TEXTO PARA DISCUSSÃO

No. 498

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DEPARTAMENTO DE ECONOMIA
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FINANCIAL CONSTRAINTS, MIGRATION AND INEQUALITY

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FEVEREIRO 2005

Financial constraints, migration and inequality [*]

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Abstract

Although the self-selection of emigrants is determined by differences in the returns to education, according to the celebrated Roy model, empirical evidence suggests that migrants tend to be favorably selected. This paper argues that financial constraints might be useful to explain this controversy. These constraints might impose positive correlations between (i) wealth and education, and (ii) wealth and migration, implying a positive bias in the empirical results. We also show that high levels of migration premium and return to education in the source country explain the migration of middle-class individuals, a situation in which migration increases inequality in the home country.

JEL Classification: O15, O16, R23

Key words: migration, financial constraints, self-selection, human capital

1 Introduction

Typically, emigrants do not represent a random sample of the source population. A central question in the literature is whether they are positively or negatively self-selected [Chiswick (1978), Borjas (1987)]. How do the workers who leave a country compare to the ones who don't? Are they more or less educated than the average worker? This issue is essential to determine what the impacts of migration are on the source and destination countries, and is consequently crucial for discussions about migration policies. [1]

Based on the celebrated paper by Roy (1951), Borjas (1987) suggests that the selection of a certain ability depends on the sign of the difference between the rate of return to this characteristic in the source and destination countries. For example, considering the case of education, emigrants tend to be positively (negatively) self-selected - i.e, more educated than the average worker in the source country - if the rate of return to education is lower (higher) in the domestic economy. [2] However, empirical evidence points to a positive selection of emigrants even when the rate of return to education is higher in the source country. [3] According to Chiswick (1999), "*one of the standard propositions in the migration literature is that economic migrants tend to be favorably 'self-selected' for labor market success.*"

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[1] See Borjas (1995) for further discussion about the topic.
[2] See also Locher (2004) and Freeman (1993).
[3] See Borjas, Bronars and Trejo (1992) and Chiquiar and Hanson (2002).

The paper aims at proposing a possible explanation for this controversy by relying on financial constraints. An important consequence of imperfections in financial or credit markets is that agents' choices become wealth-constrained. In the study of self-selection of emigrants, the relevant choices are investments in education and in the decision to migrate, both of which are positively correlated with wealth in most cases. Therefore, an empirical analysis that does not take this effect into account might be (positively) biased. In addition, the interaction between financial constraints and Roy's argument provides an economic reasoning for middle-class migration from developing countries.

Many authors recognize the importance of financial constraints for migration decisions. For Greenwood (1997), *"to some extent, migration appears to be a function of the assets that a household has to cover the cost of moving. Lack of assets may impede mobility."* Chiswick (1999) shares the same point of view: *"Migration occurs if the rate of return from the investment in migration is greater than or equal to the interest cost of funds for investment in human capital. The interest costs of funds is lower, the greater the person's wealth and access to the capital market."* [4]

Despite these contributions, no systematic analysis has been done so far of the importance of incentives and wealth constraints to the migration decision. The

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[4] On the other hand, Stark and Taylor (1991) claim that not only does absolute income matter for the propensity of migration, but also that individuals might decide to migrate because of relative deprivation with respect to other individuals living nearby. Their evidence suggests that international migration is positively correlated with absolute income and relative deprivation.

literature has been neglecting the role of credit constraints in the self-selection of migrants.

The nature of the impact of financial constraints on education and migration is twofold. First, they might be positively correlated because rich individuals can afford both education and migration costs. Poor people, on the other hand, remain in the home country with low levels of education. Second, there is a potential negative correlation between migration and education because these choices are traded off in the budget constraint. Especially in cases where the migration cost is not too high, the first case prevails and thus financial constraints determine a positive selection bias of emigrants. Therefore, if there are financial constraints, we might observe positively selected emigrants even when the rate of return to education is lower in the destination country.

This argument can also explain a very striking question: why are most emigrants leaving some developing countries from middle-class? We show that this phenomenon might happen when the migration premium - defined as the difference between the wages of a worker with zero years of schooling in the two countries discounted by the cost of migration - and return to education in the source country are both high. This implies that rich people will obtain high levels of education and will stay in their country - the income generated from the accumulation of human capital surpasses the migration premium for them. Poors also remain at home because they cannot afford migration costs. Middle-class individuals, on the other hand, decide to migrate, since

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they cannot get enough education to compensate for the migration premium.

In the Roy model, most emigrants from a given source country are drawn from one of the tails of the education distribution. Therefore, it suggests migration decreases inequality in the home country. The theoretical possibility suggested in the model presented in this article - which has a relevant empirical counterpart [5] - is that migration might increase inequality once it is possible that the majority of emigrants are from middle-class backgrounds.

Banerjee and Kanbur (1981) were the first to suggest why the middle-class is the most mobile one in some situations. They argue that the benefits of looking for a job abroad are concave with respect to income while search costs are linear. Hence, they get inverted U-shaped net benefits of migration. Mckenzie and Rapoport (2003) also argue and show empirical evidence of an inverted U-shaped relationship between migration and wealth, relying on social networks. Chiquiar and Hanson (2002), in their turn, show that workers with intermediate level of schooling might be the ones with higher incentives to migrate if migration costs are decreasing in the skill level. In our model, this pattern is neither generated by technological issues nor by the endogeneity of moving costs due to social networks as suggested by Carrington, Detragiache and Vishwanath (1996). We show that the introduction of financial constraints in the Roy model, considering exogenous migration costs, might generate an inverted U-shaped relationship between migration and wealth for the case

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[5] Chiquiar and Hanson (2002) is an example.

with high levels of migration premium and return to education in the source economy.

The remainder of the paper is organized as follows. The next section establishes the basic notation and analyzes the case with no financial constraints. In section 3, we derive the main results of the paper. Concluding remarks are presented in the last section.

2 The basic model

This section presents the basic setup of the model in a context with no financial constraints. The model focuses on the decisions of migration and education in the source economy.[6] We consider a very simple structure with two countries, where label 0 represents the source and 1 the destination. All individuals are identical except for their initial wealth a and skill θ, with utility function represented by $u(c) = c$, where c denotes the consumption of a composite good with price normalized to 1.

Individuals in country 0 decide about consumption, education and migration. At the beginning of their life, they decide about education and migration. At the end of the period, they work, receive wages and consume.

To simplify the presentation of our main argument, we assume perfect fore-

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[6] Sjaastad (1962) was the first to suggest a connection between migration and human capital investments.

sight about labor markets in both countries. There is no uncertainty and the wage schedules are perfectly anticipated by everyone. Also, there are no issues regarding the duration of the migration such as in Dustmann (2003).

Since we are establishing a benchmark, without financial constraints, the wages obtained afterwards can be used to finance current consumption and to cover the costs of education and migration. Therefore, the choices of an agent of type (a, θ) who decides to work in country j are restricted only by a budget constraint, which is given by:

$$c + m\left(e|\theta\right) + j \ M = a + w^j\left(e\right), \tag{1}$$

where $w^j\left(e\right)$ is the (exogenously given) wage schedule for a worker with education level $e \geq 0$ in country $j \in \{0, 1\}$, M is the cost of migration,[7] and $m\left(e|\theta\right)$ is the cost of education for an individual with skill θ.[8] We assume that $w_e^j > 0$, $w_{ee}^j < 0$, $w^j\left(0\right) = \bar{w}^j > 0$, $m_e > 0$, $m_{ee} > 0$, $m_{e\theta} < 0$ and $m\left(0|\theta\right) = 0$. Notice that the assumption $m_{e\theta} < 0$ establishes that skilled individuals have a lower marginal cost of education.

The optimal choice of an individual in country 0, after substituting (1), can

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[7] We consider, without loss of generality, only a one-time cost of moving. Evidently, there are many other recurrent costs regarding adaptation, language and cultural differences, visits to the home country, or even costs of discrimination. However, those are either non-monetary costs or monetary costs which will be paid some time after migration has occurred. Our analysis does not depend upon this assumption.
[8] The interest rate is normalized to 0 to simplify the notation.

be represented by the following program:

$$\max_{j,e_j \geq 0} a + w^j(e_j) - m(e_j|\theta) - j\,M. \tag{2}$$

The (interior) solution of (2) is characterized by[9]:

$$w_e^j\left(e_j^*\right) = m_e\left(e_j^*|\theta\right), \tag{3}$$

$$c_j^* = a + w^j\left(e_j^*\right) - m\left(e_j^*|\theta\right) - j\,M. \tag{4}$$

$$j^* = 1 \Leftrightarrow c_1^* \geq c_0^*, \tag{5}$$

For each pair (a, θ), the system (3)-(5) determines all relevant variables in the model. Equation (5) determines whether each individual migrates or not. Given θ, one can see from (3) that:

$$w_e^0 > w_e^1 \Leftrightarrow e_0^* > e_1^*. \tag{6}$$

From the above expression it becomes clear that workers invest more (less) in education when they decide to migrate if the return to education is higher (lower) in the labor market of the destination country. Note that the decision *on* how much to invest in education does not depend on the migration cost M. The migration cost is only important in the extent that it determines which

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[9] Throughout the analysis, we assume that the conditions of the economy are such that the interior solution characterizes the optimal levels of education.

agents emigrate. The next step is to define the selection bias.

We define B as the net benefit of emigration:

$$B \equiv c_1^* - c_0^* = \left[w^1\left(e_1^*\right) - w^0\left(e_0^*\right)\right] - \left[m\left(e_1^*|\theta\right) - m\left(e_0^*|\theta\right)\right] - M. \qquad (7)$$

From the Envelope Theorem, $m_{e\theta} < 0$ and (6), we can show that:

$$\frac{\partial B}{\partial \theta} > 0 \Leftrightarrow e_1^* > e_0^* \Leftrightarrow w_e^1 > w_e^0. \qquad (8)$$

i.e., skilled workers are more likely to emigrate if the education premium is higher in the destination country. Although we have generated an endogenous educational distribution for reasons which will soon become clear, Roy's result is still valid in this context. Emigrants are positively self-selected if the return to education is lower in the source economy. Skilled workers, the ones with high θ, decide to migrate once their comparative advantage is more valuable in country 1. On the other hand, if $w_e^1 < w_e^0$, more educated and skilled workers prefer to remain in the home economy - emigrants are negatively selected.

Thus, given a sample of individuals with different skills, the selection of emigrants is completely determined by the differences in the returns to education in the two countries.[10] Despite the composition of the flow, migration

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[10] Borjas (1987) makes a distinction between the sign of selection of emigrants, the "composition" and the "scale" effects. The "scale" effect measures the impact on the quality of emigrants when the size of the flow is increased (and the mix of the

decreases inequality since the individuals staying in country 0 become more homogeneous.

A key feature provided by the assumption of perfect credit markets is the fact that the decisions of education and migration are not affected by initial wealth, which determines only the level of consumption. In the next section, when financial constraints are introduced, initial wealth becomes crucial for the choices of education and migration. Another interesting characteristic of this benchmark case is that the migration premium, defined as $\bar{w}^1 - \bar{w}^0 - M$, does not affect the selection of emigrants. These findings are summarized in the following proposition.

Proposition 1 *Without financial constraints, emigrants tend to be positively (negatively) self-selected if the return to education in the destination country is higher (lower). In this case, initial wealth does not affect the composition or the size of the migration flow. Moreover, the migration premium does not affect the selection of emigrants and migration decreases inequality.*

3   The role of financial constraints

This section studies the impact of financial constraints on the selection of emigrants, when there is no credit market to finance agents' choices. We begin

migration flow is held constant) while the "composition" effect measures the impact on the quality of emigrants when the size is held constant.

the analysis with the financial constraints. Since agents have no access to credit, their choices are wealth-constrained. Individuals choose how to allocate their resources among educational costs and the cost of migration:

$$m\left(e_j|\theta\right) + j\ M \le a. \tag{9}$$

After having incurred such costs, they spend the available income (wages plus the remaining wealth) to finance consumption:

$$c_j = a - m\left(e_j|\theta\right) - j\ M + w_j\left(e\right). \tag{10}$$

Thus, the optimum choice of an individual in country 0 is represented by the following problem:

$$\max_{j,e_j \ge 0}\ a - m\left(e_j|\theta\right) - j\ M + w^j\left(e_j\right)\ \text{s.t.}\ m\left(e_j|\theta\right) + j\ M \le a. \tag{11}$$

The (interior) solution is given by the following system of equations [11]

$$w_e^j\left(\tilde{e}_j\right) = \left(1 + \tilde{\lambda}_j\right) m_e\left(\tilde{e}_j|\theta\right), \tag{12}$$

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[11] For the sake of simplification, we focus on the interior solution, ignoring the constraints $e_j \ge 0$. Therefore, we need to address this issue. The condition $e_1 \ge 0$ clearly binds for those individuals with $a \le M$. We deal with this possibility by adding a condition $a > M$ for those choosing to migrate, i.e., $\tilde{j} = 1$.

$$\tilde{\lambda}_j \left(a - m \left(\tilde{e}_j | \theta \right) - j \ M \right) = 0, \tilde{\lambda}_j \geq 0, \tag{13}$$

$$\tilde{c}_j = a + w^j \left(\tilde{e}_j \right) - m \left(\tilde{e}_j | \theta \right) - \tilde{j} \ M, \tag{14}$$

$$\tilde{j} = 1 \iff \tilde{B} \equiv \tilde{c}_1 - \tilde{c}_0 \geq 0 \text{ and } a > M, \tag{15}$$

where $\tilde{\lambda}_j$ is the multiplier associated with (9). Whenever financial constraints bind, initial wealth appears as a determinant of investments in education and in the migration decision. From (12), we can see that individuals with type (a, θ) such that $\tilde{\lambda}_j > 0$ get less education with respect to the case of perfect credit markets.

Based on the Fundamental Theorem of Calculus, it is very useful to represent the wage schedule in country j as

$$w^j \left(e \right) = \bar{w}^j + \int_0^e w_e^j \left(x \right) dx, \tag{16}$$

where $\bar{w}^j = w^j \left(0 \right)$. Therefore, the wage gain determined by migration can be decomposed into two parts - a migration premium and differences in the returns to education. Formally, for a given level e of education, the Fundamental

Theorem of Calculus can be used to write:

$$w^1(e) - w^0(e) - M = \underbrace{\bar{w}^1 - \bar{w}^0 - M}_{\text{migration premium}} + \underbrace{\int_0^e \left[w_e^1(x) - w_e^0(x) \right] dx}_{\text{differences in the returns to education}}. \qquad (17)$$

Now, we will investigate the effect of wealth on education and on the net benefit of emigration. From (13) we get:

$$\frac{\partial \tilde{e}_j}{\partial a} = \begin{cases} \frac{1}{m_e(\tilde{e}_j|\theta)}, & \text{if } \tilde{\lambda}_j > 0; \\ \\ 0, & \text{otherwise.} \end{cases} \qquad (18)$$

Substituting (17) in (15) we can rewrite the net benefit of migration as:

$$\tilde{B} = \left(\bar{w}^1 - \bar{w}^0 - M \right) + \int_0^{\tilde{e}_1} \left[w_e^1(x) - m_e(x|\theta) \right] dx - \int_0^{\tilde{e}_0} \left[w_e^0(x) - m_e(x|\theta) \right] dx. \qquad (19)$$

Differentiating (19) with respect to a, using (12) and (18), we have:[12]

$$\left. \frac{\partial \tilde{B}}{\partial a} \right|_{\theta, a > M} = \left[w_e^1(\tilde{e}_1) - m_e(\tilde{e}_1|\theta) \right] \frac{\partial \tilde{e}_1}{\partial a} - \left[w_e^0(\tilde{e}_0) - m_e(\tilde{e}_0|\theta) \right] \frac{\partial \tilde{e}_0}{\partial a} \qquad (20)$$

$$= \tilde{\lambda}_1 m_e(\tilde{e}_1|\theta) \frac{\partial \tilde{e}_1}{\partial a} - \tilde{\lambda}_0 m_e(\tilde{e}_0|\theta) \frac{\partial \tilde{e}_0}{\partial a}$$

$$= \tilde{\lambda}_1 - \tilde{\lambda}_0 = \frac{w_e^1(\tilde{e}_1)}{m_e(\tilde{e}_1|\theta)} - \frac{w_e^0(\tilde{e}_0)}{m_e(\tilde{e}_0|\theta)}.$$

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[12] Notice that we are considering only people with $a > M$ for the comparative static in order to avoid kinks determined by corner solutions with $\tilde{e}_1 = 0$.

Initial wealth affects education and the willingness to migrate only if the financial constraint binds. Rich people - those who are not wealth-constrained - make the same decisions taken in the context with perfect credit markets.

Our analysis, which is characterized by the system (12)-(15), is divided into two steps. First, we equalize the returns to education in the two countries to focus on the role of the migration premium. The objective is to show that there is a selection bias due to financial constraints, even when the Roy model suggests no bias at all. Then, we drop this assumption and present the complete case in which the migration premium is combined with the differences in the returns to education.

3.1   Migration premium

The previous section presented the general problem. Here, we equalize the returns to education in both economies: $w_e^1(e) = w_e^0(e) = w_e(e)$ for all $e \geq 0$. The intention is to show that there is a selection due to financial constraints even though the Roy model suggests no bias. Therefore, empirical tests that do not control for financial constraints might wrongly reject the Roy model.

We also assume that the migration premium is strictly positive, i.e., $\bar{w}^1 - \bar{w}^0 > M$. Otherwise, there would be no incentives for agents to emigrate and the problem would not be economically interesting.

The following lemma is a very useful starting point for our analysis.

Lemma 2 *For the case where $w_e^j(e) = w_e(e)$ for all $e \geq 0$ and $j \in \{0,1\}$, $\tilde{e}_0 \geq \tilde{e}_1$ for each individual in the economy. Moreover, $\tilde{e}_0 = \tilde{e}_1$ for uncon- strained individuals.*

PROOF. *see appendix.*

The intuition for this result is simple. As we have equalized the returns to education in the two labor markets, an additional unit of education has the same value in terms of wages whether the individual decides to migrate or not. In other words, the optimal unconstrained level of investments in education is the same in both countries. On the other hand, agents who choose to emigrate have (weakly) fewer resources to invest in education. Thus, we conclude that $\tilde{e}_0 \geq \tilde{e}_1$ if the returns to education in both countries are the same.

The effect of initial wealth on the willingness to migrate, in this case, is given by

$$\left. \frac{\partial \tilde{B}}{\partial a} \right|_\theta = \tilde{\lambda}_1 - \tilde{\lambda}_0 = \frac{w_e(\tilde{e}_1)}{m_e(\tilde{e}_1|\theta)} - \frac{w_e(\tilde{e}_0)}{m_e(\tilde{e}_0|\theta)} \geq 0, \qquad (21)$$

since $\tilde{e}_0 \geq \tilde{e}_1$, $w_{ee} < 0$ and $m_{ee} > 0$. Therefore, for all financially constrained individuals, the net benefit of emigration is a (strictly) increasing function of initial wealth.

Now, we are ready to analyze the decision to invest in education and the deci-

sion to emigrate in terms of initial wealth. The first thing to note is that work-ers with wealth lower than M cannot migrate. Workers with wealth greater than M have to trade off migration and education. Everyone who decides to migrate has less money to invest in education. Thus, the individual has to compare the migration premium with the reduction in wages due to lower lev-els of education. On the other hand, unconstrained workers decide to migrate once the migration premium is positive. As we go up in the wealth distribu-tion, agents become able to finance migration costs and acquire a higher level of education. Figure (1) illustrates the education choice as a function of initial wealth for a given level of skill.

Let $\bar{a}$ be the wealth level which makes $\widetilde{B} = 0$ so that the first worker to emigrate has wealth $\bar{a}$. We are under conditions such that $\bar{a} > M$. The role of the financial constraint in the selection of emigrants can be viewed as the interaction of two opposite effects.

Since migration is costly, if credit constraints bind at $\bar{a}$, individuals with initial wealth slightly above $\bar{a}$ invest less in education than individuals with initial wealth slightly below $\bar{a}$. People in a neighborhood of $\bar{a}$ have to trade off ed-ucation and migration. This component points in the direction of negatively selected emigrants.

On the other hand, people at the bottom of the wealth distribution do not migrate because the higher level of education they are able to obtain remain-
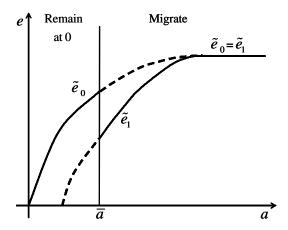
Fig. 1. Education and migration decisions vs. wealth - the case of positive migration premium and the same returns to education.

ing in country 0 surpasses the benefit accruing from the migration premium.

Agents at the top of the wealth distribution emigrate to benefit from the migration premium. These two facts together contribute for positively selected emigrants.

Except for an extreme case in which the migration costs are high and the wealth distribution is highly concentrated around $\bar{a}$, this second effect dominates and financial constraints lead to a positive selection of emigrants even when the education premium is the same in the source and destination countries. Again, in this case, migration decreases inequality because of the brain drain effect. This result is described in the next proposition.

Proposition 3 *Suppose there is a strictly positive migration premium and there is no difference in the return to education in both countries, i.e., $\bar{w}^1 - \bar{w}^0 > M$ and $w_e^1(e) = w_e^0(e) = w_e(e)$ for all $e \geq 0$. Financial constraints produce a bias in the selection of emigrants. This bias tends to be positive if the migration costs are not high and/or the wealth distribution is not concentrated*

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around $\bar{a}$. In this case, migration decreases inequality in the home country.

3.2   *Migration premium and return to education*

The next step is to allow for different returns to education in the two countries, which enables an analysis that considers the interaction of this effect with financial constraints. We will study the system (12)-(15), for the case in which there is a positive migration premium and a higher return to education in the home country. This is the most interesting case since the effects point in opposite directions. While the positive migration premium tends to generate a positive bias due to financial constraints, as shown in the previous section, the higher return to education in the home country contributes to a negative bias as in the Roy model.

Depending on the parameters of the economy, we can observe either a positive or a negative selection of migrants. Moreover, this case is useful to explain the migration of middle-class individuals which, in turn, determines that migration might increase inequality. The other three cases are less interesting for our purposes because either there is no migration or the financial constraints reinforce the Roy effect.

The net benefit of migration, according to (20), might not be a monotone function of wealth. In contrast to the previous section, it may exhibit an inverted U-shaped pattern. First, notice that $w_e^0(e) > w_e^1(e)$ for all $e \geq 0$

contributes for negative values of (20). On the other hand, the same argument used in the proof of the lemma can be applied to check that $\tilde{e}_0 > \tilde{e}_1$, which tends to make (20) positive. [13]

The intuition for this last fact is similar to the one used in the previous section. Since the return to education is higher in the home country, individuals that do not migrate get higher levels of education. In addition, financial constraints determine that emigrants must have lower levels of education in order to afford the migration costs.

Now, let us investigate the implications for the selection of the migration flow, considering individuals with different levels of initial wealth. Individuals from the bottom of the wealth distribution prefer to remain in the home country, using the resources that could be spent on migration to get a higher level of education. The benefit of migration for these people is negative.

If the return to education in the home country is sufficiently higher, agents from the top of the wealth distribution also stay in 0. In this case, the payoff of getting a higher level of education compensates for the migration premium and wealthy people decide to remain in their home country.

However, there might be a group of middle-class individuals who cannot afford high levels of education, due to financial constraints, and prefer to migrate.

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[13] After all, the unconstrained optimal level of investments in education is higher in the source country.

The migration premium for them surpasses the benefit from the higher return of education in the source country. This case contradicts the prescription of the Roy model since emigrants are neither the most educated nor the least educated individuals from country 0. This point is illustrated in Figure 2.
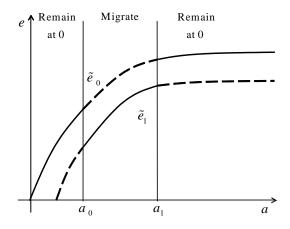

Fig. 2. Education and migration decisions vs. wealth - the case of positive migration premium and higher return to education at the origin.

The introduction of financial constraints in the traditional Roy model provides an interesting possible case where only middle-class individuals migrate and migration increases inequality in the home country. This is a possibility when the migration premium is positive and the return to education in the home country is sufficiently higher than the return to education in the destination country. The proposition below summarizes this result.

Proposition 4 *Suppose there is a strictly positive migration premium and the return to education is uniformly higher in the home country, i.e., $\bar{w}^1 - \bar{w}^0 > M$ and $w_e^1(e) < w_e^0(e)$ for all $e \geq 0$. Then, we have shown that (i) there is an ambiguous selection of emigrants, depending on the parameters of the economy; and (ii) if these differences are sufficiently high, we might observe migration*

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of middle-class individuals, a situation where migration increases inequality in the home country.

4 Concluding Remarks

The literature has been neglecting the role of financial constraints in the selection of emigrants. The theoretical arguments, based on the Roy model, suggest that this selection is primarily determined by the differences in the rate of return to education in the home and destination countries. On the other hand, empirical evidence suggests that emigrants have higher levels of education than those remaining at home, despite such differences in the returns to education.

Our main contribution is to show that financial constraints play an important role in the determination of the migration flow and might have unexpected effects on inequality in the source economy. Our findings are based on two results.

First, financial constraints tend to generate a positive bias in the selection in the relevant cases. Without access to credit, poor people are neither able to get high levels of education nor to migrate. Rich individuals, on the other hand, can afford schooling and migration. Therefore, we provide a positive bias due to wealth-constrained choices.

This result is important to reconcile the theoretical and empirical literature on migration. Financial constraints can determine a positive selection of migrants even if the rate of return in the home country is lower. Therefore, empirical investigation that does not control for initial wealth might wrongly reject the Roy model.

Second, the interaction between the effects of financial constraints and the differentials in the return to education explains facts that we were not able to understand theoretically using the Roy framework. If the migration premium is positive and the return to education in the home country is higher, we might observe the migration of middle-class individuals and an increase in inequality in the source country. This situation is in sharp contrast with the traditional literature where migration reduces inequality.

Appendix

PROOF. Suppose that $w_e^j(e) = w_e(e)$ for all $e \geq 0$ and $j \in \{0,1\}$. The result can be easily demonstrated if we split the population according to the financial constraint:

(i) For those individuals whose constraints are never binding $\left(\tilde{\lambda}_j = 0, j \in \{0,1\} \right)$, the analysis of section 2 (or equation 12) shows that $\tilde{e}_0 = \tilde{e}_1$.

(ii) When (9) is always binding $\left(\tilde{\lambda}_0 > 0, \tilde{\lambda}_1 > 0 \right)$, the education levels are implicitly determined by $m(\tilde{e}_1|\theta) = a - M$ and $m(\tilde{e}_0|\theta) = a$. Since

$m_e > 0$, it follows that $\tilde{e}_1 < \tilde{e}_0$.

(iii) For the case where the constraint binds only for the emigrants, i.e. $\tilde{\lambda}_0 = 0$ and $\tilde{\lambda}_1 > 0$, equation (12) implies that:

$$\frac{w_e\left(\tilde{e}_1\right)}{m_e\left(\tilde{e}_1|\theta\right)} = 1 + \tilde{\lambda}_1 > 1 = \frac{w_e\left(\tilde{e}_0\right)}{m_e\left(\tilde{e}_0|\theta\right)}.$$

Therefore, since $w_{ee} < 0$ and $m_{ee} > 0$, we have $\tilde{e}_1 < \tilde{e}_0$.

(iv) Nobody has $\tilde{\lambda}_0 > 0$ and $\tilde{\lambda}_1 = 0$. This situation is not possible when $w_e^j\left(e\right) = w_e\left(e\right)$ - the financial constraint is tighter because of the migration costs. $\square$

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