income in the host country does not depend on the number of existing migrants. We make no difference on whether the representative migrant earns his income from work or as a public benefit provided by the welfare system.[2] Such a set up is most suitable to analyze migration from relatively small low-income countries to large developed countries.[3] We also assume that residents of the relatively poorer country who want to migrate toward the richer country can do so. In other words, they can afford the migratory cost. This assumption makes sense only if both the origin and the host countries have removed administrative barriers on international migration of labor. This pattern

[2] A substantial literature analyzes the interaction between immigration, the welfare state and the political support for immigration in the rich countries, given various labor market scenarii (inter alia: Borjas, 1999; Epstein and Hillman, 2003; Hansen, 2003; Nannestadt, 2009).

[3] It should be noticed here that there is no consensus in the literature (mostly empirical studies in the United-States) about the impact of migrants on host country wages: some economists find only a small impact of migration on wages (Card, 2001), whereas others find a strong negative impact (Borjas, 2003) or a strong positive impact (Ottaviano and Peri, 2006).

fits well to some new migratory flows, such as migration from Eastern Europe to Western Europe, or from former Soviet Union Republics to Russia (World Bank, 2006). Our model would not be well suited to analyze migration from South to North, given that the rich industrialized countries are still maintaining tight controls on immigration from that region (Benhabib and Jovanovic, 2007). Finally, in our setting, migrants are consistently selfish: they migrate in order to obtain a higher intertemporal satisfaction, and they remit and invest their savings in the origin country for the same reason. Probably migrants can invest their savings in other countries, including in the host country. In this paper we assume that, for identical returns, they present some form of "origin country bias"; migrants prefer to invest in their relatives' or friends' enterprises at home.

We can then show that when the net migratory benefit (i.e. the differential between the migrant's income in the host country and the migratory cost) is very high, there is one high steady equilibrium which is not total (i.e. at least one individual stays in his origin country). When the net migratory benefit is not too high, and when transaction costs relative to international money transfer are not too low, then there is one "medium" steady migratory equilibrium. At difference with Carrington et al. (1996), our result is not driven by the migratory cost dynamics, but by the accumulation of capital related to invested remittances. While all equilibria are described in this paper, special emphasis is set on the medium steady equilibrium which exists for the broadest range of parameters. In this equilibrium there is a positive relationship between the equilibrium number of migrants and the invested remitted amount per migrant. The latter is increasing with the host country income and decreasing with transaction and migratory costs.

To test this result, we use data on twenty five Eastern Europe and Central Asia (EECA) countries from 2000. Migration has been an important dimension of the transition process of EECA countries and continues to be relevant as these countries move beyond transition. Nowadays, EECA accounts for one-third of all developing country emigration and Russia is the second largest immigration country worldwide (World Bank, 2006). An important element for our analysis, EECA migratory outflows seem to be driven essentially by the economic motive. Migrants' remittances with respect to GDP are large by world standards in many countries of the region. In 1995, officially recorded remittances to the EECA region totalled over US$7.7 billion, amounting

to 7.6% of the global total for remittances (US$102 billion); in 2000, it increased to over US$12.8 billion representing almost 10% of world remittances; and in 2005, it totalled over US$27.7 billion amounting to more than 10% of total remittances (WDI, 2007[4]). Like elsewhere in the world, in EECA countries remittances are partially spent on household consumption, and partially saved and invested, thus contributing to capital formation. In turn, wages in the migrants' origin countries seem to rise in an accelerated way, and so does productivity.[5] This picture is much in line with implications of our theoretical model. We will provide several OLS and bootstrap estimates of our key relationship between the total number of migrants and remittances per migrant. The estimated elasticity turns out to be positive, in keeping with the theoretical arguments.

We also analyze migratory policies that have to be implemented in order to make the equilibrium situation optimal from the standpoint of the developing country. We assume that public policies can use two levers of action: they can modify either the migratory cost, or the international transaction costs. Results depend on the chosen welfare criterion.

The paper is organized as follows. The next section introduces a two-country two-period migratory model, and particularly analyses the level of remittances and the income in the origin country of migrants. The existence and properties of the migratory equilibrium are analyzed in Section 3. Section 4 uses the EECA 2000 data to provide an empirical assessment of the link between invested remittances and the equilibrium number of migrants. Section 5 analyses the optimal migratory policies. The final section concludes the paper.

2 The model

2.1 Economic context and notations

The model analyses the equilibrium with migration within a two-period set-up. The worker earns an income only at the first period; he consumes at both the first and the second period. There are two countries: one developing country, which is the migrants' origin, and a developed country,

[4] WDI stands for World Development Indicators.

[5] For example, according to the Financial Times, in Eastern Europe, wages in some sectors have risen up to 50% from mid-2006 to mid-2007 (Financial Times, June 5, 2007, *Eastern Europe hit by shortage of workers*). According to the *Romania Monthly Economic Review* (Sept. 2008, Ernst&Young SRL), in Romania, the national gross salary increased by 21.8% from 2006 to 2007.

which is the migrants' destination. At the beginning of the first period, the worker decides whether to migrate or not. If he migrates, he gets an income abroad (in a "hard" currency), can save and invest in his home country; at the second period, he gets a positive return from his investment. If he does not migrate, his total consumption is bounded by his first period wage (imperfect financial markets do not provide for appropriate saving instruments).

In this model, we assume that residents who have investment projects (for their firms) cannot raise resources on their home country capital market due to the imperfection of financial markets. However, they may borrow from relatives who emigrated, thanks to their personal relationship. Migrants may invest their savings either on the international market or in their relatives' firms back home. Thus, they would not lend their money to their relatives below the world interest rate r. However, since in this model the amount saved by migrants does not depend on the interest rate, it is not worthwhile for residents to offer a higher interest rate to migrants because this would increase costs without leading to higher investments. We assume that, facing identical interest rates, migrants prefer to invest in their relatives' firms back home.

More in detail, the economic structure of the two countries is:

- The developed (host) country.

The developed country is assumed to be big relatively to the developing country. The representative migrant's income in the developed country, denoted by s, is exogenously given. This exogenously given income can be either a wage (assuming that the migrant has a job in the official or informal sector) or some form of public benefit.

- The developing (origin) country.

In the origin country, output is produced with labor L and capital K, according to a standard neoclassical production function, $y = F(K, L)$.

We assume that labour is homogeneous and that individuals are all identical (same skills and consumption preferences). Each individual provides one unit of labor inelastically. Without migration, the total labor supply in the origin country is L_0. If there are M migrants, available

labor becomes $L = L_0 - M$. The mobility of labor is imperfect, migrants are subject to a migration cost, c.

2.2 Optimal remittances

If an individual becomes a migrant, at the first period (index 0), he earns an income s, must pay the constant migratory cost c, and eventually remits an amount T. At the second period (index 1), he has no earnings, but he can consume his savings.

The migratory cost c is exogenously given.[6] It includes financial costs (traveling costs, relocation costs...), psychological costs (of being far away from home and the loved ones, of adapting to a different culture, of speaking a foreign language...) as well as costs linked to the migratory policy (costs to obtain a visa, costs of administrative procedure...).[7] We admit that the migratory cost is lower than the resident's earnings. Hence, all individuals who want to migrate can pay the cost without having to borrow.

The migrant may decide to invest an amount T on international markets. We define the cross-border transaction cost by τ. We assume that this cost has a fixed part and a variable part proportional to the remitted amount: $\tau = \beta + (1-\alpha)T$, with $\alpha < 1$ and $\beta > 0$. Hence, the net transfer, denoted by T_N, can be written: $T_N = T - \tau = \alpha T - \beta$.

The main trade-off of the migrant is whether or not he should invest, and if so, how much. We assume that as long as his investment is not constrained (i.e. there are available projects), he prefers to save and invest in his origin country rather than in another country.

Let us denote by C_{0m} consumption in the first period and by C_{1m} consumption in the following period. The optimization program of the migrant is:

$$\begin{cases} \max_{(C_{0m},C_{1m})} U(C_{0m}, C_{1m}) \\ \text{s.t. } C_{0m} = s - c - T \ > 0 \\ \text{and } C_{1m} = (1+r)(\alpha T - \beta) > 0. \end{cases} \tag{1}$$

In order to obtain explicit forms, we assume that: $U(C_{0m}, C_{1m}) = \ln C_{0m} + \frac{1}{1+\rho} \ln C_{1m}$, where

[6] See Carrington et al. (1996) for a model of migratory equilibria where the migratory cost, specific to the individual, declines with the stock of migrants.

[7] See Sjaastad (1962) for an inquiry about the nature of migratory costs.

ρ is representative of the individual's preference for present consumption ($0 \leq \rho \leq 1$).

The maximization program becomes:

$$\begin{cases} \max_T \left[\ln C_{0m} + \frac{1}{1+\rho} \ln C_{1m}\right] \\ \text{s.t. } C_{0m} = s - c - T \ > 0 \\ \text{and } C_{1m} = (1+r)\left(\alpha T - \beta\right) > 0. \end{cases} \tag{2}$$

The first order condition $dU(C_{0m}(T), C_{1m}(T))/dT = 0$ allows us to determine the *optimal amount* of remittances:

$$T_0 = \frac{1}{2+\rho}\left[(s-c) + (1+\rho)\frac{\beta}{\alpha}\right] > 0 \tag{3}$$

$$T_{N0} = \frac{1}{2+\rho}\left[\alpha\left(s-c\right) - \beta\right]. \tag{4}$$

We check that $C_{0m} > 0$ and $C_{1m} > 0$ if and only if $\alpha\left(s-c\right) - \beta > 0$, that is if the ratio between the fixed and the variable transaction costs is lower than the host country income net of migratory cost $\left(\frac{\beta}{\alpha} < s - c\right)$. We assume that this condition is fulfilled. Thus, the optimal remitted amount T_{N0} strictly positive.

According to Equations (3) and (4), both the gross and net remittances per head are linearly increasing functions in the host country income net of the migratory cost, $(s-c)$. Net remittances per migrant are a decreasing function of transaction costs. In this configuration, the optimal amount of remittances per migrant is independent of the number of migrants; changes in remittances per migrant are driven only by (exogenous) shocks to parameters.

For the optimal transfer, the indirect utility of the migrant can be written:

$$U(C_{0m}^*, C_{1m}^*) = \ln\left\{\frac{1}{\alpha}\left(\frac{1+\rho}{2+\rho}\right)\left(\frac{1+r}{2+\rho}\right)^{\frac{1}{1+\rho}}\left[\alpha\left(s-c\right)-\beta\right]^{\frac{2+\rho}{1+\rho}}\right\} = \ln\left(V_0\right), \tag{5}$$

with:

$$V_0 \equiv \frac{1}{\alpha}\left(\frac{1+\rho}{2+\rho}\right)\left(\frac{1+r}{2+\rho}\right)^{\frac{1}{1+\rho}}\left[\alpha\left(s-c\right)-\beta\right]^{\frac{2+\rho}{1+\rho}} = \frac{1}{\alpha}\left(1+\rho\right)\left(1+r\right)^{\frac{1}{1+\rho}}\left(T_{N0}\right)^{\frac{2+\rho}{1+\rho}}. \tag{6}$$

The indirect utility V_0 is increasing in the net remitted amount, $\frac{\partial V_0}{\partial T_{N0}} > 0$. Yet, we have shown that the net remitted amount T_{N0} is increasing with the host country income net of migratory cost $(s-c)$. Thus, the indirect utility V_0 have a similar response to variations in $(s-c)$:

$$\frac{\partial V_0}{\partial(s-c)} = \frac{\partial V_0}{\partial T_{N0}} \frac{\partial T_{N0}}{\partial(s-c)} > 0. \quad (7)$$

It can also be checked that V_0 is decreasing with transaction costs:

$$\frac{\partial V_0}{\partial \beta} = -\left(\frac{2+\rho}{1+\rho}\right) \frac{V_0}{[\alpha(s-c)-\beta]} < 0 \quad (8)$$

$$\frac{\partial V_0}{\partial \alpha} = \frac{V_0}{\alpha(1+\rho)[\alpha(s-c)-\beta]} [\alpha(s-c)+(1+\rho)\beta] > 0. \quad (9)$$

2.3 Supply of goods, capital accumulation and migration

Without migration, capital in the origin country is K_0. We assume that remittances provide for the only source of accumulating capital in the developing country. Net remittances, R, are reinvested in capital.[8] Hence, if there are M migrants, the amount of capital becomes:

$$K = K_0 + MR. \quad (10)$$

In the developing country, the resident offers the migrant a return on his investment equal to r, close to the international interest rate[9] . Because of the personal relationship between the resident and the migrant, the latter prefers to support the investment project of the resident in their home country.

To make the analysis tractable, we consider that the macroeconomic production function is of a constant-returns to scale Cobb-Douglas type:

$$y = F(K, L) = AK^a L^{1-a}, \text{ with } A > 0 \text{ and } a < 1. \quad (11)$$

We denote by $k = \frac{K}{L}$ the capital intensity in the developing country. Without migration, the capital intensity is: $k_0 = \frac{K_0}{L_0}$. If there are M migrants, the capital intensity becomes:

$$k(M) = \frac{K_0 + MR}{L_0 - M}, \quad (12)$$

with $k(0) = k_0$. Here $k(M)$ is an increasing function in the number of migrants.

[8] The structure of the model would not change if we consider that only a fraction of the remittances were invested.

[9] The resident does not wish to pay the migrant's investment at a rate higher than r because the invested amount does not depend on the interest rate.

The marginal product of labor and capital are respectively $MP_L(k) = (1-a) A (k)^a$ and $MP_K(k) = aA (k)^{a-1}$.

Finally, when borders are closed, capital is scarce and the marginal productivity of capital is higher than the return on capital. Formally, it implies:

$$MP_K(k_0) > r \Longleftrightarrow k_0 < \left(\frac{aA}{r}\right)^{\frac{1}{1-a}}. \tag{13}$$

The savings level per migrant does not depend on the number of migrants. However, the invested amount *in the origin country* depends on the migration level. Indeed, migrants can invest in their origin country only if there are available projects. Available projects exist as long as the marginal productivity of capital is higher than the interest rate required by investors. This implies the following condition:

$$MP_K(k) \geq r \Longleftrightarrow k(M) \leq \left(\frac{aA}{r}\right)^{\frac{1}{1-a}} \Longleftrightarrow M \leq M_1 \equiv L_0 \left[\frac{1-\left(\frac{r}{aA}\right)^{\frac{1}{1-a}} k_0}{1+\left(\frac{r}{aA}\right)^{\frac{1}{1-a}} R}\right]. \tag{14}$$

Note that when migrants cannot invest in their origin country, they can still invest in other countries, at the same interest rate. Thus, their savings level and their utility level does not depend on the number of migrants.

We can distinguish between three cases.

- 1st case: no investment constraint, $M \leq M_1$

In this case, each migrant can invest all his savings in his origin country. Thus, the remitted invested amount per migrant is : $R_0 \equiv T_{N0} = \frac{1}{2+\rho}[\alpha(s-c)-\beta]$.

- 2nd case: constrained investment, $M_1 < M \leq M_2$

The remitted amount per migrant is constrained. Indeed, if each migrant were remitting and investing the optimal amount $T_{N0} = \frac{1}{2+\rho}[\alpha(s-c)-\beta]$, then the marginal productivity of capital would be lower than the interest rate r, which is impossible. Necessarily, migrants remit and invest in their origin country an amount $R_1(M)$ such that the marginal productivity of capital is

at the most equal to r. In other words, the net remitted amount, $R_1(M)$, is such that:

$$\begin{aligned} \frac{K_0 + MR_1(M)}{L_0 - M} &\leq \left(\frac{aA}{r}\right)^{\frac{1}{1-a}} \\ R_1(M) &\leq \frac{1}{M}\left[(L_0 - M)\left(\frac{aA}{r}\right)^{\frac{1}{1-a}} - K_0\right] \end{aligned} \tag{15}$$

Since migrants prefer to invest in their origin country, the total remitted amount will be such that the marginal productivity of capital equals the interest rate r: $\forall M \in [M_1; M_2]$, $k(M) = k(M_1) = \left(\frac{aA}{r}\right)^{\frac{1}{1-a}}$.

Thus, the remitted invested amount per migrant is :

$$\forall M \in [M_1; M_2], \; R_1(M) = \frac{1}{M}\left[(L_0 - M)\left(\frac{aA}{r}\right)^{\frac{1}{1-a}} - K_0\right].$$

- 3rd case: no investment, $M_2 < M < L_0$

There exists a threshold M_2 such that when migration reaches this level, the capital intensity becomes lower than $\left(\frac{aA}{r}\right)^{\frac{1}{1-a}}$ for any remitted amount (the existence and properties of M_2 are studied in Appendix A.1.). Thus, when migration reaches the threshold M_2, migrants cannot invest in their origin country; remittances are then null.

Thus, we can define a function $R(M)$ representing the net remitted invested amount per migrant in their origin country :

$$R(M) = \begin{cases} R_0 = \frac{\alpha(s-c)-\beta}{2+\rho} & \forall M \in [0; M_1] \\ R_1(M) = \frac{1}{M}\left[(L_0 - M)\left(\frac{aA}{r}\right)^{\frac{1}{1-a}} - K_0\right] & \forall M \in]M_1; M_2] \\ R_2 = 0 & \forall M \in]M_2; L_0[\end{cases} \tag{16}$$

2.4 The developing country income

For the time being, we assume that the number of migrants M is exogenous. Later on, we will show how the number of migrants is determined as an equilibrium value.

When wages adjust in the labor market such that supply equals demand of labor and capital depends on remittances, profit is:

$$\pi = A(K_0 + MR)^a (L_0 - M)^{1-a} - r(K_0 + MR) - w(L_0 - M) \tag{17}$$

We know that the highest profit is obtained when factor prices equal their marginal productivity: $w = MP_L$ and $r = MP_K$:

$$\begin{cases} w = (1-a)A\left[k\left(M\right)\right]^{a} \\ r = aA\left[k\left(M\right)\right]^{a-1} \end{cases} \tag{18}$$

The last equation detemines the optimal capital intensity as a function of the interest rate r: $k^{opt} = \left(\frac{aA}{r}\right)^{\frac{1}{1-a}} = k\left(M_1\right)$. Yet, capital is scarce when borders are closed (Eq. 13). Thus, as long as $M \leq M_1$, the stock of capital is below the optimal level, and firms continue to invest. For $M \in]M_1; M_2]$, the stock of capital has reached the optimal value and does not vary any more. For $M \in]M_2; L_0]$, there are no invested remittances and the stock of capital decreases with the number of migrants.

According to equation (18), residents' wage depends on the capital intensity and thus on invested remittances. So, there is a need to distinguish between three different cases.

- 1st case: $M \leq M_1$(no investment constraint)

  Then, the remitted amount per migrant is R_0, independent from M. The capital intensity becomes: $k\left(M\right) = \frac{K_0 + MR_0}{L_0 - M}$.

The wage rate in the developing country then is:

$$w_0\left(M\right) = (1-a)A\left(\frac{K_0 + MR_0}{L_0 - M}\right)^{a}, \tag{19}$$

with $w(M=0) = w_0 = (1-a)A\left(k_0\right)^{a} > 0$ and $w\left(M_1\right) = (1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}}$.

- 2nd case: $M_1 < M \leq M_2$ (constrained investment)

Then, the remitted amount per migrant is $R_1\left(M\right)$ such that: $\forall M, k\left(M\right) = k\left(M_1\right) = \left(\frac{aA}{r}\right)^{\frac{1}{1-a}}$.

The wage rate in the developing country then is:

$$w_1(M) = (1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}} = w\left(M_1\right). \tag{20}$$

- 3rd case: $M_2 < M < L_0$ (no investment)

Then, the remitted amount per migrant is null; the capital intensity becomes: $\forall M$, $k\left(M\right) = \frac{K_0}{L_0 - M} \geq \left(\frac{aA}{r}\right)^{\frac{1}{1-a}}$.

The wage rate in the developing country then is:

$$w_2(M) = (1-a)A\left(\frac{K_0}{L_0 - M}\right)^a . \tag{21}$$

If we were to summarize the three cases, we can define a function w representing the wage in the developing country depending on M:

$$w(M) = \begin{cases} w_0(M) = (1-a)A\left(\frac{K_0+MR_0}{L_0-M}\right)^a & \forall M \in [0; M_1] \\ w_1(M) = (1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}} & \forall M \in]M_1; M_2] \\ w_2(M) = (1-a)A\left(\frac{K_0}{L_0-M}\right)^a & \forall M \in]M_2; L_0[\end{cases} \tag{22}$$

Proposition 1 *The income in the developing country is an increasing function of the number of migrants over* $[0; M_1]$*. It is constant over* $]M_1; M_2]$ *and increasing in* M *over* $]M_2; L_0[$*.*

Proof. $\frac{dw_0(M)}{dM} = \frac{(1-a)aA(K_0+L_0R_0)}{(L_0-M)^2}\left(\frac{K_0+MR_0}{L_0-M}\right)^{a-1} > 0 \; \forall M \in [0; M_1]$; $\frac{dw_1(M)}{dM} = 0 \quad \forall M \in]M_1; M_2]$ and $\frac{dw_2(M)}{dM} = \frac{(1-a)aA}{L_0-M}\left(\frac{K_0}{L_0-M}\right)^a > 0 \; \forall M \in]M_2; L_0[$. ■

Figure 1 depicts the income in the origin country as a function of M.

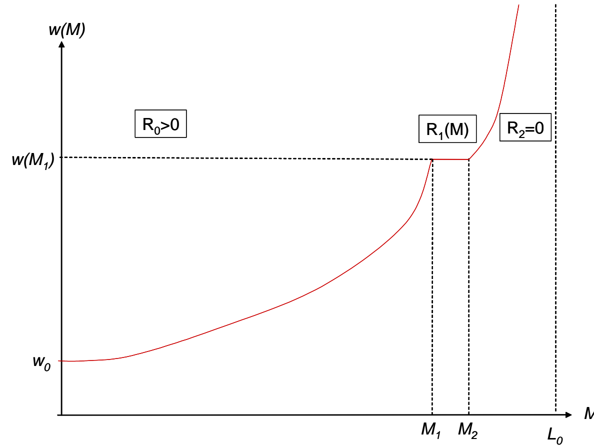


Figure 1: The income in the developing country.

Over $[0; M_1]$, the capital is below the optimal level. A trivial remark is that the residents' wage with invested remittances is bigger than without invested remittances:

$$\forall M \in [0; M_1], \, (1-a)A\left[\frac{K_0 + MR_0}{L_0 - M}\right]^a > (1-a)A\left[\frac{K_0}{L_0 - M}\right]^a \tag{23}$$

Over $[0; M_1]$, the income in the developing country reaches its (local) maximum in M_1 :

$$w(M_1) = (1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}} > w_0 > 0. \tag{24}$$

We can notice that this local maximum income is independent from the remitted amount. Yet M_1 decreases with R_0. Thus, the higher the optimal remitted amount per migrant, the faster this local maximum income is reached. In turn, the net remitted amount increases with the foreign income net of the migratory cost, and decreases with transaction costs. Thus, the higher the host country income and the lower the migratory and transaction costs, the faster this local maximum income in the origin country is reached.

2.5 The indirect utility of the resident

At the beginning of the period 0, the resident earns a wage $w(M)$. To keep the model simple, we assume that due to imperfections in the financial markets he cannot invest in productive activities (he can save money, but at a zero interest rate).

Then, if C_{0r} is the resident's consumption at the beginning of the period and C_{1r} his final consumption, his optimization program is:

$$\begin{cases} \max_{(C_{0r},C_{1r})} U(C_{0r},C_{1r}) \\ \text{s.t.} \;\; C_{0r}+C_{1r}=w(M) \\ \text{and} \;\; C_{0r}>0 \;,\; C_{1r}>0. \end{cases}$$

We assume that residents and migrants have the same utility function and the same preference for present consumption: $U(C_{0r},C_{1r})=\ln C_{0r}+\frac{1}{1+\rho}\ln C_{1r}$.

The optimization program of the resident becomes:

$$\begin{cases} \max_{C_{0r},C_{1r}} \left[\ln C_{0r}+\frac{1}{1+\rho}\ln\left(w(M)-C_{0r}\right)\right] \\ \text{s.t.} \; 0<C_{0r}<w(M). \end{cases}$$

The first order condition $dU(C_{0r})/dC_{0r}=0$ implies:

$$\begin{cases} C_{0r}^{*}=\left(\frac{1+\rho}{2+\rho}\right)w(M)>0 \\ C_{1r}^{*}=\left(\frac{1}{2+\rho}\right)w(M)>0 \end{cases}$$

For optimal consumption levels, the indirect utility of the resident is:

$$U(C_{0r}^{*},C_{1r}^{*}) = \ln\left\{(1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}} w(M)^{\frac{2+\rho}{1+\rho}}\right\} \tag{25}$$

$$U(C_{0r}^{*},C_{1r}^{*}) = \ln\left(W(M)\right), \text{ with } W(M)\equiv(1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}} w(M)^{\frac{2+\rho}{1+\rho}}. \tag{26}$$

We previously showed that the wage in the developing country depends on the number of migrants. We can then define the function W representing (the exponential of) the indirect utility of the resident:

$$W(M) = \begin{cases} W_0(M) \equiv (1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}} \left\{(1-a)A\left(\frac{K_0+MR_0}{L_0-M}\right)^a\right\}^{\frac{2+\rho}{1+\rho}} & \forall M \in [0; M_1] \\ W_1(M) \equiv (1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}} \left\{(1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}}\right\}^{\frac{2+\rho}{1+\rho}} & \forall M \in]M_1; M_2] \\ W_2(M) \equiv (1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}} \left\{(1-a)A\left(\frac{K_0}{L_0-M}\right)^a\right\}^{\frac{2+\rho}{1+\rho}} & \forall M \in]M_2; L_0[\end{cases} \quad (27)$$

3 Migratory equilibria

3.1 The equilibrium number of migrants

In autarky all the citizens of the developing country work in their origin country and receive the wage w_0. When migration is allowed, individuals have to make a choice: they can either stay in their origin country and receive the wage $w(M)$, or migrate to the developed country. If they migrate, they get the income s, need to pay a constant migratory cost c, and can remit a gross amount T of which a part R is invested in their origin country.

The worker chooses his location in order to maximize his utility. Thus, he decides to migrate if his utility in case of migration is higher than his utility when remaining in his origin country. His decision to migrate thus depends on anticipated incomes in both countries, on migratory and transaction costs and on the prospective return on his investment.

Our definition of equilibrium implies an implicit dynamics, with workers leaving one after the other (but, why not, at a very short interval). As all workers are identical in this model, who does migrate before the other ultimately depends on "the speed of packing luggage". At the migratory equilibrium, the marginal worker (i.e. the worker whose turn has come to take the decision) is indifferent between migrating to the developed country and staying in the origin country. In equilibrium, a migrant's utility is identical to a stayer's utility.

Formally, the equilibrium condition is:

$$\ln V(M) = \ln W(M). \quad (28)$$

Using the former expressions, the condition becomes:

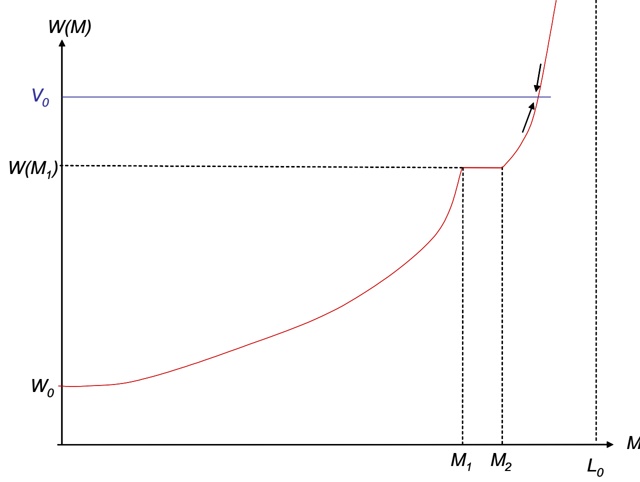
$$\begin{cases} V_0 = W_0\left(M\right) & , M \in [0; M_1] \\ V_0 = W_1\left(M\right) & , M \in \left]M_1; M_2\right] \\ V_0 = W_2\left(M\right) & , M \in \left]M_2; L_0\right[\end{cases} \tag{29}$$

Proposition 2 *There are four types of equilibria:*

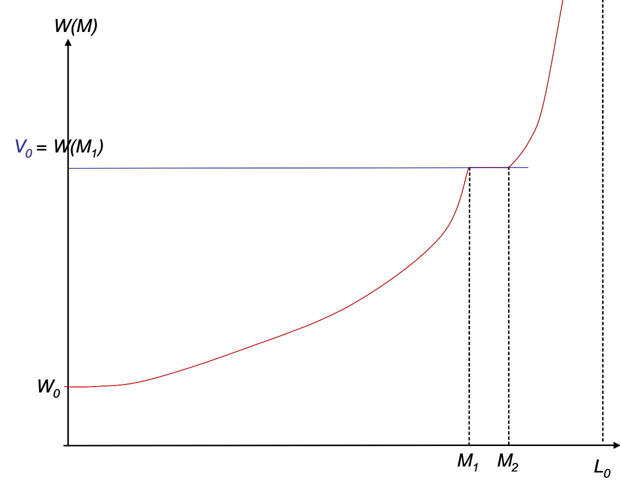
- *When* $V_0 > W\left(M_1\right)$*, there is one very high steady equilibrium above* M_2 *(equilibrium 0).*
- *When* $V_0 = W\left(M_1\right)$*, there is an infinity of equilibria between* M_1 *and* M_2 *(equilibrium 1).*
- *When* $W_0 < V_0 < W\left(M_1\right)$*, there is one steady equilibrium,* M^**, before* M_1 *(equilibrium 2).*
- *When* $V_0 \leq W_0$*, there is no migration (equilibrium 3).*

Proof. The proof can be found in Appendix A.2. ■

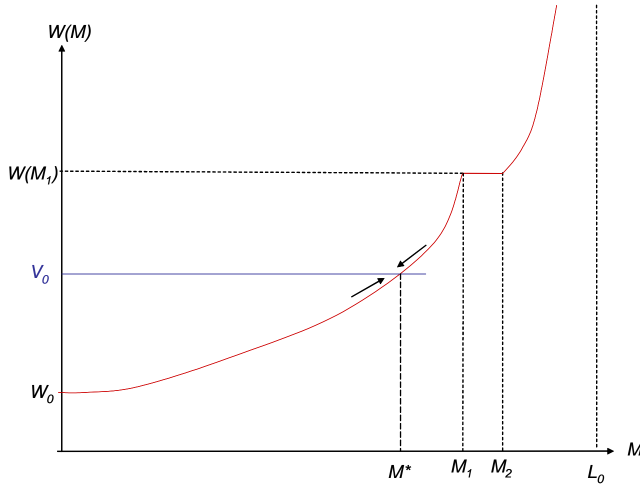
Figure 2 displays the various possible equilibria, depending on the parameters of the problem.



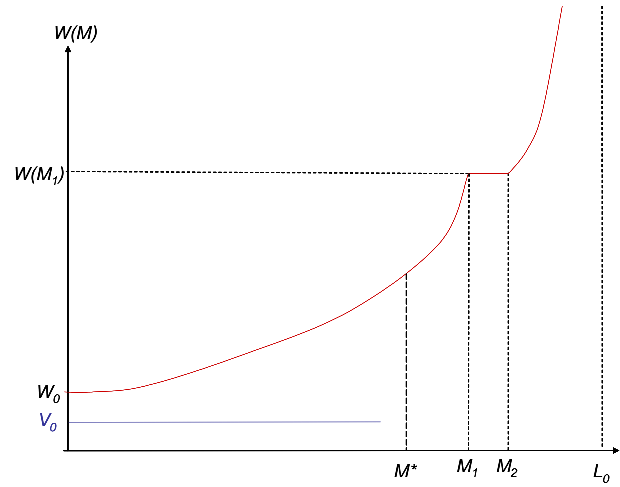
Eq. 0: One high steady equilibrium.



Eq. 1: An infinity of equilibria.



Eq. 2: One steady equilibrium M^*.



Eq. 3: No migration.

Figure 2: Various Types of Equilibria

Formally, there is a very high steady equilibrium above M_2 (equilibrium 0) when the migratory cost (function of transaction costs) is too low:

$$V_0 > W(M_1) \Longleftrightarrow c < s - \frac{\beta}{\alpha} - \frac{(1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}}}{\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}}. \tag{30}$$

There are an infinity of equilibria between M_1 and M_2 (equilibrium 1) when the migratory cost reaches a certain threshold:

$$V_0 = W(M_1) \Longleftrightarrow c = s - \frac{\beta}{\alpha} - \frac{(1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}}}{\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}}. \tag{31}$$

There is a steady migratory equilibrium M^* below M_1 (equilibrium 2) when the migratory cost (function of transaction costs) is neither too low, nor too high:

$$W_0 < V_0 < W(M_1) \Longleftrightarrow s - \frac{\beta}{\alpha} - \frac{(1-a)A\left(\frac{aA}{r}\right)^{\frac{a}{1-a}}}{\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}} < c < s - \frac{\beta}{\alpha} - \frac{(1-a)A(k_0)^a}{\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}}. \quad (32)$$

Finally, there is no migration at all (equilibrium 3) when the migratory cost (function of transaction costs) is too high:

$$V_0 \leq W_0 \Longleftrightarrow c \geq s - \frac{\beta}{\alpha} - \frac{(1-a)A(k_0)^a}{\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}}. \quad (33)$$

For the sake of parsimony, we study hereafter only the Equilibrium 2. Indeed, this equilibrium is non total, that is not all the residents leave the developing country; this seems to be a general migration pattern. Furthermore, Equilibrium 2 is likely to occur for the broadest range of parameters.

3.2 Properties of the Equilibrium 2

Let M^* denote the equilibrium number of migrants. In this configuration, the equilibrium number of migrants is below $M_1 : M^* \leq M_1$ (with utilities ranked: $\ln W_0 < \ln V_0 \leq \ln W(M_1)$). Thus, any migrant's utility is $\ln V_0 = \ln\left[\frac{1}{\alpha}(1+\rho)(1+r)^{\frac{1}{1+\rho}}(R_0)^{\frac{2+\rho}{1+\rho}}\right]$, and any resident's utility is $\ln W_0(M^*) = \ln\left[(1+\rho)\left(\frac{1}{2+\rho}\right)^{\frac{2+\rho}{1+\rho}}\left\{(1-a)A\left(\frac{K_0+M^*R_0}{L_0-M^*}\right)^a\right\}^{\frac{2+\rho}{1+\rho}}\right]$.

How does the equilibrium number of migrants vary with the gross and net remitted amounts? and with migratory and transaction costs?

We have shown (equation 4) that for $M < M_1$, the optimal amount of remittances $\left(R_0 = \frac{1}{2+\rho}\left[\alpha(s-c) - \beta\right]\right)$ depends on $(s-c)$, α and β. Changes in these parameters (for instance an increase in the host country income s) induces changes in the remitted amount. In turn, changes in parameters that push up the remitted amount per migrant, also push up the migrant's indirect utility V_0.

On the other hand, for a constant number of migrants below M_1, the wage in the origin country $w(M)$ is an increasing function of the remitted amount per migrant:

$$\frac{\partial w_0}{\partial R_0} = \frac{(1-a)AM}{L_0 - M}\left(\frac{K_0 + MR_0}{L_0 - M}\right)^{a-1} > 0. \quad (34)$$

Thus, for a constant number of migrants below M_1, both residents' and migrants' utilities increase when changes in parameters push up the optimal remitted amount. The increase in

the residents' utility has a negative effect on the equilibrium number of migrants, whereas the increase in the migrants' utility has a positive effect on the equilibrium number of migrants. In our framework, we can show that:

Proposition 3 *The equilibrium number of migrants M^* and the optimal amount of remittances per migrant R_0 are positively related.*

Proof. The Appendix A.4. shows that the elasticity of M^* with respect to R_0 is:

$$\frac{dM^*}{dR_0}\frac{R_0}{M^*} = \frac{1}{a}\left[\frac{K_0 + (1-a)\,M^* R_0}{K_0 + L_0 R_0}\right]\left[\frac{L_0 - M^*}{M^*}\right] > 0. \tag{35}$$

■

When remittances per migrant increase, the induced increase in the migrant's utility is higher than the induced increase in the resident's utility. Note that M^* is an increasing function of the remitted amount whereas M_1 is a decreasing function of remittances.

Proposition 4 *The higher the net migratory benefit $(s-c)$, the higher the equilibrium migration M^*, and the higher the remittances per migrant, R_0.*

The smaller the fixed transaction costs (β), the higher the equilibrium migration M^*, and the higher the remittances per migrant R_0.

The smaller the variable transaction costs $(1-\alpha)$, the higher the equilibrium migration M^*, and the higher the remittances per migrant R_0.

Proof. This proposition derives from the previous one and from the definition of R_0 (cf. Eq. 4).

■

In equilibrium, shocks to parameters move both remittances per migrant and the total number of migrants in the same direction. As a consequence, if this equilibrium prevails, one should observe a positive correlation between the amount of remittances per migrant and the equilibrium number of migrants.

Figure 3 illustrates the mechanism at work.

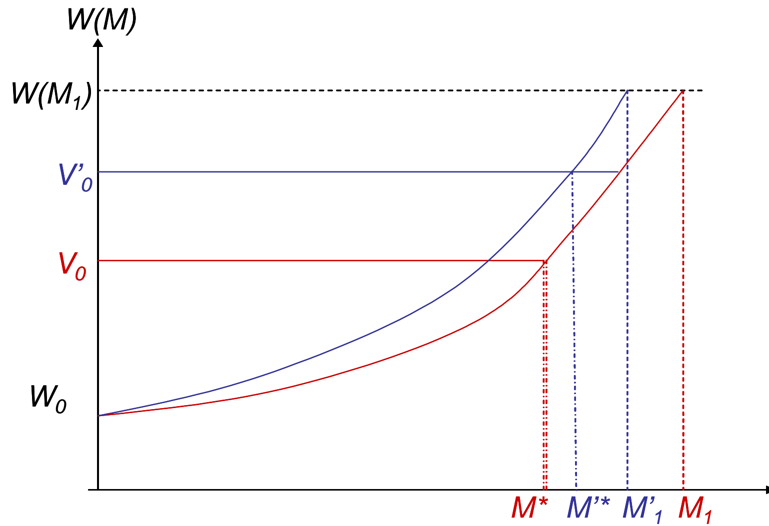


Figure 3: Impact of an increase of the net migratory benefit.

The initial equilibrium is obtained for $V_0 = W(M^*)$, where the number of migrants is M^*. An increase in s leads to higher optimal remittances and to a higher utility for migrants: their utility moves from V_0 to V_0' (blue horizontal line). All things equal, the number of migrant would increase. Yet, the increase in s and in invested remittances also implies an increase in residents' utility, thus shifting $W(M)$ upwards (the blue positive slope curve). *Ceteris paribus*, the number of migrant would decline. The new equilibrium is actually obtained for M'^*: the net migratory effect is positive: $M'^* > M^*$, but smaller as compared to the situation where remittances cannot be invested, thus do not push up incomes in the origin country.

In the next section, we aim at backing the theoretical model with some empirical evidence. Despite the substantial interest in this field, suitable data on remittances are so far very scarce; in particular, data on migratory costs and transaction costs are not available for a large group of countries; therefore, we could not test directly the relationships stated in Proposition 4. As a second best solution, we will analyze the equilibrium comovement between remittances per migrant and the total number of migrants (Proposition 3). But before, let's analyze the welfare implications of the model.

3.3 *Welfare implications*

By construction of the model, the focus of the analysis has been set on the impact of migration and remittances on the origin (developing) country. Policymakers in migrants' origin countries have an impact on both the migratory cost (by redefining the migratory policy or by helping potential migrants cover migratory costs) and international transaction costs (by redesigning regulations and standards imposed on money transfer operators, by improving competition in this sector or by improving controls over informal money transfer channels). They can tune these policy levers in order to reach an equilibrium number of migrants consistent with a social welfare criterion.

However, the definition of such a criterion is not an easy task, especially if policymakers are concerned by both individual utility and collective utility (the latter being increasing in the number of residents). In particular, in our problem, the number of residents is negatively related to the individual utility of each resident, given that the more people leave the country, the higher the inflow of capital and the higher the wage (and utility) of the left-home people. Policymakers are thus subject to a typical policy dilemma.

For instance, one objective that mixes collective and individual utility is to maximize the total utility of the left-home residents:

$$\max_{(c,\alpha,\beta)} \left\{ \mathcal{U}\left(M\right) = \left(L_0 - M\right) \ln W(M) \right\}. \tag{36}$$

where $(L_0 - M)$ is the number of residents and $\ln W(M)$ is the utility of each of them. Migration ($dM > 0$) then has two opposite effects: on the one hand, more migrants decrease the number of residents; on the other hand, more migrants entail higher transfers and thus a higher wage per resident. In this case, depending on the shape of $\ln W(M)$, there can be an interior optimal number of migrants $\tilde{M} \in]0, M_1[$ and, at one moment, the equilibrium number of migrants can be above or below this desired number (cf. Appendix A.4.).

Schiff (2002) has considered the decision of a policymaker who seeks to maximize the total utility of the developing country citizens, be them residents or migrants. In our context, the M citizens of the developing country who migrated have a utility level $\ln V\left(M\right)$, while the $(L_0 - M)$

residents have a utility level $\ln W(M)$. Thus, the objective of this social planner is:

$$\max_{(c,\alpha,\beta)} \left\{ \mathcal{U}(M) = M \ln V(M) + (L_0 - M) \ln W(M) \right\}. \tag{37}$$

Yet, at the migratory equilibrium, migrants' and residents' utilities are the same: $\ln V(M^*) = \ln W(M^*)$. Thus, the total utility becomes $\mathcal{U}(M) = L_0 \ln W(M)$, which is an increasing function in residents' wage only. In our model, the latter reaches its highest level in the extreme (and improbable) case where all migrants have left the country. According to this criterion, migration is always insufficient.[10]

4 The empirical analysis

4.1 The EECA region

Countries under scrutiny belong to the group of formerly centrally planned economies in Eastern Europe and Central Asia (EECA hereafter), and build on the World Bank's official delineation of the zone. In 2006, there were 28 countries in this group.[11] Three countries had to be removed from the analysis (Tajikistan, Turkmenistan and Uzbekistan), since we did not have any information on the amount of remittances they received. Thus, we will study at most 25 countries.

This group of countries provides for a worthy case study, since they have a similar economic history; most important for our analysis, new migration is driven essentially by economic motives. The region also provides enough diversity in terms of development levels, growth in population and new migration to allow for meaningful tests of our model.

EECA countries total 444 million people. In 2000, the average crude birth rate in EECA countries was 12.7 per thousand people and the crude death rate was around 11.7 per thousand; net emigration represented 2.5 million people; globally, in 2000, the EECA population grew by 0.12% (*WDI figures*). More specifically, in 2000, most EECA countries saw their population decrease; in 4 countries, it grew by less than 1% (Slovenia, Montenegro, Macedonia, FYR, Azerbaijan); and in

[10] This is the concusion reached by Schiff (2002) in a different analytical context.

[11] The World Bank includes in its "Europe and Centra Asia" group of countries: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, the Former Yugoslav Republic of (FYR) Macedonia, Georgia, Hungary, Kazakhstan, Kyrgyztan, Latvia, Lithuania, Moldova, Poland, Romania, Russian Federation, Serbia and Montenegro, Slovak Republic, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan.

only 6 countries, the population growth rate was between 1% and 2.1% (Uzbekistan, Kyrgyztan, Tajikistan, Turkmenistan, Turkey, Bosnia and Herzegovina).

According to a recent study by the World Bank (2006), migration flows in EECA tend to move in a largely bipolar pattern. Much of the emigration in Western EECA[12] (42%) is directed toward Western Europe, while much emigration from the CIS[13] remains within the CIS (80%). Germany is the most important destination country outside EECA for migrants from the region, while Israel was an important destination in the first half of the 1990s. Russia is the main intra-CIS destination. The United Kingdom is becoming a destination for migrants from the EECA countries of the European Union (EU). In 2000, according to the *Global Migrant Origin Database*, the largest stocks of migrants from EECA were located in Russia (11,553,062), Ukraine (6,669,273), Germany (3,883,761), Kazakhstan (2,838,336), the United States (2,177,586), Belarus (1,270,862), Israel (1,216,672) and Uzbekistan (1,034,601).

For many EECA countries, remittances are the second most important source of external financing after foreign direct investment. They represented 0.87% of the region's GDP in 1995, 1.45% in 2000 and 1.37% in 2005. But these figures hide wide disparities. In 2000, for example, remittances represented more than 10% of the GDP of Moldova (30.8%), Tajikistan, Armenia, Bosnia and Herzegovina, Albania, and Kyrgyztan. It represented between 1% and 5% in several countries (Bulgaria, Georgia, Azerbaijan, Romania, Macedonia FYR, Croatia, Serbia and Montenegro, Latvia, Poland, Lithuania and Estonia). Finally, it represented less than 1% only in the following countries (Belarus, Czech Republic, Slovenia, Ukraine, Russian Federation, Kazakhstan, Hungary, Turkey and Slovak Republic) (*WDI figures*).

Generally remittance flows in EECA follow the same two-bloc pattern as migration. The EU is the main source of remittances, accounting for three quarters of the total, and the resource-rich CIS are the other main source, accounting for 10%. The amount contributed by the EU-10 countries[14] is also significant (World Bank, 2006).

[12] Western ECA: the EU-10 new member countries, plus Bosnia and Herzegovina, Serbia, Montenegro, Albania, Croatia, and FYR Macedonia.

[13] CIS = Commonwealth of Independent States (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyztan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan).

[14] EU-10: the Czech Republic, Poland, Hungary, Slovakia, Slovenia, Latvia, Lithuania, Estonia, Bulgaria and

Results from surveys with returned migrants in EECA found that a non negligible share of remittances is invested in capital formation. The World Bank (2006) claims that if the majority of remittances are utilized for funding consumption of food and clothing, large quantities are also used for education and savings (over 10%); smaller amounts are spent on direct investment in business (less than 5%). For example, in Armenia, empirical evidence suggests that the propensity to save out of remittance income is high (almost 40%) and remarkably consistent across studies (Roberts et al., 2004). In Albania, a study conducted on the national level in 1998 suggests that 17% of the investments in small and medium size enterprises came from money accumulated while working abroad (Kule et al. 2002). Other sources claim that almost 30% of investments in Albanian small and middle sized enterprises were primarily financed by remittances from family members working abroad (INSTAT, 2003). Another survey conducted in the Korçë district in Albania in 2002 suggests that around 5% of receiving households use the money from remittances to invest in non-farm business, and around 17% use remittances for agricultural investments (Arrehag et al., 2005). An IOM survey of Serbian households with relatives living in Switzerland conducted in two rural regions of Serbia in 2006 showed that approximately $1/4^{th}$ of surveyed households have used remittances to expand agricultural production and 8% to invest in a business (SECO, 2007). A World Bank survey (World Bank, 2006) shows that in Kyrgyztan, 11% of households receiving remittances report saving remittances. In Tajikistan, about 9% report saving remittances and 2.5% report investing in business. In Moldova, according to a study conducted in 2006, nearly 30% of recipient households save over US$500 (Orozco, 2007).

4.2 Data and definition of main variables

4.2.1 Migration data

- Problems inherent to migration data

Compiling data on migration stocks and flows is quite complicated for several reasons. Official data often underestimate migrants stocks and flows because of difficulties that arise from differences across countries in the definition of a migrant (foreign born versus foreign nationality), reporting lags in census data, and under-reporting of irregular migration. These problems arise,

Romania (the latter two countries joined the EU in 2007).

in part due to a lack of standardized definitions and common reporting standards (and inadequate adherence to these standards where they exist). The commonly accepted UN definition describes a "migrant" as a person living outside his or her country of birth.

Some problems are more specific to EECA countries. Indeed, the type, direction and magnitude of the flows in the region have changed dramatically since the beginning of economic transition, liberalization of societies and retrieved human rights (including the cross-border freedom of movement), and the emergence of 22 new states. The extent to which the successor states have implemented statistic systems able to properly measure total migration flows and disaggregate these flows by nationality varies considerably. Moreover, the break-up of the Soviet Union, Yugoslavia, and Czechoslovakia created a large number of "statistical migrants".[15]

- Databases

For the purpose of this paper, we need an estimate of the total stock of emigrants from each EECA countries. To our knowledge, the only databases providing that information are the Global Migrant Origin Database (Migration DRC, University of Sussex) and the database prepared by the Development Prospects Group (World Bank).

We get the University of Sussex data from the Development Research Centre on Migration, Globalisation and Poverty (Migration DRC), an independent organization for the study of migrations.[16] The data are generated by disaggregating the information on migrant stocks in each destination country or economy as given in its census to get a 226x226 matrix of origin-destination stocks by country. In essence, the Migration DRC database extends the basic stock data on international migration published by the United Nations.[17] Four versions of the database are currently available and we choose to use the latest version of the database, given that its authors strived to correct for some biases specific to all stock data inferred from census data.[18] The

[15] Statistical migrants refers to persons who migrated internally while those countries existed, thus not qualifying as a migrant under the UN definition at the time, but who began to be counted as migrants when those countries broke apart even though they did not move again (World Bank, 2006).

[16] See: www.migrationdrc.org/index.html

[17] See http://www.un.org/esa/population/ publications/migstock/2003TrendsMigstock.pdf

[18] The Migration DRC methodology is available online at: www.migrationdrc.org/ research/ typesofmigration/global_migrant_origin_database.html. See Parsons et al., 2007 for more details.

reference period is the 2000 round of population censuses. In order to get estimates of the total stock of migrants from each EECA country in 2000, we summed the stocks of migrants from the same origin country in all destination countries. This variable is denoted by $MIGRS$.

The database prepared by the Development Prospects Group of the World Bank is a variant of the Migration DRC database. The latter was updated using the most recent census data and unidentified migrants were allocated only to two broad categories, "other South" and "other North" (Ratha and Shaw, 2007). We used this database to get other estimates of the stocks of migrants from each EECA country in 2000. This variable is denoted by $MIGRWB$.

4.2.2 Two kinds of remittances data

The main sources of official data on migrants' remittances are the annual balance of payments of various countries, which are compiled in the Balance of Payments Yearbook published annually by the International Monetary Fund (IMF). The IMF data include two categories of data: *workers' remittances* including current transfers by migrants who are employed or intend to remain employed for more than a year in another economy in which they are considered residents, and *workers' remittances and compensation of employees* made up of current transfers by migrant workers and wages and salaries earned by nonresident workers.

While the categories used by the IMF are well defined, there are several problems associated with their worldwide implementation that can affect their comparability. On the one hand, official remittance figures may underestimate the size of flows because they fail to capture informal remittance transfers, including sending cash back with returning migrants or by carrying cash and/or goods when migrants return home. Only two countries in EECA – Moldova and Russia – attempt to capture remittances sent through informal channels in the balance of payments statistics (World Bank, 2006). On the other hand, official remittance figures may also overestimate the size of the flows. Other types of monetary transfers – including illicit ones – cannot always be distinguished from remittances (Bilsborrow et al., 1997).

For the purpose of this study, we constructed two different variables from the WDI database: received workers' remittances and compensation of employees (US$) and receipts of workers' remit-

tances (US$). In 2000, the first one, denoted by $REMCE$, was available for 25 EECA countries, while the second, denoted REM, was only available for 18 countries.[19] In order to be able to compare these figures in the different countries, we first converted them into local currency units (LCU) using the official exchange rate of the WDI database and then used a PPP conversion factor.[20] The WDI database offers two different PPP conversion factors: one for GDP and one for private consumption (i.e., household final consumption expenditure). Thus, we built four variables representing remittances in PPP: $REMCEPPP1$ and $REMPP1$ (using the PPP conversion factor for GDP), and $REMCEPPP2$ and $REMPPP2$ (using the PPP conversion factor for private consumption).

4.2.3 Two assumptions about the investment rate of remittances

In this paper, we want to estimate the link between invested remittances and the number of equilibrium migrants. However, there is no information on the rate of investment of remittances sent by migrants. Thus, we made two different assumptions about the proportion of invested remittances.

According to the first hypothesis, invested remittances contribute to gross fixed capital formation (GFCF); the proportion of invested remittances out of total remittances is similar to the proportion of GFCF out of GDP. Thus, we build a first couple of variables, denoted by $REMCEPPPiGFCF$ and $REMPPPiGFCF$ (with $i = 1, 2$), representing invested remittances in 2000 as the product of remittances and the share of GFCF in GDP, for each EECA country in the database (the cross-country average rate was of 21% in 2000).

According to the second hypothesis, we assume that migrants act in the same way as foreign investors; the proportion of invested remittances out of total remittances is then similar to the proportion of foreign direct investment (FDI) out of GDP. Thus, we build a second couple of variables, denoted by $REMPPPiCEFDI$ and $REMPPPiFDI$ ($i = 1, 2$), representing invested remittances in 2000 as the product of remittances and the ratio of net inflows of FDI to GDP, for

[19] Data were missing for Belarus, Bulgaria, Czech Republic, Russian Federation, Serbia and Montenegro, Slovak Republic and Ukraine.

[20] A PPP conversion factor is the number of units of a country's currency required to buy the same amounts of goods and services in the domestic market as a U.S. dollar would buy in the United States.

each EECA country in the database (the cross-country average rate was of 4.5% in 2000).

All the data come from the World Development Indicators (WDI) database.

4.2.4 Control variables

In our econometric model, we include as control variables either the GDP per capita (PPP) or the wage rate (PPP).

In the first case, we take GDP per capita as a proxy for the economic incentives to leave one's origin country. Indeed, neoclassical economics stipulates that migration can be explained by the differential between anticipated wages in the origin and the potential host countries. But since we do not have information on bilateral remittances, we only use the level of GDP per capita in origin countries as a push factor potentially explaining migration. These data are taken from the WDI database and denoted by $GDPcap$.

By the same token, in the second case, we use the wage rate in the origin country as a control variable. Wage rates data come from the International Labor Organization (ILO) where they can be found in LCU. Then, we built two variables representing wage rates in PPP: $WAGEPPP1$ (using the PPP conversion factor for GDP) and $WAGEPPP2$ (using the PPP conversion factor for private consumption).

4.2.5 Descriptive statistics

Descriptive statistics for the sample are shown in the following table:

Variable	N	Mean	Standard Deviation	Minimum	Maximum
MIGRS	25	1,665,179.80	2,531,169.06	108,897.00	12,098,614.00
MIGRWB	25	1,780,151.42	2,482,629.83	133,964.91	11,480,137.37
REMCEPPP1	23	1,344,052,665	2,289,061,735	635,0576.49	8,869,947,794
REMCEPPP2	24	1,735,799,593	2,733,693,389	7,138,959.92	10,068,748,556
REMPPP1	16	963,223,143	2,265,985,617	722,652.57	8,869,947,794
REMPPP2	17	1,219,871,966	2,527,829,801	812,365.26	10,068,748,556
GFCF (% of GDP)	25	21.07	4.16	12.28	27.98
FDI (% of GDP)	24	4.47	2.91	0.28	9.90
REMCEPPP1GFCF	23	260,010,275	425,880,953	165,0467.58	1,808,851,637
REMCEPPP2GFCF	24	336,527,855	503,452,378	1,855,362.56	2,053,323,507
REMCEPPP1FDI	22	30,103,229.28	43,188,550.82	437,394.20	197,073,664
REMCEPPP2FDI	23	39,457,716.17	52,016,291.14	491,693.89	221,917,180
REMPPP1GFCF	16	208,069,910	470,478,818	187,812.02	1,808,851,637
REMPPP2GFCF	17	262,914,875	525,338,320	211,127.69	2,053,323,507
REMPPP1FDI	15	24,333,155.63	45,727,815.89	49,772.50	175,151,217
REMPPP2FDI	16	31,841,504.10	51,905,057.04	55,951.43	197,231,144

As can be seen, the two assumptions made about the rate of investment of remittances can

be considered as a high hypothesis (when the rate of investment of remittances is proxied by the proportion of GFCF in GDP) and a low hypothesis (when the rate of investment of remittances is proxied by the proportion of FDI in GDP).

4.3 Empirical estimates

4.3.1 The model

We want to analyze the equilibrium co-movements between invested remittances per migrant and the number of migrants. Proposition 3 claims that the two variables are positively correlated.

Thus, we postulate that the equilibrium number of migrants, M, (we can drop the star in this section), can be written as a function of invested remittances per migrants at the equilibrium, $\frac{IR}{M}$, a control variable, *control*, and an error term, u:

$$M = \beta_0 \left(\frac{IR}{M}\right)^{\beta_1} (control)^{\beta_2} u. \tag{38}$$

Taking the log, we get:

$$\ln(M) = b_0 + b_1 \ln(IR) + b_2 \ln(control) + \varepsilon, \tag{39}$$

with $b_0 = \frac{\ln(\beta_0)}{1+\beta_1}$, $b_1 = \frac{\beta_1}{1+\beta_1}$, $b_2 = \frac{\beta_2}{1+\beta_1}$, $\varepsilon = \frac{\ln(u)}{1+\beta_1}$.

All the coefficients of equation (38) can then be expressed as a function of the coefficients of equation (39):

$$\left\{\begin{array}{l} b_0 = \frac{\ln(\beta_0)}{1+\beta_1} \\ b_1 = \frac{\beta_1}{1+\beta_1} \\ b_2 = \frac{\beta_2}{1+\beta_1} \end{array}\right. \iff \left\{\begin{array}{l} \beta_0 = \exp\left(\frac{b_0}{1-b_1}\right) \\ \beta_1 = \frac{b_1}{1-b_1} \\ \beta_2 = \frac{b_2}{1-b_1} \end{array}\right. \tag{40}$$

Thus, if we can estimate equation (39) and get estimates of b_0, b_1 and b_2, denoted by $\hat{b}_0$, $\hat{b}_1$ and $\hat{b}_2$, we can infer estimates of β_0, β_1 and β_2, denoted by $\hat{\beta}_0$, $\hat{\beta}_1$ and $\hat{\beta}_2$.

If our Proposition 3 is correct, the equilibrium number of migrants is positively related to the remitted amount per migrant. Thus, we expect $\hat{\beta}_1$ to be statistically greater than 0, which is true if $\hat{b}_1$ is statistically greater than 0 and smaller than 1. In addition, we expect the control variables, either GDP per capita or the wage in the origin country, to have a negative impact on the number of migrants; thus we expect $\hat{\beta}_2$ to be statistically negative.

4.3.2 Methodology and Results

In equation (39) the dependent variable is the number of migrants. As previously explained, the number of migrants can be taken either from the Global Migrant Origin Database or from the database prepared by the Development Prospects Group of the World Bank. Likewise, the main independent variable, invested remittances, can be measured either by workers' remittances and compensation of employees or by workers' remittances only, multiplied either by the gross fixed capital formation expressed as a percentage of GDP or by net inflows of foreign direct investment expressed as a percentage of GDP. Finally, the control variable can be either GDP per capita, or the wage rate measured with the PPP conversion factor either for GDP or for private consumption.

Hence, in a general form, the basic equation is:

$$\ln \left\{ \begin{array}{c} MIGRWB \\ MIGRS \end{array} \right\} = b_0 + b_1 \ln \left\{ \begin{array}{c} REMCEPPPiGFCF \\ REMCEPPPiFDI \\ REMPPPiGFCF \\ REMPPPiFDI \end{array} \right\} + b_2 \ln \left\{ \begin{array}{c} GDPcap \\ WAGEPPP1 \\ WAGEPPP2 \end{array} \right\} + \varepsilon. \tag{41}$$

- OLS estimates

In a first step, we use OLS to estimate various variants of this equation. The results of the regressions using the World Bank database for the stocks of migrants ($MIGRWB$) are as follows:[21]

[21] We obtain similar results with the dependant variable $MIGRS$ (models 13 to 24).

Variables	*(1)*	*(2)*	*(3)*	*(4)*
Intercept	12.34***	15.09***	13.16***	13.54***
	(4.23)	(3.77)	(5.43)	(4.18)
LREMCEPPP2GFCF	0.39***			
	(3.62)			
LREMCEPPP2FDI		0.31**		
		(2.14)		
LREMPPP2GFCF			0.25***	
			(3.81)	
LREMPPP2FDI				0.24***
				(3.19)
LGDPcap	-0.65**	-0.72*	-0.44*	-0.42
	(-2.33)	(-2.04)	(-1.80)	(-1.35)
N	24	23	17	16
R^2	0.44	0.31	0.56	0.53
adj. R^2	0.39	0.24	0.50	0.46
Shapiro-Wilk test	0.92825	0.905946	0.913336	0.884403
(p-value in brackets)	(0.0891)	(0.0336)	(0.1139)	(0.0455)
F value ($b_1 = 1$)	33.14	23.19	131.42	97.57
(p-value in brackets)	(<.0001)	(0.0001)	(<.0001)	(<.0001)

t-student in brackets; *** significant to 1%; ** significant to 5%; * significant to 10%

Variables	*(5)*	*(6)*	*(7)*	*(8)*
Intercept	11.08***	13.38***	12.08***	12.53***
	(4.46)	(4.68)	(6.87)	(6.94)
LREMCEPPP1GFCF	0.40***			
	(3.21)			
LREMCEPPP1FDI		0.634**		
		(2.27)		
LREMPPP1GFCF			0.27***	
			(3.21)	
LREMPPP1FDI				0.26***
				(3.49)
LWAGEppp1	-0.76***	-0.85***	-0.50**	-0.49*
	(-3.02)	(-2.92)	(-2.27)	(-2.13)
N	20	19	13	12
R^2	0.50	0.44	0.58	0.66
adj. R^2	0.44	0.37	0.50	0.58
Shapiro-Wilk test	0.965432	0.946293	0.877033	0.863554
(p-value in brackets)	(0.6570)	(0.3143)	(0.0650)	(0.0542)
F value ($b_1 = 1$)	23.78	19.85	76.98	93.73
(p-value in brackets)	(0.0001)	(0.0004)	(<.0001)	(<.0001)

t-student in brackets; *** significant to 1%; ** significant to 5%; * significant to 10%

Variables	*(9)*	*(10)*	*(11)*	*(12)*
Intercept	10.83***	12.83***	11.69***	12.00***
	(4.52)	(4.63)	(7.07)	(6.98)
LREMCEPPP2GFCF	0.40***			
	(3.48)			
LREMCEPPP2FDI		0.36**		
		(2.55)		
LREMPPP2GFCF			0.27***	
			(3.63)	
LREMPPP2FDI				0.27***
				(3.99)
LWAGEppp2	-0.73**	-0.80**	-0.45*	-0.42*
	(-2.87)	(-2.71)	(-2.06)	(-1.89)
N	21	20	14	13
R^2	0.48	0.42	0.58	0.65
adj. R^2	0.43	0.35	0.50	0.58
Shapiro-Wilk test	0.964065	0.963052	0.882883	0.854326
(p-value in brackets)	(0.6015)	(0.6065)	(0.0639)	(0.0325)
F value ($b_1 = 1$)	26,52	21.03	13.19	110.05
(p-value in brackets)	(<.0001)	(0.0003)	(0.0039)	(<.0001)

t-student in brackets; *** significant to 1%; ** significant to 5%; * significant to 10%

In 9 models out of 12 the coefficient $\hat{b}_1$ is statistically positive and smaller than 1 at the 99% confidence level; it is always statistically positive and smaller than 1 at the 95% confidence level. The results corroborate Proposition 3. Furthermore, the estimates of $\hat{b}_1 \in [0.24; 0.63]$. This is tantamount to an elasticity of the equilibrium number of migrants with respect to remittances per migrant equal to $\beta_1 = \frac{b_1}{1-b_1} \in [0.31; 1.7]$.

Concerning the coefficient $\hat{b}_2$, it is negative as expected and statistically significant in 6 models out of 12 at the 95% confidence level, and in all models but one at the 90% confidence level.

- Bootstrap estimations

In the previous regressions, the sample size varies from 12 to 24. This small sample size may raise difficulties determining confidence intervals of coefficients, since these intervals depend on assumptions on the distribution of the error term of the regression model. If these assumptions are no longer satisfied, standard confidence intervals can no longer be defined. We did test the normality assumption of the residuals in the different models using a Shapiro-Wilk test:[22] in 5 models, the p-value is higher than 0.1, so we cannot reject the null hypothesis that the residuals are normally distributed; however, when the p-value is between 0.05 and 0.1 (in 4 models), we reject the null hypothesis at the 90% confidence level, and when it is between 0.01 and 0.05 (in 3 models), we reject the null hypothesis at the 95% confidence level. Thus, in some cases, the confidence intervals of these OLS coefficients may be wrong.

In order to improve the robustness of our estimations, we resort to the bootstrap method proposed by Efron (1979), which allows the approximation of an unknown distribution by an empirical distribution obtained by a resampling process. Bootstrap is a resampling technique based on random sorts with replacement in the data forming a sample. The application of bootstrap methods to regression models helps approximate the distribution of the coefficients (Freedman, 1981) and the distribution of the prediction errors when the regressors are data (Stine, 1985). Used to approximate the unknown distribution of a statistic by its empirical distribution, bootstrap methods are employed to improve the accuracy of statistical estimations (Juan and Lantz, 2001).

[22] This is a suitable normality test for small samples.

Following Juan and Lantz (2001), we used a percentile-t bootstrap procedure, resampling the residuals. At the 95% confidence level, with 1000 resamples, we get the following results:

Model	Variable	Observed Statistics	Approximate Lower Confidence Limit	Approximate Upper Confidence Limit
1	LREMCEPPP2GFCF	0.38637	0.25406	0.76687
	LGDPCAP	-0.64704	-3.27976	-0.33270
2	LREMCEPPP2FDI*	0.30716	0.14525	1.88117
	LGDPCAP	-0.72228	-3.75634	2.36405
3	LREMPPP2GFCF	0.24953	0.1510	0.62367
	LGDPCAP	-0.44352	-3.35808	2.64043
4	LREMPPP2FDI	0.24394	0.13043	0.86527
	LGDPCAP	-0.42301	-5.46452	4.62736

*: 90% confidence level interval: [0.16619; 0.96771]

Model	Variable	Observed Statistics	Approximate Lower Confidence Limit	Approximate Upper Confidence Limit
5	LREMCEppp1GFCF*	0.39702	0.23385	1.04430
	LWAGEppp1	-0.75881	-2.51281	-0.42981
6	LREMCEppp1FDI**	0.33753	-0.31596	1.80207
	LWAGEppp1	-0.85292	-4.02815	-0.47920
7	LREMppp1GFCF	0.26765	0.04549	0.99177
	LWAGEppp1	-0.50190	-4.11571	3.59820
8	LREMppp1FDI***	0.26519	-0.37139	0.94213
	LWAGEppp1	-0.49269	-4.47034	2.48687

*: 90% confidence level interval: [0.24854; 0.82102]
**: 90% confidence level interval: [0.17418; 1.17804]
***: 90% confidence level interval: [0.07674; 0.63844]

Model	Variable	Observed Statistics	Approximate Lower Confidence Limit	Approximate Upper Confidence Limit
9	LREMCEPPP2GFCF	0.40297	0.25158	0.97288
	LWAGEppp2	-0.72607	-2.59453	-0.40870
10	LREMCEPPP2FDI	0.35721	0.18936	1.44802
	LWAGEppp2	-0.80129	-4.01409	-0.43552
11	LREMPPP2GFCF	0.27296	0.13848	0.94592
	LWAGEppp2	-0.44606	-3.60403	2.40149
12	LREMPPP2FDI	0.27544	0.04540	0.84588
	LWAGEppp2	-0.42412	-3.18863	2.34093

As can be seen, the average coefficient (observed statistics) for both $\hat{b}_1$ and $\hat{b}_2$ are very much in line with OLS estimations. Most important, according to the bootstrap results, $\hat{b}_1$ is statistically positive and smaller than 1 (as claimed in Proposition 3) in 7 models out of 12 at the 95% confidence interval and in 10 models out of 12 at the 90% confidence interval. So this more rigorous method for determining confidence intervals does corroborate the OLS estimates.

4.3.3 Discussion

We tried to introduce other control variables to take into account institutional differences between EECA countries. However, a dummy variable differentiating East Europe countries from Central Asia countries is highly correlated with the GDP per capita (PPP) and the wage rate (PPP). Thus, it could not be introduced in the model. We also tried to take into account a possible lagged effect of invested remittances and used variables on the received amount of remittances one year earlier (in 1999). The results are quite similar to those presented and corroborate our proposition.[23] Finally, we tried to introduce a "pull factor" variable representing the attractiveness of foreign countries for potential migrants, but important data were missing.

We acknowledge the fact that our empirical estimations should be subject to caution due to the modest quality of the data. In particular, data on migration and remittances do not take into account illegal migrants nor informal remittances. But since informal remittances are rarely invested and illegal migrants seldom use formal channel to remit, this measurement problem in the data may not be as serious as it seems. A more rigorous analysis would build on a more precise measure of the investment rate of remittances. Unfortunately, such data are not yet available.

5 Conclusion

This paper examines the existence and properties of a steady migratory equilibrium, and the public policies that should be implemented to make this migratory equilibrium optimal. We develop a simple two-country migratory model, where the incentives to migrate are explained by the differential between incomes in the two countries and where migrants' remittances are invested in capital formation in the origin country. Migrants are assumed to be selfish, they migrate and invest at home in order to maximize their own utility, yet their egoism is beneficial to the left-home labor force.

Because of a joint effect of migration which leads to a decrease in the labor supply of the

[23] Using received remittances in 1999 as the main dependant variable, we find that in 7 models out of 12, the OLS estimate of b_1 is statistically positive and smaller than 1 at the 99% confidence level; it is always statistically positive and smaller than 1 at the 95% confidence level. According to the bootstrap results, $\hat{b}_1$ is statistically positive and smaller than 1 in 9 models out of 12 at the 95% confidence interval and in all the models at the 90% confidence interval.

developing country, and of the investment of remittances which induces an increase in the capital stock of the developing country, the wage in this country first increases with the number of migrants, then stay constant, and then increases again.

A migratory equilibrium is reached when the marginal citizen of the developing country is indifferent between migrating and remaining, i.e. when migrants and residents have the same utility level. We then show that there exists four types of migratory equilibria: almost everybody migrates (when the net migratory benefit is too high); nobody migrates (in the opposite case and/or when transaction costs are too high); the equilibrium number of migrants is such that the capital intensity in the origin country is below its optimal level; finally, the equilibrium is high and undetermined (when the migratory cost reaches a certain level).

Studying more in depth the steady equilibrium expected to prevail for the broadest range of parameter values, we show that the higher the income in the host country and the lower the migratory cost, the higher the remittances and the equilibrium migration rate. It turns out that the optimal invested remitted amount per migrant and the equilibrium number of migrants move in the same direction in response to various shocks. We test for this implication of our model using EECA data from 2000. OLS and bootstrap estimates put forward a positive elasticity of the number of migrants with respect to remittances per migrant, in the range of $[0.31; 1.7]$, keeping in line with the theoretical model. For sure, these figures should be interpreted cautiously, given the modest quality of the data on migrations and remittances.

This model enables us to draw off some lessons as regards public policies. Indeed, policies can impact the equilibrium number of migrants through their effect on migratory and international transaction costs. Migratory policy can more or less ease the migration process and thus has an influence on individual migration costs. In addition, regulations, standards and controls regarding international transfers of funds have an impact on international transaction costs and thus on remitted amounts. The policy response to migration incentives varies with the objective of the policymakers.

The model is based on several assumptions, and some of them are simplifying. First of all, we assume that the arrival of immigrants does not have an impact on the host country income. This

assumption is partly related to the lack of consensus in the literature on the impact of migrants on the host country wage rate. If this assumption were loosened, the remitted amount would always depend on the number of migrants, and the migratory equilibria would be modified. The optimal migratory policy should also take into account the impact of migration on the host country, and a bargaining mechanism should be introduced to work out the equilibria outcome. We also assumed that residents cannot invest in their own country. In the opposite case, a resident could invest an amount increasing with his wage and the supply of capital in the developing country would increase more quickly than in the analyzed case. Finally, it could be interesting to carry on with this study by differentiating workers according to their skills, acknowledging the fact that their propensity to remit depends on their skills (Faini, 2007), and by taking into account the possible impact of migrant workers on technology through the improvement in social capital (Docquier and Rapoport, 2009).

The model is too simple to claim at providing an exhaustive view on recent migratory trends. Its limited but original contribution to existing literature is to point out the role of invested remittances in capital formation in developping countries, which, when coupled with a shrinking labor supply, brings about an offsetting impact on the very first motive to migrate: the weakness of incomes in the developing world.

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References

Arrehag, Lisa, Örjan Sjöberg, and Mirja Sĵoblom. 2005. Cross-border migration and remittances in a post-communist society: return flows of money and goods in the Korçë district, Albania. South Eastern Europe Journal of Economics, 3, 1, pp. 9-40.

Azam, Jean-Paul and Flore Gubert. 2005. Those in Kayes: The impact of remittances on their recipients in Africa. *Revue Economique*, 56, 6, pp. 1331-1358.

Borjas, George J. 2003. The labor demand curve is downward sloping: Re-examining the impact of immigration on the labor market. *Quarterly Journal of Economics*, 118, 4, pp. 1335-1374.

Bilsborrow, Richard E. 1997. International Migration Statistics: Guidelines for Improving Data Collection Systems, International Labour Office, United Nations Population Fund, International Labour Organization.

Card, David. 2001. Immigrant inflows, native outflows and the local labor market impacts of higher immigration. *Journal of Labor Economics*, 19, 1, pp. 22-64.

Carrington, William J., Enrica Detragiache and Tara Vishwanath. 1996. Migration with endogenous moving costs. *American Economic Review*, 86, 4, pp. 909-930.

Chami, Ralph, Connel Fullenkamp and Samir Jahjah. 2005. Are immigrant remittance flows a source of capital for development?. *IMF Staff Papers* 52, 1, pp. 55-81.

van Dalen, Hendrik P., George Groenewold, and Tineke Fokkema. 2005. The effect of remittances on emigration intentions in Egypt, Morocco and Turkey, *Population Studies*, 59, 3, pp. 375-392.

Dimova, Ralitza, and François-Charles Wolff. 2009. Remittances and chain migration: Longitudinal evidence from Bosnia and Herzegovina, *Work in progress*.

Djajic, Slobodan, and Ross Milbourne. 1988. A general equilibrium model of guest worker migration. *Journal of International Economics*, 25, pp. 335-351.

Docquier, Frédéric and Hillel Rapoport. 2009. The Economics of the Brain Drain. *Preliminary version,* January 2009.

Efron, Bradley. 1979. Bootstrap methods : another look at the jacknife, *Annals of Statistics*, 7, 1, pp. 1-26.

Ernst&Young SRL. 2008. *Romania monthly economic review*, September 2008.

Faini, Riccardo. 2007. Remittances and the brain drain: Do more skilled migrants remit more?. *World Bank Economic Review*, 21, 2.

Financial Times. 2007. *Eastern Europe hit by shortage of workers*, June 5, 2007.

Freedman, David A. 1981. Bootstrapping regression models, *Annals of Statistics*, 9, 6, pp. 1218-1228.

Galor, Oded. 1986. Time Preference and International Migration. *Journal of Economic Theory*, 38, pp. 1-20.

Ilahi, Nadeem, and Saqib Jafarey. 1999. Guestworker migration, remittances and the extended family: Evidence from Pakistan, *Journal of Development Economics*, 58, pp. 485-512.

INSTAT. 2003. Youth and transition, issues confronting Albania's key resource. Social Research Center, Tirana, Albania.

Juan, Sandrine and Frédéric Lantz. 2001. Application of bootstrap techniques in econometrics: the example of cost estimation in the automotive industry, *Oil & Gas Science and Technology,* 56, 4, pp. 373-388.

Karayalcin, Cem. 1994. Temporary and permanent migration. *Journal of Development Economics*, 43, 2, pp. 197-295.

Leon-Ledesma, Miguel and Matloob Piracha. 2004. International Migration and the Role of Remittances in Eastern Europe. *International Migration*, 42, 4, pp.65-83.

Kule, Dhori, Ahmet Mançellari, Harry Papapanagos, Stefan Qirici, and Peter Sanfey. 2002. The causes and consequences of Albanian emigration during transition: evidence of micro data. *International Migration Review*, 36, 1, pp. 229-239.

Lucas, Robert E.B. 1985. Mines and Migrants in South Africa. *American Economic Review*, 75, 5, pp.1094-1108.

McCormick, Barry, and Jackline Wahba. 2004. Return International Migration and Geographical Inequality: the Case of Egypt. *Journal of African Economies*, 12, 4, pp. 500-532.

Naiditch, Claire, and Radu Vranceanu. 2009. Migrant wages, remittances and recipient labour supply in a moral hazard model. *Economic Systems,* 33, 1, pp. 60–82.

Ottaviano, Gianmarco I.P. and Giovanni Peri. 2006. Rethinking the effects of immigration on wages. *NBER Working Paper* 12497.

Orozco, Manuel. 2007. Looking forward and including migration in development: Remittance leveraging opportunities for Moldova. International Organization for Migration, Mission to Moldova.

Parsons, Christopher R., Ronald Skeldon, Terrie L. Walmsley, and L. Alan Winters. 2007. Quantifying International Migration: a Database of Bilateral Migrant Stocks, *World Bank Policy Research Working Paper* 4165, March 2007, The World Bank, Washington, D.C.

Rapoport, Hillel, and Frédéric Docquier. 2006. The Economics of Migrants' Remittances. In S.C. Kolm and J. Mercier-Ythier (eds.), *Handbook on the Economics of Giving, Reciprocity and Altruism*, volume 2, chapter 17, North-Holland, Elsevier.

Ratha, Dilip. 2003. Workers' Remittances: An Important and Stable Source of External Development Finance. In: World Bank, *Global Development Finance*, 2003, chapter 7.

Ratha, Dilip and William Shaw. 2007. South-South Migration and Remittances, *World Bank Working Paper* 102, The World Bank, Washington, D.C.

Roberts, Bryan W., and King Banaian. 2004. Remittances in Armenia: size, impacts and measures to enhance their contribution to development. USAID, Yerevan, Armenia. http://www.usaid.gov/locations/europe_eurasia/countries/am/docs/remittances_in_armenia.pdf.

Schiff, Maurice. 2002. Love thy neibor: trade, migration, and social capital. *European Journal of Political Economy*, 18, pp. 87-107.

SECO. 2007. Development financing and the remittance market in Serbia and Switzerland. State Secretariat for Economic Affairs SECO, Switzerland.

Stark, Oded. 1991. *The migration of labor*, Basil Blackwell, Cambridge.

Stark, Oded. 1995. *Altruism and beyond.* Basil Blackwell, Oxford and Cambridge.

Stark. Oded and You Qiang Wang. 2002. Migration dynamics, *Economic Letters*, 76, pp. 159-164.

Stine Robert A .1985. Bootstrap prediction intervals for regression, *Journal of The American Statistical Association*, 80, 392, pp. 1026-1031.

Woodruff, Christopher M. et Rene Zenteno. 2007. Migration Networks and Microenterprises in Mexico. *Journal of Development Economics*, 82, pp. 509–528.

World Bank. 2006. *Migration and Remittances - Eastern Europe and the Former Societ Union*, edited by Ali Mansoor and Bruce Quillin, World Bank, Washington, D.C.

A Appendix

A.1 Definition of M_2

When do migrants stop investing in their origin country?

Migrants invest their optimal amount in their origin country as long as there are less than M_1 migrants. When migration is above M_1, migrants' investments are limited and equal to $R_1(M)$, decreasing with the number of migrants. Migrants stop investing in their origin country when $R_1(M)$ becomes negative.

Formally:

$$R_1(M) \geq 0 \Longleftrightarrow M \leq L_0 - \left(\frac{r}{aA}\right)^{\frac{1}{1-a}} K_0 \equiv M_2. \tag{42}$$

Thus, as long as there are less than M_2 migrants, the remitted invested amount per migrant is $R_1(M)$. However, when migration reaches the threshold M_2, migrants do not invest anymore in their origin country.

Note that when M reaches M_2, the capital intensity in the developing country is: $k(M_2) = \left(\frac{aA}{r}\right)^{\frac{1}{1-a}} = k(M_1)$.

A.2 The equilibrium number of migrants

Proof of Proposition 2.

- 1st case: $M = 0$.

  There is no migration at all if the utility level when migrating is smaller than the utility level when staying, i.e. if $V_0 \leq W_0$.

- 2nd case: $M \in [0; M_1]$.

  Then migrants' utility is V_0 and residents' utility is increasing with the number of migrants from $W_0 = W(M = 0)$ to $W(M_1)$. There is an equilibrium number of migrants $M^* \in]0; M_1]$ such that $W(M^*) = V_0$ if and only if $V_0 \in]W_0; W(M_1)]$. When it exists, M^* is a steady equilibrium:

  Pretend that migration is at the level $M^* - dM$. Then $W(M^* - dM) < W(M^*) = V_0$ and $W(M)$ is increasing in M. Residents prefer to migrate whereas migrants do not want to

come back. Step by step, the number of migrants increases, residents' utility increases until it reaches $W(M^*)$, right when migration reaches M^*.

Pretend that migration is at the level $M^* + dM$. Then $W(M^* + dM) > W(M^*) = V_0$ and $W(M)$ is increasing in M. Residents prefer to remain whereas migrants prefer to come back. Step by step, the number of migrants decreases, residents' utility decreases until it reaches $W(M^*)$, right when migration reaches M^*.

- 3rd case: $M \in \,]M_1; M_2]$.

  Then migrants' utility is V_0 and residents' utility is constant equal to $W(M_1)$. There is an infinity of equilibria $M \in \,]M_1; M_2]$ such that $W(M) = V_0$ if and only if $V_0 = W(M_1)$.

- 4th case: $M \in \,]M_2; L_0]$.

  Then migrants' utility is V_0 and residents' utility is increasing with the number of migrants from $W(M_1)$ to $+\infty$. There is an equilibrium number of migrants $M \in \,]M_2; L_0]$ such that $W(M) = V_0$ if and only if $V_0 > W(M_1)$. When it exists, M is a steady equilibrium.

A.3 Characteristics of Equilibrium 2

Proof of Proposition 3.

The equilibrium condition is:

$$\begin{aligned} V_0 &= W_0(M^*) \\ \left(\frac{V_0}{1+\rho}\right)^{\frac{1+\rho}{2+\rho}} &= \left(\frac{W_0(M^*)}{1+\rho}\right)^{\frac{1+\rho}{2+\rho}} \\ \frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}} R_0 &= \frac{(1-a)A}{2+\rho}\left[k(M^*)\right]^a . \end{aligned} \tag{A.43}$$

Differenciating, we get:

$$\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}} dR_0 = \frac{(1-a)aA}{2+\rho}\left[k(M^*)\right]^{a-1}\left[\frac{K_0 + L_0 R_0}{(L_0 - M^*)^2} dM^* + \frac{M^*}{L_0 - M^*} dR_0\right]. \tag{44}$$

Yet, according to the equilibrium condition, we have: $\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}} = \frac{1}{R_0}\frac{(1-a)A}{2+\rho}\left[k(M^*)\right]^a$.

Thus, this expression becomes:

$$
\begin{aligned}
k\left(M^*\right)\frac{dR_0}{R_0} &= a\left[\frac{K_0+L_0R_0}{\left(L_0-M^*\right)^2}dM^*+\frac{M^*}{L_0-M^*}dR_0\right]\\
\left[\frac{K_0+M^*R_0}{L_0-M^*}\right]\frac{dR_0}{R_0}-\left[\frac{aM^*}{L_0-M^*}\right]dR_0 &= a\left[\frac{K_0+L_0R_0}{\left(L_0-M^*\right)^2}\right]dM^*\\
\left[K_0+(1-a)M^*R_0\right]\frac{dR_0}{R_0} &= a\left[\frac{K_0+L_0R_0}{L_0-M^*}\right]dM^*\\
\frac{dM^*}{dR_0}\frac{R_0}{M^*} &= \frac{1}{a}\left[\frac{K_0+(1-a)M^*R_0}{K_0+L_0R_0}\right]\left[\frac{L_0-M^*}{M^*}\right]>0
\end{aligned} \tag{A.45}
$$

Optimal remittances per worker and the equilibrium number of migrants are positively related.

Note that the equilibrium condition allows us to give an explicit definition of M^*:

$$
\begin{aligned}
\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}R_0 &= \frac{(1-a)A}{2+\rho}\left[k\left(M^*\right)\right]^a\\
\left[\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}R_0\right]^{\frac{1}{a}} &= \left[\frac{(1-a)A}{2+\rho}\right]^{\frac{1}{a}}\left[\frac{K_0+M^*R_0}{L_0-M^*}\right]\\
\left\{\left[\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}R_0\right]^{\frac{1}{a}}+\left[\frac{(1-a)A}{2+\rho}\right]^{\frac{1}{a}}R_0\right\}M^* &= \left[\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}R_0\right]^{\frac{1}{a}}L_0-\left[\frac{(1-a)A}{2+\rho}\right]^{\frac{1}{a}}K_0\\
M^* &= L_0\frac{\left[\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}\right]^{\frac{1}{a}}\left(R_0\right)^{\frac{1}{a}}-\left[\frac{(1-a)A}{2+\rho}\right]^{\frac{1}{a}}k_0}{\left[\frac{1}{\alpha}\left[\alpha(1+r)\right]^{\frac{1}{2+\rho}}\right]^{\frac{1}{a}}\left(R_0\right)^{\frac{1}{a}}+\left[\frac{(1-a)A}{2+\rho}\right]^{\frac{1}{a}}R_0}
\end{aligned} \tag{A.46}
$$

A.4 Welfare implications

Suppose that the objective of the policymaker is to maximize the total utility of the left-home residents, $\mathcal{U}(M)=(L_0-M)\ln W(M)$, with $W(M)=(1+\rho)\left(\frac{(1-a)A}{2+\rho}\left[k(M)\right]^a\right)^{\frac{2+\rho}{1+\rho}}$.

Differenciating this function, we get:

$$
\begin{aligned}
\frac{\partial\mathcal{U}(M)}{\partial M} &= -\ln W(M)+(L_0-M)\frac{\partial\ln W(M)}{\partial M}\\
\frac{\partial\mathcal{U}(M)}{\partial M} &= -\ln W(M)+a\left(\frac{2+\rho}{1+\rho}\right)\frac{(L_0-M)}{k(M)}\frac{\partial k(M)}{\partial M}.
\end{aligned} \tag{A.47}
$$

There is a need to distinguish between three cases:

- $\forall M\in\left]0;M_1\right]$,

$$
\begin{aligned}
\frac{\partial\mathcal{U}(M)}{\partial M} &= -\ln W(M)+a\left(\frac{2+\rho}{1+\rho}\right)\frac{(L_0-M)}{k(M)}\frac{K_0+L_0R_0}{(L_0-M)^2}\\
\frac{\partial\mathcal{U}(M)}{\partial M} &= -\ln W(M)+a\left(\frac{2+\rho}{1+\rho}\right)\frac{K_0+L_0R_0}{K_0+MR_0}.
\end{aligned} \tag{A.48}
$$

- $\forall M \in \left]M_1 ; M_2\right]$,

$$\frac{\partial \mathcal{U}(M)}{\partial M} = -\ln W(M) . \tag{49}$$

- $\forall M \in \left]M_2 ; L_0\right]$,

$$\begin{aligned}
\frac{\partial \mathcal{U}(M)}{\partial M} &= -\ln W(M) + a\left(\frac{2+\rho}{1+\rho}\right) \frac{(L_0 - M)}{k(M)} \frac{K_0}{(L_0 - M)^2} \\
\frac{\partial \mathcal{U}(M)}{\partial M} &= -\ln W(M) + a\left(\frac{2+\rho}{1+\rho}\right) \frac{K_0}{K_0 + M R_0} .
\end{aligned} \tag{A.50}$$

Thus $\frac{\partial \mathcal{U}(M)}{\partial M}$ is decreasing in M over $[0; L_0]$.

If parameters are such that $\frac{\partial \mathcal{U}(M=0)}{\partial M} > 0$ and $\frac{\partial \mathcal{U}(M=M_1)}{\partial M} < 0$, then there exists a single $\tilde{M} \in \left]0; M_1\right[$ which maximises $\mathcal{U}$; $\tilde{M}$ is the social optimum ($\mathcal{U}$ is increasing over $\left]0; \tilde{M}\right]$ and decreasing over $\left]\tilde{M}; M_1\right]$).

However, if parameters are such that $\frac{\partial \mathcal{U}(M=0)}{\partial M} < 0$ and $\frac{\partial \mathcal{U}(M=M_1)}{\partial M} < 0$, then the social optimum is reached when nobody migrates ($\mathcal{U}$ is decreasing over $\left]0; M_1\right]$).

Finally, if parameters are such that $\frac{\partial \mathcal{U}(M=0)}{\partial M} > 0$ and $\frac{\partial \mathcal{U}(M=M_1)}{\partial M} > 0$, then the social optimum is reached after M_1 ($\mathcal{U}$ is increasing over $\left]0; M_1\right]$).

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