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Remittances for Economic Development: the Investment Perspective

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Abstract

Based on the economic theory of the family, this paper constructs a model of remittances where the migrant, besides sending money to his family, also invests in his home country. The investment is looked after by a family member in return for some monetary compensation. The model focuses on two different cases: state-contingent transfers (transfers are tied to investment outcomes) and fixed transfers (transfers are mainly of altruistic motive). As the migrant derives utilities from consumption, his consumption-investment decision is driven by preferences and future investment prospects. The transfers are to increase with both business encouraging and income compensatory effects.

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1. Introduction

Recently, there has been a substantial increase in remittance flows from developed countries to developing countries. An estimate by the World Bank (2007) indicates that total remittances to developing economies amounted up to $240 billion in 2007 from $31.2 billion in 1990. The actual numbers are surely much larger given the fact that official statistics miss informal inflows. This information suggests that remittances are potentially a good source of finance for economic development, especially for the poorest countries.

There is a considerable debate on the role of remittances to economic development process of developing countries. Remittance supporters posit that remittances help improve recipients' standard of living and encourage households' investment in education and healthcare. Remittances are also necessary for financing imports and investment. However, the negative view of remittances indicates that remittances can fuel inflation and reduce recipients' incentive to work which are obviously harmful for growth. Empirical studies on the economic impact of remittances also produce mixed results (see, for example, Glytsos, 2002; Leon-Ledesma and Piracha, 2004; Chami *et al.*, 2005).

This paper contributes to the above mentioned debate over the economic impact of remittances by constructing a theoretical model in which remittances act like a capital inflow besides an income transfer from overseas. The model is set up based on the economic theory of the family[1] where the relationship between a migrant and his family back home is characterized by both altruism (as suggested by Johnson and Whitelaw, 1974) and business (as pointed by Lucas and Stark, 1985).[2] The relationship is altruistic in the sense that the migrant cares about his family and makes his utility dependent on the family member's utility.

[1] There is a big literature on the economic theory of family, especially on the aspect of private income transfers such as Bernheim *et al.* (1985), Cox (1987), and Chami (1998).
[2] For simplicity, the migrant's family back home is assumed to consist of only one member.

It is also business-like because the migrant makes investment in his home country and asks the family member to look after the investment project on his behalf. In return, the migrant offers the family member some monetary transfer. In this framework, remittances include two different flows: a capital flow and an income transfer flow. As a result, remittances are not only compensatory but also business motivated. To make it more general, this paper differentiates two different situations. In the first situation, the migrant ties the transfer to the outcome of the investment project. This creates an incentive for the recipient to exert more managerial effort. In the second situation, the migrant makes a transfer simply based on his altruistic motive.

The results of the model can be summarized as follows. Despite having different settings, the two above mentioned situations yield qualitatively close findings. They both reveal that remittances are not only a pure income transfer which help increase consumption at home but also an important source of finance for economic development through investment channel. Here, remittances increase with business encouraging as well as income compensatory motives. In particular, the migrant will invest more in his home country if the expected gain from making extra investment is high enough. He will send more monetary payment home if his income is higher, when his family member is poor, or when he wants to encourage his relative to exert more effort in managing his investment project. The family member will act more positively on the migrant's project when she cares more about the migrant and when the promised monetary rewards are higher.

Generally, this paper is well placed into the literature on remittances. It is linked to the theory on altruistic motivations for remittances (e.g. Johnson and Whitelaw, 1974; Chami *et al.*, 2005) as well as the theory on self-interested remittances as a means of business (e.g. Lucas and Stark, 1985). Although not study here, this paper recognizes the theory that considers the family as a source of insurance company that provides members with protection from any income shocks (Poirine, 1997; Ilahi and Jafarey, 1999) or a bank that finances the migration of the members (Stark, 1991; Agerwal and Horowitz, 2002; Gubert, 2002).[3] By modeling explicitly financial development as a factor that encourages investment from remittance flow, this paper also fits well in the literature on financial market and economic development (e.g. Giuliano and Ruiz-Arranz, 2005; Mundaca, 2009).

The rest of this paper is structured as follows. Section 2 sets up the theoretical model on remittances and investment motives. Section 3 documents some implications and further discussions on the results of the model in Section 2. Section 4 ends the paper with some concluding remarks.

2. Theoretical models for analyzing remittances

Consider an economy which consists of a large number of identical two-person families that live for two periods.[4] In each family, one person has already migrated to a foreign country at the beginning of the first period. He earns an exogenous income y_m in that foreign country. The other member of the family remains in the home country. She works in the domestic labor market and earns an exogenous income y_r. In the first period, the migrant makes an investment I in his home country[5] and asks the family member at home to take care of this investment.[6] Assume that the investment outcome is subject to uncertainty. For simplicity, there are only two possible outcomes for this investment, either high outcome $I_h = \theta_h I, \theta_h > 1$ with probability p or low outcome $I_l = \theta_l I, 0 < \theta_l < 1$ with probability

[3] Rapoport and Docquier (2005) provide a comprehensive review on the economics of remittances.
[4] This is a simplified assumption that does not affect the model results. The game can be allowed to play repeatedly.
[5] Of course, there is always an option of investing overseas. However, dealing with this option is beyond the scope of this paper.
[6] Unlike the model by Chami *et al.* (2005) where the migrant send remittances home as a pure altruistic transfer, in this current model, the migrant is allowed to invest in his home country from overseas. This is a crucial assumption that makes this paper distinct from other papers in the literature which commonly assume an altruistic motive for remittances.

$(1-p)$. Here, the probability of high investment outcome occurring is dependent on the favorable conditions in the financial market α (such as more investment opportunities or low risks) as well as the effort level e in managing the investment project of the family member at home. Assume $p(\alpha, e)$ is an increasing and concave function of its two arguments, $p'(.) > 0$, $p''(.) < 0$.[7] In the second period, the migrant makes a transfer to the family member at home (from now on this family member is referred to as the recipient). This paper focuses its analysis on two different practical situations: investment state-contingent transfers and fixed transfers.

2.1. State-contingent transfers

It can be imagined as there exists an implicit agreement between the migrant and the recipient, for example, an implicit agreement between a brother and a sister, in which the brother working overseas seeks for helps from his sister at home in managing the investment project and offers her some monetary rewards in return. As the migrant is away, he does not know or observe his sister's effort level directly. However, he can see the outcome of the investment project at the end of the first period which depends on his sister's effort. The migrant is then assumed to tie the monetary rewards to the investment results. If the project is successful, the migrant transfers a large amount of money back home T_h to the recipient. If it is not successful, only a small amount of money T_l is transferred.[8] Both of these amounts are known to the recipient ex ante.

The migrant derives utility from his consumption which is equal to $y_m - I$ in the first period and equal to either $y_m + I_h - T_h$ or $y_m + I_l - T_l$ depending on whether the investment project is successful or not in the second period. His expected utility is:

[7] An example for such a function is $p(e) = A\alpha^{1/2}e^{1/2}$ where $A > 0$ is a constant.
[8] For a simple case, T_l is very much like an altruistic transfer while T_h is business related transfer.

$$E(U_m) = u(y_m - I) + pu(y_m + I_h - T_h) + (1-p)u(y_m + I_l - T_l) + \beta E(U_r) \quad (1)$$

where $0 < \beta < 1$ is the discount factor for his relative utility. Here, the migrant not only cares about the outcome of his investment project at home but is also altruistic towards his sister. As a result, his utility depends on the recipient's utility U_r. The utility function is assumed to be increasing, concave, and twice differentiable $u'(.) > 0,\ u''(.) < 0$. The migrant benefits more if his investment is more profitable so $I_h - T_h > I_l - T_l$. In other words, he extracts more surpluses if the investment is successful.

The recipient also derives utility from consumption. Her expected utility is:

$$E(U_r) = u(y_r) + p(e)u(y_r + T_h) + [1 - p(e)]u(y_r + T_l) - v(e) \quad (2)$$

where $v(e)$ denotes disutility of effort expended on the migrant's investment project and $v'(e) > 0, v"(e) > 0$.

For simplicity of notation, define $u_{mh} \equiv u(y_m + I_h - T_h), u_{ml} \equiv u(y_m + I_l - T_l), u_{rh} \equiv u(y_r + T_h), u_{rl} \equiv u(y_r + T_l)$. Here, $u_{mh} > u_{ml}, u_{rh} > u_{rl}$ but $u'_{mh} < u'_{ml},\ u'_{rh} < u'_{rl}$ according to the assumption on the increasing and concave utility function.

The model can be solved by backward induction. First, the recipient chooses her effort level that maximizes her expected utility given her labor income and the monetary reward contingent on the outcome of the investment project that she manages. The migrant then makes a decision on the investment and the transfer based on the realization of the investment project.

The first order condition for the recipient's choice of effort is:

$$\frac{\partial E(U_r)}{\partial e} = p'(e)[u_{rh} - u_{rl}] - v'(e) = 0 \quad (3)$$

This equation states that the marginal benefit (in utility term) of exerting effort is equal to the marginal disutility of expending that effort level. Solving the equation implicitly delivers $e^* = e(y_r, T_h, T_l)$. This leads to the following proposition.

Proposition 1. $\frac{\partial e^*}{\partial y_r} < 0,\ \frac{\partial e^*}{\partial T_h} > 0,\ \frac{\partial e^*}{\partial T_l} < 0, \frac{\partial e^*}{\partial y_m} = 0.$

Proof. See Appendix.

That is, the recipient's effort decreases with her income. As the monetary rewards are known to both parties ex ante, raising the rewards of high investment outcome or reducing the transfer of low investment outcome would increase the recipient's effort (the business encouraging effect). The commitment of transferring a positive amount when investment outcome is low creates a disincentive for effort since it provides more certainty of income whereas the transfer in high investment outcome case creates more incentives for inducing higher effort. In addition, it can be seen that $\frac{\partial e^*}{\partial y_r} = \frac{\partial e^*}{\partial T_h} + \frac{\partial e^*}{\partial T_l}$ which implies that an increase in the recipient's income is equivalent to an increase in transfers in both states of investment. It costs more for the migrant if he wants the recipient to exert an extra amount of effort. In other words, the disincentive effect exceeds the incentive effect of positive transfers. The recipient's optimal effort is found to be independent from the migrant's income as under this incentive scheme, the recipient is more concerned about how much money she can get from the migrant (the monetary rewards) rather than the migrant's income.

As for the migrant, he chooses the investment level as well as the amounts of transfer to be made, T_h and T_l, that corresponds to the investment project outcomes, I_h and I_l, respectively in order to maximize his expected utility. The first order conditions are:

$$\frac{\partial U_m}{\partial I} = -u'_m + pu'_{mh}\theta_h + (1-p)u'_{ml}\theta_l = 0 \quad (4)$$

$$\frac{\partial E(U_m)}{\partial T_h} = p'(e^*)\frac{\partial e^*}{\partial T_h}[(u_{mh} - u_{ml}) + \beta(u_{rh} - u_{rl})] + p(e^*)(\beta u'_{rh} - u'_{mh}) - \beta v'(e^*)\frac{\partial e^*}{\partial T_h} = 0 \quad (5)$$

$$\frac{\partial E(U_m)}{\partial T_l} = p'(e^*)\frac{\partial e^*}{\partial T_l}[(u_{mh} - u_{ml}) + \beta(u_{rh} - u_{rl})] + [1 - p(e^*)](\beta u'_{rl} - u'_{ml}) - \beta v'(e^*)\frac{\partial e^*}{\partial T_l} = 0 \quad (6)$$

It should be noted that the derivation in equation (4) uses the assumptions that $I_h = \theta_h I$ and $I_l = \theta_l I$. The equation implies that investment is future consumption. At optimal, the utility cost of making investment in the first period is equal to the expected utility gain of that investment in the second period. Solving the equation implicitly delivers the optimal investment level I^*. It would be interesting to examine how a change in financial market conditions, captured by α, or a change in the migrant's income, y_m, would affect this investment level. As a result, the two following propositions are made.

Proposition 2. $\frac{\partial I^*}{\partial \alpha} > 0$ if $\frac{u'_{ml}}{u'_{mh}} < \frac{\theta_h}{\theta_l}$.

Proof. See Appendix.

Here, $\frac{u'_{ml}}{u'_{mh}}$ reflects the marginal rate of change or the cost in terms of utility between two states of investment – profitable and lost. By contrast, $\frac{\theta_h}{\theta_l}$ indicates the premium or the surplus in monetary terms between these two states. The result implies that when the financial market condition becomes more favorable (represented by an increase in α), the migrant will increase his investment back home if the expected monetary gain outweighs the expected utility loss resulting from such an investment increase. However, when the cost is more than the gain, he will very likely cut down the investment level. His investment decision will be indifferent if the expected cost is equal to the expected gain.

The intuition is as follows. An increase in α raises the probability of successful investment as the financial market now becomes healthier, contains lower risks, and provides more investment opportunities. This creates both an income effect and a substitution effect. The income effect tends to induce higher investment as well as higher consumption to the migrant. However, the substitution effect tends to make the migrant to move away from investment and more into consumption. Whether the optimal level of investment is higher or lower with an increase in the level of financial development depends which effect actually dominates the other.

Proposition 3. $\frac{\partial I^*}{\partial y_m} > 0$ if $u''_m < p\theta_h u''_{mh} + (1-p)\theta_l u''_{ml}$.

Proof. See Appendix.

The result signifies the trade-off between current consumption and future consumption in which investment plays a role as the cost to the current consumption but the return to future consumption (in terms of utility). As soon as the loss in marginal utility of current consumption is smaller than the expected gain in marginal utility of future consumption, the migrant will increase the investment level to his home country when his income is higher. This can also be explained on the ground of income effect and substitution effect as what was provided after Proposition 2.

With respect to the migrant's decision on monetary rewards, rearranging equations (5) and (6) gives:

$$\beta \frac{\partial e^*}{\partial T_h}[p'(e^*)(u_{rh} - u_{rl}) - v'(e^*)] + p'(e^*)\frac{\partial e^*}{\partial T_h}(u_{mh} - u_{ml}) + p(e^*)(\beta u'_{rh} - u'_{mh}) = 0 \quad (5')$$

$$\beta \frac{\partial e^*}{\partial T_l}[p'(e^*)(u_{rh} - u_{rl}) - v'(e^*)] + p'(e^*)\frac{\partial e^*}{\partial T_l}(u_{mh} - u_{ml}) + [1 - p(e^*)](\beta u'_{rl} - u'_{ml}) = 0 \quad (6')$$

In both equations, the first term reflects the (indirect) impact of the recipient's choice of effort on the migrant's utility and is equal to zero according to (3). The second term reflects the increase in the migrant's utility due to an extra effort from the recipient. The third term shows the trade-off in terms of utility of consumption between the migrant and the recipient due to additional transfer. Solving (5') implicitly yields $T_h^* = T_h(y_m, y_r, I_h, I_l)$. Similarly, solving (6') implicitly yields $T_l^* = T_l(y_m, y_r, I_h, I_l)$.

Proposition 4. $\frac{\partial T_h^*}{\partial I_h} > 0$, $\frac{\partial T_h^*}{\partial I_l} < 0$, $\frac{\partial T_h^*}{\partial y_m} <$ or > 0, $\frac{\partial T_h^*}{\partial y_r} < 0, \frac{\partial T_h^*}{\partial \beta} > 0$

And $\frac{\partial T_l^*}{\partial I_h} < 0$, $\frac{\partial T_l^*}{\partial I_l} > 0$, $\frac{\partial T_l^*}{\partial y_m} > 0$, $\frac{\partial T_l^*}{\partial y_r} < 0, \frac{\partial T_l^*}{\partial \beta} > 0$.

Proof. See Appendix.

Results obtained indicate that the amount transferred increases with the investment outcome surplus (represented by the difference between I_h and I_l) but does not necessarily increase with the migrant's income. The migrant's reaction to changes in investment outcomes reflect the fact that he intends for remittances to reward the recipient's efforts (the business encouraging effect). Here, remittances are meant to be used mainly for the case of better realization of investment output at which the recipient exerts a higher level of effort. However, the transfers decrease with the recipient's income (the income compensatory effect). This implies that besides providing more incentives for the recipient to expend higher effort (the business related motive), remittances can also be compensatory (the altruistic motive). This argument is further strengthened by the results that the transfers are shown to increase with the migrant's degree of altruism towards the recipient.

2.2. Fixed transfers

By contrast to the first situation just exposed, now assume that the migrant transfers to the recipient a fixed amount of money regardless of the outcome of the investment project. The reason why the migrant does not tie the money rewards to the investment outcome in this case because he knows that the recipient also cares about him (that is why it may not be necessary to have such an incentive scheme as before). The relationship between the migrant and his relative can now be imagined in a most natural way as the one between a son (the migrant) and his parent (the recipient). As a result, there exists mutual (two-sided) altruism between the two individuals.

The expected utility for the migrant is as follows:

$$E(U_m) = u(y_m - I) + pu(y_m + I_h - T) + (1-p)u(y_m + I_l - T) + \beta_m E(U_r) \quad (7)$$

where $0 < \beta_m < 1$ is the discount factor for the migrant which reflects his degree of altruism towards his parent.

The expected utility for the recipient now becomes:

$$E(U_r) = u(y_r) + u(y_r + T) - v(e) + \beta_r E(U_m) \tag{8}$$

where $0 < \beta_r < 1$ denotes the discount factor for the recipient which also reflects her degree of altruism towards her son.

For simplicity of notation, define $u_{mh} \equiv u(y_m + I_h - T), u_{ml} \equiv u(y_m + I_l - T)$. Solving this system of equations gives:

$$E(U_m) = \frac{1}{1-\beta_m\beta_r}[u(y_m - I) + pu_{mh} + (1-p)u_{ml} + \beta_m u(y_r) + \beta_m u(y_r + T) - \beta_m v(e)] \tag{9}$$

$$E(U_r) = \frac{1}{1-\beta_m\beta_r}[u(y_r) + u(y_r + T) - v(e) + \beta_r u(y_m - I) + \beta_r p u_{mh} + \beta_r(1-p)u_{ml}] \tag{10}$$

Again, the model can be solved by backward induction in which the recipient chooses her effort level to maximize her expected utility given the amount of money to be received and her labor income; the migrant chooses his levels of investment and transfer to maximize his expected utility. The first order condition for the recipient's decision on effort level to expend is:

$$\frac{\partial E(U_r)}{\partial e} = \frac{1}{1-\beta_m\beta_r}[-v'(e) + \beta_r p'(e)(u_{mh} - u_{ml})] = 0 \tag{11}$$

The interpretation of this equation is as the following. While expending some extra effort acts as disutility, $-v'(e)$, it raises the recipient's utility by increasing the chance of the migrant getting utility surplus.

Proposition 5. $\frac{\partial e^*}{\partial y_m} < 0$, $\frac{\partial e^*}{\partial y_r} = 0$, $\frac{\partial e^*}{\partial T} > 0$, $\frac{\partial e^*}{\partial \beta_r} > 0$.

Proof. See Appendix.

It can be seen that the impact of changes in incomes of both agents on the recipient's effort are different from the incentive transfer case. The first difference is that the recipient's effort now decreases with the migrant's income. This might be because the marginal increase in the migrant's utility is less than the recipient's disutility from exerting extra effort. The second difference is that the recipient's decision on exerting effort is invariant to her own income. This is because in this case, the recipient cares about the migrant's well-being. A change in her income does not change her altruism towards the migrant.

The conditions also say that an increase in the transfer raises the recipient's effort level because monetary compensation offers her more incentive to exert effort (business encouragement). This effect is the same as in the case of state-contingent transfers. Another interesting result is the recipient will work harder on the investment project if she is more altruistic towards the migrant. This result makes sense as both agents are altruistic to each other.

As for the migrant, his strategic move is to choose the level of investment to be made as well as the amount of remittances to be transferred back home such that his utility is maximized. The first order conditions are given by:

$$\frac{\partial E(u_m)}{\partial I} = \frac{1}{1-\beta_m\beta_r}\left[-u'_m + pu'_{mh}\theta_h + (1-p)u'_{ml}\theta_l\right] = 0 \tag{12}$$

$$\frac{\partial E(U_m)}{\partial T} = \frac{1}{1-\beta_m\beta_r}\left[-pu'_{mh} - (1-p)u'_{ml} + \beta_m u'(y_r + T)\right] = 0 \tag{13}$$

As the condition in equation (12) is similar to that of equation (6), its interpretation follows what is given to equation (6). Therefore, in this case, the migrant is expected to behave exactly the same as in the case of state-contingent transfers in forming his investment decision. His investment responses to a change in the level of financial development and his income level are the same as what discussed under propositions 2 and 3 above.

Equation (13) indicates that the migrant's utility is maximized when the cost (in utility terms) of additional transfer, reflected by the first two terms inside the bracket, is equal to the benefit (in terms of utility) of it which is reflected by the last term inside the bracket. While the utility cost is a direct effect as the migrant's consumption falls, the utility benefit is an indirect effect as the migrant derives utility from the recipient's extra consumption.

Proposition 6. $\frac{\partial T^*}{\partial y_m} > 0,\ \frac{\partial T^*}{\partial y_r} < 0,\ \frac{\partial T^*}{\partial \beta_m} > 0,\ \frac{\partial T^*}{\partial I_h} > 0, \frac{\partial T^*}{\partial I_l} > 0.$

Proof. See Appendix.

That is, similar to the previous case of state-contingent transfers, the migrant's transfer increases with his degree of altruism and the investment outcome surplus but decreases with the recipient's income (due to income compensatory effect). The only difference lies in the result that the transfer increases with the migrant's income while it is not clearly the case under the incentive scheme. The reason is that the migrant is more altruistic towards the recipient in this case so he will send more money home when he earns higher income overseas. Again, the obtained results show that remittances may contain both business encouraging and income compensatory effects.

3. Some implications and further discussions

The above theoretical consideration has been concerned with a model of investment remittances which examines two different practical situations of migrant-recipient relationship. Although the settings of these two cases are different, the results obtained are qualitatively the same. They both point out several important implications regarding the causes and effects of remittances:

(i) The migrant sends more money home when his earnings are higher.

(ii) The recipient tends to receive more income transfer from overseas when her income is lower (income compensatory effect).

(iii) The migrant's decision on the division of income between consumption and investment is driven by intertemporal preferences and information about future investment prospective. More specifically, he will invest more in his home country if the expected gain from such an activity is high enough.

(iv) Remittance transfer increases with successful investment outcomes as monetary rewards to the recipient for taking care of the migrant's investment project at home (business encouraging effect). It also increases with the migrant's degree of altruism towards the recipient.

(v) The recipient tends to exert more managerial effort on the investment project when her income is low, when more financial rewards through remittances are promised in advance (business encouraging effect), or when she is more altruistic towards the migrant.

It can be seen that results in (i) and (ii) are fairly general. They reflect the altruistic motive. The predictions in (iii), (iv), and (v) are consistent with both investment-business hypothesis and the altruistic hypothesis. While the altruistic motive is clear and receives a fair amount of attention in the literature, the business oriented motive is generally new and worth examining further.

So far, the model in the paper has been assuming that the recipient's incentive to exert effort is independent financial development in affecting the probability of success in making investment. The parameter α is meant to capture the favorable financial market condition.[9] If e is unchanged, an increase in α will lead to an increase in $p(\alpha, e)$ as there are more good opportunities for doing business[10] and, hence, the expected returns on investment will be higher. This is an incentive for the migrant to invest in his home country from overseas and it is expected that there will be more remittances devoted to investment.[11] However, one may argue that the increase in α is not totally free of charge as there might be a moral hazard problem involved: the recipient might not exert as much effort as previously (e may be lower). Whether $p(\alpha, e)$ increases or decreases will depend on the relative change in magnitudes of α and e. As a result, the investment outcome and, hence, total investment out of remittances, will also be subject to this relative change. This creates a puzzle on the role of financial market development in extracting investment from remittances. Examining this issue will open an important new research project.

4. Conclusions

This paper has developed a model which allows it to examine the motivation for sending remittances. Remittances are made both due to altruistic and business doing motivations. It is shown that remittances not only compensate the recipients for unfavorable economic conditions but also serve as an important flow of capital as well as monetary rewards for investment managerial efforts. From macroeconomic stance, this creates two opposing effects of remittances in the relationship with home country's income level. While the compensatory

[9] This condition may include any good policy that enhances the likelihood of successful investment such as regulatory policy, macroeconomic conditions, and institutions, etc. These factors are generally correlated with financial development. By financial development this paper refers to the development of the financial sector per se as well as infrastructure that supports that system.

[10] This is one positive aspect of financial development. Other aspects include better insurance against shocks and better diversifying rate of return risks, etc.

[11] One may argue that the lack of financial development leads to high returns to capital for those who can access it and remittances may be sent back to take advantage of business opportunities that local financing is unable to take advantage of. This may be true for some particular cases. However, when the financial system is underdeveloped, there are often high risks associated with these high returns. In the end, on average, the risk adjusted returns may not be as high as they first appear to be.

effect results in a negative relationship with income growth which is consistent with the literature, the business encouraging effect is positive since it stimulates remittances for investment purposes. This is a novel aspect of the paper. This aspect makes remittances a potentially important source of finance for economic development. It highlights the role of financial development in mobilizing investment for productive activities from this source of finance.

The lesson to learn is that in countries where there is an effective financial system in place, the business encouraging effect may dominate the compensatory effect and remittances have a net positive contribution to economic development. Remittances and financial development can be complementary and they may interact to promote growth. Testing this hypothesis will surely enrich the literature. From economic policy point of view, countries should aim to improve the local conditions (i.e. infrastructure, legal framework, etc.) in general and the local financial system in particular. This will attract more remittances from overseas for productive activities and allow recipient countries to optimize the potential benefits of remittances.

Appendix - Mathematical proofs of propositions

In the proofs that follow, conclusions on directions of inequalities are reached based on the standard assumptions made on the utility and probability functions, specifically: $u'(.) > 0, u''(.) < 0; v'(.) > 0, v''(.) < 0$; and $p'(.) > 0, p''(.) < 0$.

Proof of Proposition 1

Using the condition specified in (3), it can be derived as follows:

$$\frac{\partial e^*}{\partial y_r} = \frac{p'(e^*)(u'_{rl} - u'_{rh})}{p''(e^*)(u_{rh} - u_{rl}) - v''(e^*)} < 0$$

$$\frac{\partial e^*}{\partial T_h} = \frac{-p'(e^*)u'_{rh}}{p''(e^*)(u_{rh} - u_{rl}) - v''(e^*)} > 0$$

$$\frac{\partial e^*}{\partial T_l} = \frac{p'(e^*)u'_{rl}}{p''(e^*)(u_{rh} - u_{rl}) - v''(e^*)} < 0$$

$$\frac{\partial e^*}{\partial y_m} = 0$$

Proof of Proposition 2

Differentiating (4) with respect to α and then rearranging gives:

$$\frac{\partial I^*}{\partial \alpha} = \frac{p'(\alpha)(u'_{ml}\theta_l - u'_{mh}\theta_h)}{u''_m + p(\alpha)u''_{mh}\theta_h^2 + [1 - p(\alpha)]u''_{ml}\theta_l^2}$$

Given that the denominator is always negative, the sign of this derivative is determined by the sign of the term $u'_{ml}\theta_l - u'_{mh}\theta_h$ or, by rearranging, the sign of the term $\frac{u'_{ml}}{u'_{mh}} - \frac{\theta_h}{\theta_l}$. Hence, $\frac{\partial I^*}{\partial \alpha} > 0$ if $\frac{u'_{ml}}{u'_{mh}} < \frac{\theta_h}{\theta_l}$.

Proof of Proposition 3

From (4) it can be derived the following:

$$\frac{\partial I^*}{\partial y_m} = \frac{u''_m - p\theta_h u''_{mh} - (1 - p)\theta_l u''_{ml}}{u''_m + p\theta_h^2 u''_{mh} + (1 - p)\theta_l^2 u''_{ml}}$$

As the denominator is negative, the sign of this derivative is dependent on the sign of the terms in the numerator or $u''_m - p\theta_h u''_{mh} - (1-p)\theta_l u''_{ml}$. Therefore, $\frac{\partial I^*}{\partial y_m} > 0$ if $u''_m < p\theta_h u''_{mh} + (1-p)\theta_l u''_{ml}$.

Proof of Proposition 4

Differentiating (5') with respect to I_h and I_l gives:

$$\frac{\partial T_h^*}{\partial I_h} = \frac{p(e^*)u''_{mh} - p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh}}{-p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh} + \beta p(e^*)u''_{rh} + p(e^*)u''_{mh}} > 0$$

$$\frac{\partial T_h^*}{\partial I_l} = \frac{p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{ml}}{-p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh} + \beta p(e^*)u''_{rh} + p(e^*)u''_{mh}} < 0$$

$$\frac{\partial T_h^*}{\partial y_m} = \frac{p(e^*)u''_{mh} - p'(e^*)\frac{\partial e^*}{\partial T_h}(u'_{mh} - u'_{ml})}{-p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh} + \beta p(e^*)u''_{rh} + p(e^*)u''_{mh}} <> 0$$

$$\frac{\partial T_h^*}{\partial y_r} = \frac{-\beta p(e^*)u''_{rh}}{-p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh} + \beta p(e^*)u''_{rh} + p(e^*)u''_{mh}} < 0$$

$$\frac{\partial T_h^*}{\partial \beta} = \frac{-p(e^*)u'_{rh}}{-p'(e^*)\frac{\partial e^*}{\partial T_h}u'_{mh} + \beta p(e^*)u''_{rh} + p(e^*)u''_{mh}} > 0$$

Similarly, differentiating (6') with respect to I_h and I_l gives:

$$\frac{\partial T_l^*}{\partial I_h} = \frac{-p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{mh}}{p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml} + \beta[1-p(e^*)]u''_{rl} + [1-p(e^*)]u''_{ml}} < 0$$

$$\frac{\partial T_l^*}{\partial I_l} = \frac{[1-p(e^*)]u''_{ml} + p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml}}{p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml} + \beta[1-p(e^*)]u''_{rl} + [1-p(e^*)]u''_{ml}} > 0$$

$$\frac{\partial T_l^*}{\partial y_m} = \frac{[1-p(e^*)]u''_{ml} - p'(e^*)\frac{\partial e^*}{\partial T_l}(u'_{mh} - u'_{ml})}{p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml} + \beta[1-p(e^*)]u''_{rl} + [1-p(e^*)]u''_{ml}} > 0$$

$$\frac{\partial T_l^*}{\partial y_r} = \frac{-\beta[1-p(e^*)]u''_{rl}}{p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml} + \beta[1-p(e^*)]u''_{rl} + [1-p(e^*)]u''_{ml}} < 0$$

$$\frac{\partial T_l^*}{\partial \beta} = \frac{-[1-p(e^*)]u'_{rl}}{p'(e^*)\frac{\partial e^*}{\partial T_l}u'_{ml} + \beta[1-p(e^*)]u''_{rl} + [1-p(e^*)]u''_{ml}} > 0$$

Proof of Proposition 5

Using condition (11), the following results can be obtained:

$$\frac{\partial e^*}{\partial y_m} = \frac{\beta_r p'(e^*)(u'_{ml} - u'_{mh})}{-v''(e^*) + \beta_r p''(e^*)(u_{mh} - u_{ml})} < 0$$

$$\frac{\partial e^*}{\partial y_r} = 0$$

$$\frac{\partial e^*}{\partial T} = \frac{\beta_r p'(e^*)(u'_{mh} - u'_{ml})}{-v''(e^*) + \beta_r p''(e^*)(u_{mh} - u_{ml})} > 0$$

$$\frac{\partial e^*}{\partial \beta_r} = \frac{p'(e^*)(u_{ml} - u_{mh})}{-v''(e^*) + \beta_r p''(e^*)(u_{mh} - u_{ml})} > 0$$

Proof of Proposition 6

From (13), it can be derived the following results:

$$\frac{\partial T^*}{\partial y_m} = \frac{pu''_{mh} + (1-p)u''_{ml}}{pu''_{mh} + (1-p)u''_{ml} + \beta_m u''(y_r + T)} > 0$$

$$\frac{\partial T^*}{\partial y_r} = \frac{-\beta_m u''(y_r + T)}{pu''_{mh} + (1-p)u''_{ml} + \beta_m u''(y_r + T)} < 0$$

$$\frac{\partial T^*}{\partial \beta_m} = \frac{-u'(y_r + T)}{pu''_{mh} + (1-p)u''_{ml} + \beta_m u''(y_r + T)} > 0$$

$$\frac{\partial T^*}{\partial I_h} = \frac{pu''_{mh}}{pu''_{mh} + (1-p)u''_{ml} + \beta_m u''(y_r + T)} > 0$$

$$\frac{\partial T^*}{\partial I_h} = \frac{(1-p)u''_{ml}}{pu''_{mh} + (1-p)u''_{ml} + \beta_m u''(y_r + T)} > 0$$

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