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The impact of migration on origin countries: a numerical analysis

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Abstract. The focus of this article is on the impact of high-skilled emigration on fertility and human capital of a sending country within an overlapping generations model where parents choose to finance higher education to a certain number of their children. We assume that high- and low-skilled children emigrate with a certain probability when they reach adulthood and that they send remittances to their parents back home. The model shows that an increase in the intensity of the brain drain induces parents to provide more higher education to their children and to raise less low-skilled children. The impact on fertility and on human capital formation however remains unclear. This is why we run numerical simulations by calibrating our model to a developing country like the Philippines. The calibration results show in particular, that increased brain drain lowers fertility and boosts long-run human capital formation in the sending country.

Keywords: Simulation method, migration, fertility.

JEL Classification: C63, F22, J13.

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1 Introduction

Recent empirical evidence indicates that migration becomes increasingly skill-biased, and that South to North human flows are gaining heightened importance. For example, the immigration rate in high income countries has tripled since 1960 and doubled since 1985 (IOM 2005, Docquier and Marfouk, 2006). Remittances are an important by-product of emigration from the poor countries. According to the Human Development Report (2009), the volume of officially recorded remittances to developing countries was in 2007 about four times the size of total official development aid.

The impact of skilled emigration on migrants' source countries remains an open question. The early theoretical literature, with foremost Bhagwati and Hamada (1974), perceived brain drain as having a negative impact on the source country's welfare. In recent years, economists took a new look and highlighted a range of positive side-effects of skilled emigration that may outweigh the negative ones (Mountford, 1997; Beine et al., 2001; Stark and Wang, 2002).

Other benefits to the origin country induced by skills emigration have been recognized by the recent literature. For example, brain drain may enable the transfer at home of knowledge acquired abroad (Dustmann and Kirchkamp, 2002) and by the creation of migrant networks, human outflows may also help to reduce informational barriers to FDIs and increase the attractiveness of the home country to foreign investors (Kugler and Rapoport, 2007).

However, most of this economic literature on the brain drain takes population as constant and does not analyze fertility decisions.[1] The objective of this article is to examine the implications of brain drain on fertility and human capital in migrants' countries of origin. To do so, we develop an overlapping generations model where parents choose to finance higher education to a certain number of their children. High- and low-skilled children emigrate with a certain probability when they reach adulthood and send remittances to their parents back home. We find that an increase in the intensity of the brain drain stimulates parents to finance higher education to a larger number of their children and to raise less low-skilled children. However, the impact on fertility and on the human capital formation remains unclear. In order to further investigate these issues we calibrate our model to a developing country,

[1] Exceptions are Chen (2006), Mountford and Rapoport (2009) and Beine et al. (2008).

the Philippines. The simulation results show in particular, that increased brain drain lowers fertility and boosts long run human capital formation in the sending country.

2 The Economic Model

Following de la Croix and Doepke (2003), we consider an overlapping generation economy where individuals live for 3 periods: childhood, adulthood, and old age. Each individual has one parent, which creates the connection between generations. Individuals have either a low (superscript l) or a high education level (superscript h). Higher education is costly, while lower education is offered for free by the society. During their childhood, individuals who attend school do not work, whether they obtain higher education or not. Also, agents work only in their adulthood and earn a wage that depends on their education level. High-skilled adults earn a wage w^h, while low-skilled ones a wage w^l with $w^h > w^l$.

We consider a small open economy where capital is perfectly mobile, which implies a fixed international interest factor R^*. Also, both high and low skilled wages are exogenous and constants. Both low- and high-skilled labor in this small open economy can emigrate to an advanced economy and earn a higher salary, w^{*i} ($i = h,l$), which is exogenously given with $w^{*i} > w^i$. Finally, we assume that emigration is not large enough to affect the economy of the destination country.

2.1 Individual behavior

All decisions are made by the individual during her adulthood. Thus at time t, each adult with education level i cares about her own old age consumption D^i_{t+1}. It is assumed that individuals consume only when old. Thus there is no arbitrage opportunity for consumption, which is purchased through savings and remittances. The individual also cares about the return from her “education investment”, that is, the expected income of her children, V^i_{t+1}, which represents the altruistic component in the utility. Moreover, an adult chooses how many low- (n^i_t) and high-skilled children (m^i_t) she would like to have.

At the beginning of their adulthood, individuals with education level i can emigrate with a probability p^i, $i = h,l$, to a more advanced economy. Hence, the expected income of a child with education level $i = h,l$ is

$$\overline{w}^i = (1-p^i)w^i + p^i w^{*i},\ i = h,l. \tag{1}$$

The probability to emigrate p^i is exogenous and will serve as a policy variable in the comparative statics as well as in the numerical example. A rise in p^i can either be associated with a more liberal immigration policy of a destination country, such as, for example, a reduction of the entry barriers, or with more liberal emigration policies in the origin country, such as larger exit quotas.

Raising one child takes a fraction $\phi \in (0,1)$ of an adult's time and high-skilled children induce an additional cost for their education x. Therefore, savings, S^i_{t+1}, result from an adult's labor earnings minus raising and educational costs of her children, and parents' old age support,

$$S^i_{t+1} = R^*[w^i(1-\phi(n^i_t + m^i_t) - \theta^i) - xm^i_t]. \tag{2}$$

It is assumed that all children care about their parents and remit a proportion $\theta^i \in (0,1)$ of their incomes to their parents. Hence, parents' expected transfers, T^i_{t+1}, from her low- and high-skilled children are given by

$$T^i_{t+1} = \theta^h \overline{w}^h m^i_t + \theta^l \overline{w}^l n^i_t. \tag{3}$$

Therefore, lifetime consumption writes as follows

$$D^i_{t+1} = S^i_{t+1} + T^i_{t+1}. \tag{4}$$

The utility function of an individual who is an adult with education level i at time t is then given by:

$$U(D^i_{t+1}, V^i_{t+1}) = \ln(D^i_{t+1}) + \beta \ln(V^i_{t+1}), \tag{5}$$

and

$$V^i_{t+1} = (n^i)^{\varepsilon}\overline{w}^l + (m^i)^{\varepsilon}\overline{w}^h. \tag{6}$$

Apart from the fact that we explicitly introduce heterogeneity among the types of children, the non-linear term in V^i_{t+1} is similar to the idea of Becker and Barro (1988), Barro and Becker (1989), and Doepke (2005), with $\varepsilon \in (0,1)$ playing the role of the elasticity of the utility with respect to each children type. As mentioned by Barro and Becker (1989), this form of the altruism term means that, for a given expected income per child $\overline{w}^i$, "parental utility $U(\cdot)$ increases, but at a diminishing rate, with the number of children" (here n^i and m^i).

Thus, combining the above information, each adult is facing the following problem

$$\max_{n^i,m^i} U^i = \ln(D^i_{t+1}) + \beta \ln(V^i_{t+1}), \qquad i = l,h, \tag{7}$$

subject to (4) with parameter $\beta \in (0,1)$ the weight of the altruism term in the utility.

2.2 Solving the individual problem

It is possible to show[2] that the first order condition of maximizing U^i with respect to n^i_t is

$$\frac{R^*\phi w^i_t - \theta^l \overline{w}^l}{D^i_{t+1}} = \frac{\beta\varepsilon\overline{w}^l (n^i_t)^{\varepsilon-1}}{V^i_{t+1}}, \tag{8}$$

which states that the net marginal cost of raising a low-skilled child, $R^*\phi w^i_t - \theta^l \overline{w}^l$ (cost minus expected transfers), in terms of consumption, should equal the marginal utility gain from a low-skilled child's expected income in terms of the future value of total children V^i_{t+1}**)**. If this equality does not hold, raising children is either too costly (it is then optimal to have no children), or not costly enough (then individuals choose to have more and more children).

Similarly, the first order condition of maximizing U^i with respect to m^i_t yields

$$\frac{R^*(\phi w^i + x) - \theta^h \overline{w}^h}{D^i_{t+1}} = \frac{\beta\varepsilon\overline{w}^h (m^i_t)^{\varepsilon-1}}{V^i_{t+1}}, \tag{9}$$

which means that the net marginal cost of educating one child in terms of consumption (left hand side) should be equal to the marginal benefit from educating a child.

The second order conditions of the agents' maximization problem are satisfied. It follows that the solutions from (8) and (9) are optimal for the households.

It is easy to see that in (8) and (9), the right hand sides are positive, implying that the left hand sides are positive too. In the following we will assume that the necessary conditions for the existence of interior solutions are granted.

Assumption 1. The following conditions are supposed to hold (for $i = l,h$ and $\forall t$),

[2] The proofs of the results presented in this section are available on request.

$$R^*\phi w^i > \theta^l \overline{w}^l, \;\; R^*(\phi w^i + x) > \theta^h \overline{w}^h.$$

Assumption 1 guarantees that raising children is expensive, otherwise parents will have as many children as they can. At the same time, educating children is also costly, otherwise all children will get higher education.

Combining these two equations leads to explicit solutions for *m* and *n*, which are given in the following proposition.

Proposition 1. *Under Assumption 1, it yields*

$$m_t^i = \frac{\beta\varepsilon\overline{w}^h R^* w^i (1-\theta^i)}{(1+\beta\varepsilon)\left[R^*(\phi w^i + x) - \theta^h \overline{w}^h\right]\left[\overline{w}^l \sigma_{n,m}^i + \overline{w}^h\right]} \tag{10}$$

and

$$n_t^i = (\sigma_{n,m}^i)^{\frac{1}{\varepsilon}} m_t^i, \tag{11}$$

where

$$\sigma_{n,m}^i = \left(\frac{B}{A^i}\right)^{\frac{\varepsilon}{1-\varepsilon}}, \;\text{with}\; A^i = \frac{R^*\phi w^i - \theta^l \overline{w}^l}{R^*(\phi w^i + x) - \theta^h \overline{w}^h}, \;\; B = \frac{\overline{w}^l}{\overline{w}^h}. \tag{12}$$

The parameter A^i represents the ratio of net costs of raising a low educated child to a high educated one (see (8) and (9)), while B is the ratio of the expected income of a low educated child to a high educated one. Since ε is the elasticity of the utility with respect to each children type, then $\sigma_{n,m}^i$ can be considered as the elasticity of substitution between high and low educated children in each type of household.

3 Numerical Analysis

In this section we provide a numerical illustration to analyze the effects of a brain drain (skilled emigration) on fertility and human capital. Higher migration can be due to the fact that destination countries adopt more liberal immigration policies. Since immigration policies tend to be more and more skilled-biased, we focus on the effects of increased high-skilled emigration. Our model is calibrated to the Philippine economy, since this country is experiencing an important brain drain.

In order to run our simulation exercice we assume that the year 2000 corresponds to a steady state. A migration shock moves the economy away from this initial state to a new long run equilibrium. We then focus on the transitional dynamics. This analysis is conducted under three different variants; (i) one with a higher propensity to remit for low-skilled, which we consider as our benchmark (ii) one with equal remittance propensities between low- and high-skilled emigrants, (iii) and finally one without remittances. In what follows, we cast a glance on the simulation method we use before turning to the calibrations.

3.1 Simulation method

The dynamic model is characterized by a set of non-linear equations of the following form:[3]

$$f(y^A_{t-1}, y^A_t, y^B_t, y^B_{t+1}, z_t) = 0, \tag{13}$$

where y^i_t denotes an endogenous variable at time t. The subscript A stands for a predetermined variable and B for a forward-looking variable. The system also depends on a vector of exogenous variables and parameters denoted by z_t and accounts for leads or lags of one period corresponding to the lifetime of a grown-up individual.[4] We finally assume initial conditions on the predetermined variables, which correspond to an initial steady state (in our case, reproducing the economic conditions of the Philippines in the year 2000):

$$y^A_{-1}, y^A_0 = y^A_{initial}.$$

Concerning the terminal conditions, we assume in the baseline that exogenous variables stay constant as in 2000. Thus the initial and final steady states coincide in the baseline. In our simulation we analyze the impact of increased skilled emigration which translates into a permanent increase in one of the exogenous variables contained in vector z. Under such a scenario, the final steady state will obviously differ from the intital one. After this shock, the economy should converge to a new steady state if this latter is a saddle-point and as long as local stability is granted (if the distant between the initial and the final steady states is not too large).

Since f is non-linear, it is not possible to obtain an analytical solution of the model, especially when calibrating large-scale economies. The general problem

[3] A more extensive description of the simulation method can be found in de la Croix et al. (2007).

[4] Notice that the model would have a two period lead or lag structure if the optimization problem was written from a child's perspective.

consists in solving a system of finite difference equations with initial and terminal conditions. The infinite horizon of the model is approximated by a finite one, meaning that the steady state is reached at the end of the simulation limit (T). The complete system has as many equations as the number of equations at each period multiplied by the simulation horizon plus the initial and terminal conditions:

$$(\Gamma) = \begin{cases} y^A_{-1}, y^A_0 & = \; y^A_{\text{initial}} \\ f(y^A_{-1}, y^A_1, y^B_1, y^B_2, z_t) & = \; 0 \\ \vdots & \vdots \quad \vdots \\ f(y^A_{T-1}, y^A_T, y^B_T, y^B_{T+1}, z_T) & = \; 0 \\ y^B_T, y^B_{T+1} & = \; y^B_{\text{final}} \end{cases}$$

The simulation method solves the system (Γ) for y_t. It builds on a Newton-Raphson relaxation method put forward by Laffargue (1990) and Boucekkine (1995) for solving dynamic nonlinear models with perfect foresight. This routine is implemented with the package Dynare of Juillard (1996).

3.2 Calibration

Our model is calibrated to depict a typical situation of South-North migration and as such the parameter of our model are adjusted to match the economy of the Philippines which is the migrants'origin country. This choice seems appropriate since emigration and large in flows of remittances have been notorious characteristics of the Philippine economy for several decades (see the IMF study of Burgess and Haksar, 2005). The foreign country in the model is represented by a combination of OECD countries the relative importance of which is weighted by the share of Filipino emigrants they host (see below). As mentioned above, the initial steady state is assumed to correspond to 2000 data.

Observed parameters and exogenous variables. The values of observed parameters and exogenous variables are reported in table 1 and chosen as follows. According to Haveman and Wolfe (1995) parents spend around 15% of their time raising children, which enables us to set the raising cost parameter ϕ to 0.15. We further know that the wage of a high-skilled worker in the Philippines is 2.54 times larger than the one of a low-skilled.[5] Thus if w^l is set to 1, w^h equals 2.54. Since one period is considered to be 20 years, the interest factor is set to $R^* = 1.806$, which corresponds to an annual interest rate of 3%. Then we try to quantify the probabilities to emigrate, p^h and p^l since they are not directly observable. Docquier and Marfouk (2006) indicate that 67% of the Filipinos living in OECD in 2000 are high-skilled, thus we can set $p^h = 2\ p^l$. Since one period lasts 20 years, we consider that the number of migrants in the OECD in 2000 reported by the above authors represents the number of emigrants during one period in our model. This means that 1'678'735 Filipinos emigrated within one period.[6] If the number of migrants is written as $p^l N^l + p^h N^h$ then taking N^l and N^h from Docquier and Marfouk, we obtain $p^l = 0.043094295$ and $p^h = 0.08618859$.

Table 1 Parameter values for the Philippines

$\phi = 0.15$	$w^l = 1$	$w^h = 2.54$
$p^h = 0.086$	$p^l = 0.043$	$R^* = 1.806$

Unobserved parameters and exogenous variables. For the remaining exogenous variables no data are available. We start by equalling to 0.5 the parameter ε in the "altruistic" argument of the utility function.[7] Remaining variables are set in order to match four main characteristics of the Philippine economy. Let us describe this procedure, which is summarized in table 2. First, we know from Docquier and Marfouk (2006), who themselves rely on the data of Barro and Lee (2001), that in 2000 the ratio of the low- to high-skilled labor force, $1/h$ $(= N^l/N^h)$, amounts to 3.5045. This value is obtained by fixing the education costs of a low-skilled child to $x_t^l = 0.413033$ and by the plausible assumption that $x^h = x^l$. Second, annual population growth rate in the Philippines equals 1.98% during the period 1999-2004. If we consider one period to be 20 years, then the population growth rate in our model equals $g = 0.481$, implying that $\beta = 0.664238$. Moreover, we can consider the wage differ-

[5] The data is originally collected by the United Nations, *General Industrial Statistics* and corresponds to the skill premium in the manufacturing sector for the year 2000, see also Zhu (2005).

[6] This number is not exaggerated, because when considering also temporary residents (42%) and irregular migrants (21%) together with permanent residents (37%), the number of Filipinos living and working overseas was estimated to be around 7.58 million in 2002 with an increase of 1 million since 1996. This number is equivalent to almost one quarter of the domestic labor force (Burgess and Haksar, 2005; Castro, 2006)

[7] It can be shown that our findings are qualitatively robust to alternative values of this parameter.

ential between the Philippines and the OECD to be similar to the per capita GDP differential. According to the World Development Indicators (WDI, 2007), average per capita GDP between 1999-2004 was \$3'991 in the Philippines and \$34'268 in the OECD (PPP, constant 2000 international \$), thus 7.98 times higher in the OECD.[8] If the average domestic wage is defined as $\widehat{w} = (w^h + w^l/h)/(1+1/h)$ and the average foreign wage as $\widehat{w}^* = (w^{*h} + w^{*l}/h^*)/(1+1/h^*)$, the average wage difference $\omega = \widehat{w}^*/\widehat{w}$ equals 7.98. Relying on the same sources as for the domestic economy and applying the same weights to the distribution of migrants among OECD countries as for GDP per capita, the average ratio of low- to high-skilled labor force in the OECD, $1/h^*$, was 1.096703272 and the skill premium, w^{*h}/w^{*l}, 1.96.[9] Then, to match the aforementioned average wage difference, the variable w^{*h} is required to be 14.3876 and w^{*l} is set equal to $w^{*h}/1.96$. Finally, we need to quantify the propensities to remit (θ^l and θ^h). While high-skilled migrants remit a larger amount than low educated migrants, recent research claims that their propensity to remit is lower than the one of low-skilled migrants, see Faini (2007) and Nimii et al. (2008). In our benchmark model it is assumed that the propensity to remit of the skilled equals 50% of the low-skilled propensity and thus $\theta^h = 0.5\ \theta^l$. This assumption will be subject to robustness checks (see below). Based on Fund staff estimates and on the World Bank, Burgess and Haksar (2005) indicate that remittances in percentage of GDP amount to 9.4%. If we define GDP, Y, by the sum of total labor income and total capital income, then $Y_t = N_t^h w_t^h + N^l w_t^l + (R^* - 1)(N_{t-1}^h s_{t-1}^h + N_{t-1}^l s_{t-1}^l)$, where $s_t^i = [w_t^i(1-\phi(n_t^i + m_t^i) - \theta^i) - xm_t^i]$. The total amount of remittances corresponding to one period, Λ, equals $\Lambda_t = N_{t-1}^h T_t^h + N_{t-1}^l T_t^l$. Then $\Lambda_t/Y_t = 0.094$ implies that $\theta^l = 0.113158$.[10]

We consider the case where low-skilled migrants have a higher propensity to remit as our benchmark model, labelled "Benchmark". As said above, we also calibrate two alternative specifications of our model, one where high- and low-skilled

[8] According to Docquier and Marfouk, migrants from the Philippines living in the OECD in 2000 were distributed as follows: United States (69.31%), Canada (11.41%), Australia (4.65%), Japan (4.56%), Italy (2.44%), United Kingdom (2.07%), Germany (0.75%), Korea (0.72%), Spain (0.67%), New Zealand (0.51%), Austria (0.45%), Switzerland (0.43%), Netherlands (0.34%), Greece (0.29%), France (0.28%), Norway (0.25%), Sweden (0.23%), Ireland (0.21%), Denmark (0.15%), Belgium (0.13%), Iceland (0.04%), Mexico (0.04%), Finland (0.037%), Czech Republic (0.0014%), Hungary (0.001%), Slovakia (0.0001%).

[9] The same data source as for the skill premium in the Philippines is used.

[10] According to aggregate data on remittances from the International Monetary Fund (IMF 2007) remittances amount to \$7876 million in 2003. Moreover a more recent report of the World Bank (2006) indicates that the remittances share of GDP in the Philippines would even amount to 13.5% (see World Bank, 2006, p.90, Figure 4.1).

Table 2 Calibration of unobserved exogenous variables

N^l/N^h	$= 3.50$	$\Leftrightarrow$	x^l	$= 0.413033$
g	$= 0.481$	$\Leftrightarrow$	β	$= 0.664238$
ω	$= 7.98$	$\Leftrightarrow$	w^{*h}	$= 14.3876$
Λ_t/Y_t	$= 0.094$	$\Leftrightarrow$	θ^l	$= 0.113158$

have the same propensity to remit ("*Variant 1*") and one without remittances ("*Variant 2*"). This implies that in these both cases the values for the exogenous variables in Table 2 differ from those in the benchmark case. Notice that the case without remittances is extensively studied in Marchiori, Pieretti and Zou (forthcoming).

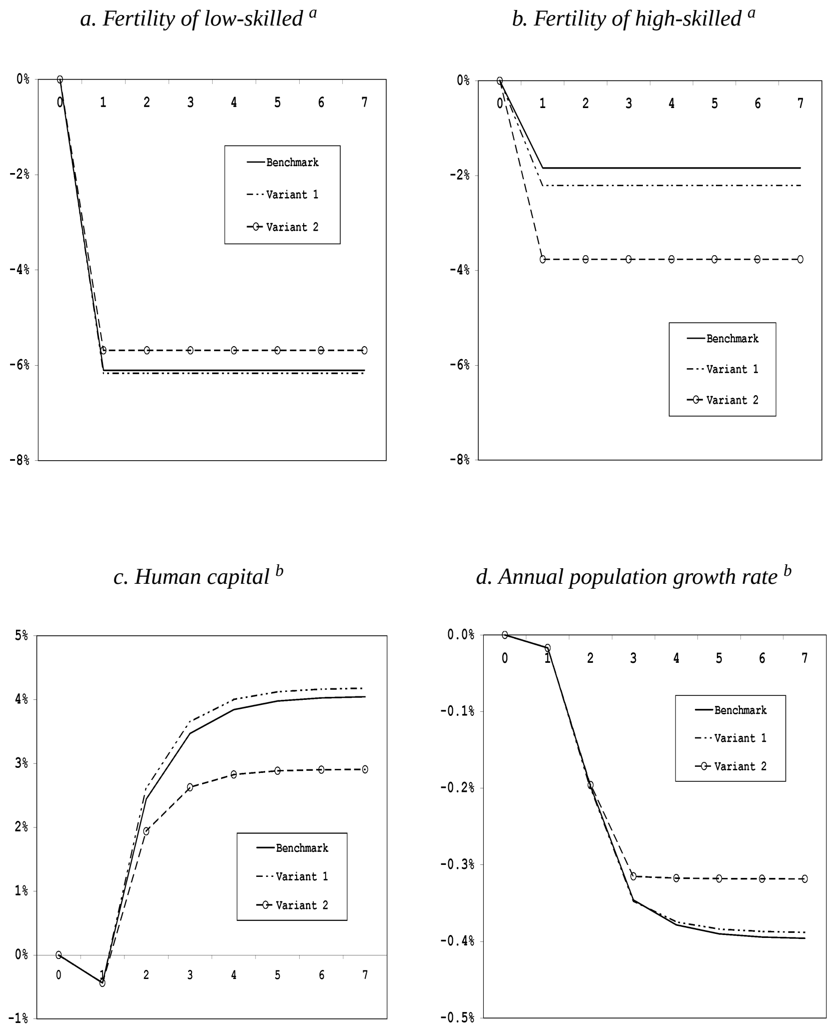
3.3 Results

We analyze the effects of a permanent increase of 10% in emigration flows, which means that more people leave the Philippines at each period with respect to the baseline. For instance, in the first period of the shock, the additional migrants amount to 164 thousand. To analyze the impact of permanent brain drain, we assume that all the additional migrants are high-skilled, which means that p^h rises from 0.086 to 0.109.

Theoretically, increased skilled emigration induces both types of parents to finance higher education to a larger number of children and to raise less low-skilled children. This is also confirmed by our numerical findings. However the impact of a brain drain on the total number of children is theoretically ambiguous.[11] The impact on human capital remains unclear as well. In fact, a brain drain induces a flight-out of high-skilled workers but at the same time stimulates parents to raise more high-skilled children. The purpose of the numerical exercice is to provide a specific answer to the consequences of skilled emigration on fertility and human capital. Figure 1 depicts the effects of a brain drain on the number of children in a low- and high-skilled family, on human capital and on annual population growth under the three model specifications.

[11] In the variant that entails no remittances, it can be theoretically shown that a brain drain reduces the number of children within a family, see Marchiori, Pieretti and Zou (forthcoming).

Fig. 1 Support ratio and labor income tax rate in the baseline



[a] Results are expressed in percentage changes with respect to the baseline.
[b] Percentage points deviations with respect to the baseline.
Benchmark stands for the case where high-skilled have a lower propensity to remit.
Variant 1 represents the case where high- and low-skilled have the same propensity to remit.
Variant 2 comprises no remittances.

Table 3 Long-run impact of an increase in p^h (5^{th} period)

Impact on household decisions	**Variables**	**Benchmark**	$\gamma^h = \gamma^l$	$\Lambda = 0$
High-skilled children of high-skilled parents	m^h	4.75	5.51	4.02
High-skilled children of low-skilled parents	m^l	9.52	10.07	6.48
Low-skilled children of high-skilled parents	n^h	-11.88	-11.91	-10.27
Low-skilled children of low-skilled parents	n^l	-9.06	-9.32	-8.14
Total children of high-skilled parents	$m^h + n^h$	-1.84	-2.21	-3.76
Total children of low-skilled parents	$m^l + n^l$	-6.10	-6.17	-5.69
Human capital[a]	H	3.98	4.12	2.88
Annual population growth rate[a]	g_{annual}	-0.39	-0.38	-0.32

Values display percentage changes compared to the baseline.

[a] Percentage points deviations with respect to the baseline.

Our findings indicate that both low- and high-skilled families choose to raise less children following a brain drain. The effect of a brain drain on human capital H (defined as the proportion of high educated workers in the total labor force) is negative in the short run when the policy is adopted.[12] The reason is that the shock is not anticipated in period 0 and more high-skilled individuals leave the country in period 1. However, in this first period parents already change their fertility decisions in favor of more high-skilled children. When these additional high-skilled children add to the high-skilled labor force in period 2, they will more than compensate the loss of the departing high educated workers. A permanent 10% rise in emigration flows, where all additional emigrants are highly educated leads, in the long run (period 5), to a 4 percentage points increase in human capital (the proportion of high-skilled within a generation H rises from 22.20% to 26.18%). Due to diminished fertility choices in terms of the number of children, the annual population growth decreases by 0.4 percentage points and passes from 1.98% to 1.59%.

How to explain the differences across the different variants? First, it should be noted that since the baselines differ across the three specifications, any comparison between them should be taken with caution. Nevertheless, while it can be observed that the results are qualitativily similar across variants, differences in the response of the main variables of interest (human capital and population growth) are apparent. When high-skilled remit in the same propensity as low-skilled (*dashed line*), more remittances are sent back and thus the incentives to send more children to get education are higher (see Table 3, column "$\theta^l = \theta^h$"). It results that the impact on human capital is more intense than in the benchmark specification (*solid line*).

[12] Notice that the policy change arises from period 1 onwards.

Furthermore, human capital augments even in the absence of remittances (*line with circles*), because parents are altruistic and prefer having more high-skilled children who are expected to earn a higher wage.

In terms of population growth, the scenario in which both high- and low-skilled remit in the same way has a less reducing impact than in the benchmark case. The reason is that since high-skilled migrants remit more, the number of high-skilled children is further stimulated and the decrease in population growth is dampened (see Table 3). In the absence of remittances, the purpose to raise high-skilled children to obtain additional remittances vanishes and low-skilled children are then relatively more “valuable” than in the other variants. Consequently, the decline in the number of low-skilled children is less important and the effect on population growth is reduced.

4 Conclusion

In this contribution we analyze the impact of high- and low-skilled emigration on parents’ fertility choices and on human capital formation in the country of origin. For that purpose we develop an endogenous fertility model with overlapping generations in which parents decide upon the number of children to provide with higher education. This implies that families are composed of low and high educated children.

Though our theoretical analysis does not give unambiguous results on the central issues we address, it provides an interesting framework for running numerical simulations. We therefore decide to calibrate the model on the Philippines to provide specific quantitative results. More precisely, we analyze the effects of a permanent increase of 10% in emigration flows where all additional migrants are high-skilled. In the long run we observe increasing formation of human capital (the share of high-skilled individuals rises from 22.20% to 26.18%). Finally it appears that due to diminished fertility choices, the annual population growth decreases by 0.4 percentage points and passes thus from 1.98% to 1.59%.

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