Trade liberalization, urban-rural remittances and income inequalities in Senegal: lessons from a CGE analysis.

Antoine Bouët, Elisa Dienesch, Laetitia Leroy

15th Annual Conference on Global Economic Analysis, Geneva, Switzerland, June 2012

Abstract

This paper aims at assessing how domestic urban-rural remittances can mitigate macroeconomic shocks in a developing country. When trade liberalization occurs, it may affect the national income structure and increase regional poverty and many studies underline that private transfers can significantly help households deal with exogenous risk, when similar studies also find evidence of an efficient risk sharing between the poorest households thanks to private cash exchange. We explore this issue by working on Senegal, and to deepen it, we design a single-country computable general equilibrium (CGE) to capture all the redistributive channels implied by domestic transfers in an African economy. This model is then used to simulate macroeconomic shocks liberalization and we show the importance of introducing micro foundations of domestic transfers in a general equilibrium to better capture the effects of trade liberalization on domestic income inequalities. We test the robustness of our results, by using alternative micro founded specifications of domestic transfers.

1 Introduction

> "One of the few uncontroversial insights of trade theory is that changes in a country's exposure to international trade, and world markets more generally, affect the distribution of resources within the country and can generate more substantial distributional conflict" Goldberg and Pavcnik, Journal of Economic Literature, vol XLV, March 2007, pp39

As many developing countries for the last two decades, Senegal faces a progressive trade liberalization that implies prices variations, income variability and even rise income inequalities across sectors and regions. Actually, since 1985, IMF programs led Senegal to adopt liberalization policies, including trade liberalization, which came with a rise of VAT rate, in order to compensate for

the looses of government revenue, linked to the fall of import taxes. The combination of these two elements involves important changes in the allocation of resources, factor remunerations, consumption structure of different households groups, and income inequalities.

At the same time, high fertility rates[1] and population growth can exacerbate poverty and income inequalities linked to a restricted labor market access, in a context of trade liberalization and economic turndown. Especially, Senegal's large share of youth people, 44% of total population in 2011 (World Bank, 2012), faces up mismatch between their skills and the labour market, which is characterized by dichotomy issues between formal and informal sectors in both urban and rural areas. All these factors lead to many waves of migration within a territory, in reaction to the changes in income distribution across the different regions. Consequently to these massive migrations, domestic remittances (but also international remittances when migration is cross-border) become an important source of income for households, especially in rural areas, in which poverty is prominent. We will discuss in-depth these specific issues on poverty, income inequalities among households and the labor market.

Our target in this paper is to assess how domestic remittances, especially across urban and rural areas can effectively mitigate an economic shock. To explore this issue, we design a single-country computable general equilibrium (CGE) to capture all the redistributive channels implied by domestic transfers in an African economy. This model is then used to simulate macroeconomic shocks of liberalization and we show the importance of introducing micro foundations of domestic transfers in a general equilibrium to better capture the effects of trade liberalization on domestic income inequalities. We test the robustness of our results, by using alternative micro founded specifications of domestic transfers.

This is a key issue in the case of a developing country which is gradually opening up to foreign trade. Why? Firstly, because trade liberalization induce a cut in government revenue that is very detrimental, since import duties represent more than 40% of total public revenue (Diagne et al. 2003). Therefore, efficient redistributive policies cannot be financed by the government, and this is especially true since the trade collapse due to the financial crisis of 2007. Domestic and private transfers have an important role to play in this context. Furthermore, but in the same spirit, many studies[2] underline that private transfers can significantly help households deal with exogenous risk.

> "Altruism or mutual "caring" among family members has been hypothesized to play an important role in facilitating risk sharing, particularly in environments with less developed markets". Becker, 1991.

Similar studies also find evidence of an efficient risk sharing between the poorest households thanks to private cash exchange that allow households to

[1] In accordance with World bank database and report, total fertility rate (TFR) fell from 6.6 births per woman in 1986 to 5.3 in 2005 and to 4.9 in 2008–2009, but it is still high among the poorest countries.

[2] Cox 1990, 2002; Cox and Jimenez 1998; and Morduch 1995, Foster and Rosenzweig (2001)

smooth consumption on the face of shocks (Deaton 1997, Townsend 1995, Jalan and Ravallion 1997).

To assess the mitigating impact of remittances on economic shocks we face two significant challenges: the theoretical ambiguity of remittance decision models and the credibility of transfer data:

First, identifying the determinants of remittances is puzzling and controversial within the theoretical literature. Numerous theoretical models have been developed based successively on altruistic motive (Becker 1974, Stark 1985, Cox 1987) or quite the reverse exchange strategy motive (Cox, 1987; Cox, Eser et Jimenez 1998), which is generally the sign of temporary migrations as underlined by Docquier and Rapoport (2006). Other common models rely on strategic game analysis (Stark 1995, Stark and Wang, 2002), insurance strategy, moral hazard (Stark and Levhari, 1982; Rozenzweig, 1988; Lambert, 1994) and mixed motives (Lucas and Stark, 1985; Andreoni, 1989; and Cox and al., 1998). Amongst the models relying on mixed motives, "tempered altruism" and "enlightened self-interest" involve both altruistic considerations and mutual exchange strategies. To deepen these models on transfer motives, Docquier and Rapoport have reviewed the state of art in this field. More recently, Aisa, Andaluz and Larramona (2011) assess the remittances' factors using a family bargaining model and they conclude that family transfers have non-monotonic effects. Facing these many theoretical conceptions, we choose to use alternative micro-founded specifications in our CGE model as a robustness test and then compare the different simulation results further to trade liberalization and variations in world prices.

The second challenge we address is the credibility of transfer data in household surveys. Reliable national data on bilateral remittances is most often not available or inaccurate. This issue is currently pointed out in the literature (Frankel 2012). We follow Ratha and Shaw (2007) who work on improving data accessibility concerning bilateral migrations flows and bilateral remittances, adopting different rules of allocation of aggregated amounts that are available from surveys. A CGE analysis implies to use micro-data levels and for that we decide to adapt the Ratha and Shaw's approach by choosing allocation rules that come from micro-founded models of transfer.

Therefore, we apply a three-step methodology: the first step consists in estimating bilateral transfers among households by using transfers' determinants as an allocation rule, the second step aims at implementing these specific micro-foundations (the same that are used in the first step) in our CGE model, and the third step consists in implementing different scenarios of international shocks and analyze the simulation results in terms of income variation. Applying this three-step method for different microeconomic models in order to test the robustness of our proceeding, we compare the simulation results and describe the nature of transfers in Senegal with attention to their potential for cushioning macroeconomic shocks.

The first section of our study focuses on household data and descriptive analysis of income inequalities in Senegal, then we describe the CGE model that we design for Senegal, focusing on two main features: the geographic and sectorial duality of Senegalese economy (dual-dual economy model) and the mi-

crofoundations of inter-households transfers. Then we simulate external shocks and study the impact on income distribution and conclude.

2 Poverty, income distribution and remittances in Senegal: a descriptive analysis from household data

Our study is based on three household surveys ESAM I, ESAM II and ESPS, for respectively the years 1997, 2002 and 2007. Furthermore, our model is calibrated on a social accounting matrix (Fall, 2011), which includes 30 private sectors and one public sector. So, we have at our disposal, in one hand, macroeconomic and sectorial information about productions, consumptions, incomes, taxes or other inter-agents transfers and, in the other hand, microeconomic information which give us detailed features about Senegalese households, in terms of income, education levels, occupation, consumption levels by products and inter-agents transfers. Thus we disaggregate the traditional representative household into various categories, with respect to individual heterogeneity. This allows us to assess income distribution effects in our simulations results. We present in this section available data, the manipulations we've done and finally we present some descriptive statistics on the main economic stylized facts of Senegal.

2.1 Household microdata

2.1.1 Estimating bilateral amount of transfers

One challenge we face is the poor availability and quality data on remittances, that is an important issue widely underlined in the literature (Ratha and Shaw 2007; Jimenez-Martin, Jorgensen and Labeaga 2007; Frankel 2012). Actually, information we have at our disposal is total amounts of transfers versed and received by each household, with details on the origin or destination. Thus we need to disaggregate those total amounts in order to construct a bilateral matrix of transfers. For that, we choose to stay in the same spirit of Ratha and Shaw (2007) who derive "bilateral remittance flows indirectly using bilateral migrant stock data and estimates and assumptions about the remittance behavior of migrants". The authors use in turn three different allocation rules, namely weights based on migrant stocks abroad, on migrant incomes (proxied by a share of GDP per capita at a macro level), and bidirectional incomes of the migrants and the recipients in the home country.

Conversely, our study is done at a micro-level data so our choices in terms of allocation rules are quietly different, but in the same line. Actually, instead of using macro stylized facts, we base our analysis on specific theoretical models that offer optimal transfer specifications, coming from the migrant's maximizing behavior, which answers to different motives. The theoretical models we choose to allocate total remittances will be described in section 3.2 and will be used to implement an optimal function of transfers in our CGE model. So, in

brief, micro-foundations allow us to both estimate bilateral inter-household remittances and evaluate the cushioning role of these transfers in case of external shock.

2.1.2 Total expenditure structure and total disposable incomes

[Descriptive table 1]
[Descriptive table 2]
...

2.2 Poverty and income inequalities: a descriptive analysis

Descriptions and comments to be drafted.
...

3 A CGE-simulation approach

Our target is to design a single computable general equilibrium that is the most relevant as possible to model an African economy such as Senegal can be. In this perspective, we base the framework of our model on the previous works of Rodrick (1997) and Stifel and Thorbecke (2003) who built a CGE framework for an archetype African economy, called "Dual-Dual CGE model".

On this basis, we design and adapt our model to implement baseline scenarios of trade liberalization. After what, we introduce different micro-foundations of transfers in order to assess the impact of domestic transfers on the income distribution after an external shock on prices and check the robustness of our results.

3.1 A dual-dual economy model

The dual-economy models of Lewis (1954) and Fei and Ranis (1964) are pertinent frameworks to build a model adapted to Senegal. The central concept of these models is the modeling of sectorial dualism, inherent in developing countries. But actually, as underlined by Stifel and Thorbecke (2003), two main features can help to conceive the idea of dualism: first, the existence of strong inequalities between rural and urban regions, in terms of localization of the activities and in second place the dichotomy between traditional technologies, in which most of firms are family-owned and modern technologies hold by more complex organizations. This double dichotomy between sectors, thus underlined, leads to classify sectors into four categories: in one hand, rural sectors that can be divided into formal (exporting agriculture, with capital-intensive technology) and informal sectors (subsistence agriculture), and urban sectors, formal (mainly manufacturing) or informal (services) in the other. In reference

to this double-dichotomy, Thorbecke called this kind of models "dual-dual economy". Contrary to the dual-economy models, these new developments introduce a geographical component of analysis, where both urban and rural areas know situations in which informal sectors emerge to absorb the residual labor force, unemployed in the formal sector. This geographical dimension allows improving our understanding of poverty, migrations and the motivations to remit and above all, it provides a rich model in which distributional effects of trade policies can be better explained.

Is this description is relevant in case of Senegal?

Senegal, as many other African countries, presents significant informal jobs, both in the agriculture and in the urban sectors. Subsistence agriculture and especially fishing is an archetype example of what is an informal sector, labor-intensive production, employing in the majority, unskilled workers. In urban areas, services are widely informal sectors, unlike manufactures which are capital-intensive production processes.

[descriptive figure]

Thus, on the basis of the dual-dual economic model from Stifel and Thorbecke (2003), we build a single computable general equilibrium in which the economic dichotomy is determinant to the construction of the labor market. The next sub-section presents the production framework and the labor market.

3.1.1 Production and the labor market

In our model, domestic production of sector i (xd_i) is decomposed into value-added (va_i) and intermediate consumptions (ci_i), following a Leontief function. The value-added is produced using a composite factor of mobile inputs (capital K, skilled L_S and unskilled labor L_U) and specific inputs (land) that are expressed following a CES function. Finally, at a third stage, another CES function reflects the combination of mobiles factors. This specification of the production allows specifying different degrees of substitutability at each stage. This domestic production is then exported or sold to the domestic market according to a CET function. We need to precise that the public agent does not produce public good following the same scheme, since production is a Leontief function of intermediate consumption, labor and capital. Appendix A provides schematic representations of the different production processes. Now, in the following, we describe the labor market which is very specific to developing countries, reflecting the duality of their economy.

There are two kinds of labor: skilled and unskilled workers. If the unskilled workers are perfectly mobile between formal and informal sectors both in urban and rural areas, the skilled workers are only employed in the formal sectors. This means that production function of informal sectors does not contain units of skilled workers and only combine unskilled jobs and capital. Considering some stylized facts, we pick up important features that need to be modeled. First, concerning the unskilled workers (annotated by index "U" ("S" for the skilled ones), wages in the informal sectors are lower than wages in the formal

one, such as

$$w_U^i < w_U^f,$$

where exponent "i" denotes informal sectors whereas "f" denotes formal ones. Further explanations can be advanced: presence of a minimum wage in formal sectors that implies a rise of all wages, or presence of transaction costs which can be considered as a social cost to move from informal to formal sectors, which is compensated by a financial retribution. Besides, productivity per worker is higher in the formal sector, benefiting from capital-intensive process of production. Furthermore, as Harris and Todaro (1967) have underlined, there is a wage premia in the urban formal sector compared to the rural sector. So, finally, wages in formal sectors are always higher than in informal sectors, and urban wages usually exceed rural wages. Following that statement, we should observe that most workers are employed in rural sectors in the case of Senegal.

Because unskilled and skilled workers are not substitutable, our model contains two distinct labor markets, following the level of education. Here it is important to notice that the supply of skills is exogenous in the economy

$$\overline{L} = \overline{L}_U + \overline{L}_S.$$

Next, we describe the equations defining both supplies and demands of different kinds of labor in each sector, and equilibrium wages.

Wages of unskilled workers in informal sectors (both in urban and rural areas) are defined as the weighted average of the labor product, returns perceived by each hired unskilled worker, expressed as follows

$$w_u^{i,r} = \frac{pp^{i,r} xd^{i,r} \beta_{L_U}}{L_u^{i,r}},$$

where β_{L_U} is the supply elasticity with respect to unskilled labor. So at equilibrium, unskilled rural labor allocate itself with respect to the following condition

$$w_u^{f,r} = w_u^{i,r}(1+\delta),$$

where δ is the transaction cost implied by migration from informal sector to the formal one, in rural area. Taking a job in rural export sector induces psychological and financial costs that are representing as a financial compensation, which justifies that $w_u^{f,r} > w_u^{i,r}$. In urban sector, workers are also paid for their marginal revenue product. In addition, if they are employed in formal urban sector, they receive a share of the firm's profits, justifying also that $w_u^{f,u} > w_u^{i,u}$, in reference to the observed wage premium. The urban formal sector adopts efficiency wages to prompt intensive effort, so the equilibrium condition in the urban area, between formal and informal activities is written as following:

$$\begin{aligned} w_u^{f,u} &= w_u^{i,u} + \gamma \frac{\Pi}{L_u^{f,u}} \\ & \quad where \\ w_u^{i,u} &= \frac{pp^{i,u} xd^{i,u} \beta_{L_U}}{L_u^{i,u}}. \end{aligned}$$

Now that we have described the equilibrium conditions which allocate the unskilled labor force between formal and informal in each localization, we need a condition that defines migration of these unskilled workers between urban and rural activities, so to define $L_u^{\cdot u}$ and $L_u^{\cdot r}$. In the same spirit of Harris and Todaro (1967) and Stifel and Thorbecke (2003), we model the urban-rural wage gap such that unskilled workers move towards urban areas until the rural wage is equal to the expected wage in the urban sector. We precise that each worker who cannot obtain a job in the urban formal sector is likely to work in the informal one until he reaches his objective to be hired in the formal importing sector in the next period. This equilibrium condition is expressed by

$$w_U^{f,r} = \left(1 - \frac{hL_U^{f,u}}{L_U^{f,u} + L_U^{i,u}}\right) w_u^{u,i} + \left(\frac{hL_U^{f,u}}{L_U^{f,u} + L_U^{i,u}}\right) w_U^{f,u},$$

where $\frac{hL_U^{f,u}}{L_U^{f,u}+L_U^{i,u}}$ is the probability of being hired in the formal, urban sector, which is in fact, the share of the urban uneducated labor force in that sector multiplied by a scale parameter. This equilibrium condition defines the proportion of unskilled workers who moves to urban areas $L_U^{\cdot u}$, so implicitly we can write

$$L_U^{\cdot r} = \overline{L}_U - L_U^{\cdot u},$$

that defines the supply of unskilled labor in the rural areas.

Now turning to the skilled labor force, which is only employed in formal sectors, we need to explain the wage differential between urban and rural skilled jobs, $w_S^u > w_S^r$. As many studies have underlined, this inequality is often explained by the presence of union labor forces in the urban sectors only. The specification used is the one proposed by Booth (1995), namely the monopoly union labor which is powerful and thus fixes the urban wage for skilled workers, by maximizing its utility function:

$$\begin{array}{l} \underset{w_S}{MaxU(w_S, L_S)} \\ s.t. \quad L_S = L_S(w_S) \ . \end{array}$$

The labor union gives the same importance to the present skilled labor force, hired in the urban sector, than to the potential labor force currently hired in the rural sector. Thus there is an alternative wage, namely, in rural area. Knowing this, the utility function to maximize is expressed by the following equation

$$\begin{array}{rcl} U\left(w_S^u\right) & = & \left[L_S^u\left(w_S^u\right)\right] u\left(w_S^u\right) + \left[L_S - L_S^u\left(w_S^u\right)\right] u\left(w_S^r\right) \\ & & where \\ u\left(w_S\right) & = & \dfrac{w_S^{1-\theta}}{1-\theta}, \end{array}$$

where θ is a preferential parameter, reflecting a present preference. This specification, reported in Stifel and Thorbecke (2003), comes from the three main hypothesis of skilled job market: the perfect inelastic substitutability between

skilled and unskilled, the full employment of skilled workers and the distinctive feature of these skilled workers, only hired in formal sectors. Finally, the equilibrium condition of urban-rural skilled labor force resulting from this maximizing problem, is

$$w_s^{u,f} = \left[\frac{1 - \beta_{Lu}^{u,f}}{(1-\theta)\,\beta_{Ls}^{u,f} + \theta\left(1 - \beta_{Ls}^{u,f}\right)} \right] w_s^{r,f},$$

that defines the variable L_S^u, thus we only need one more equation to define L_S^r, assuming the absence of unemployment

$$L_S^r = \overline{L}_S - L_S^u.$$

Finally, at the equilibrium, all wages are ascertained by the equalizing of labor supplies and labor demands, on each labor market. Demands of labors follow from profit maximizing in each sector of the economy.

3.1.2 Consumption, income and savings

Using household surveys in different years, namely 1996 (ESAM1), 2002 (ESAM2) and 2005 (ESPS), we disaggregate the representative household into various representative agents, with respect to individual characteristics: milieu (urban/rural), source of incomes, level of education, occupation, ethnic group affiliation. Each consumer maximizes its utility function, a combination of a private consumption and a public good (Cobb-Douglas function)

$$U(C_{pri}, C_{pub}) = C_{pri}^{\alpha} C_{pub}^{\beta}.$$

The private consumption is then divided into an agricultural composite product and a non agricultural composite, linked by a CES function

$$C_{pri} = ac \left[C_{ag}^{-\sigma_c} + \sum_{i \in inag} \left(dt_i^{-\sigma_c} \right) \right]^{-\frac{1}{\sigma_c}}.$$

This specification allows us to specify different degrees of substitutability between goods, for example between two agricultural products, that are more substitutable.

We then adapt this utility function in order to implement microfoundations of transfers, meaning that migrant's utility depends on his own utility, as expressed right above, and on the recipient's utility, depending on the theoretical model chosen. The object of the next sub-section describes how we determine optimal transfers and implement them in our CGE model.

3.2 Domestic transfers: introduction of microfoundations

This section is devoted to the description of micro-founded models of family transfers, which are alternately implemented in our CGE model, in order to

better capture the redistributive effects after an external shock. Our aim is not to be exhaustive, by reviewing all the rich literature on the subject, but to choose some theoretical forms to test the robustness of our simulation results. We first consider transfers as a result of an altruistic behavior. We dedicate the next sub-section to this important framework.

3.2.1 Altruistic motive and optimal transfer

We study altruism motive using a model from Stark (1995, chapter 1) assuming both mutual and unilateral altruism. Each agent's utility is affected by the satisfaction derived from his own consumption and by the utility of the other. The amount of remittances made with altruistic motives are positively correlated with migrant's income and degree of altruism, but negatively correlated with the recipient's income (Stark, 1995). Actually, the form of the consumer utility function is

$$U^m(C^m, C^h) = (1 - \beta^m)V^m + \beta^m U^h,$$

where β^m is a parameter reflecting the degree of altruism of a migrant, for whom utility depends on its own indirect utility getting from its personal consumption, but also depends on the household' utility, namely the recipient of transfers. Maximizing the total indirect utility function for T^*, the amount of remittances, Stark (1995) gives us an expression of optimal transfer, which is function of personal and recipient incomes:

$$T^* = \max(\gamma^m Y^m - (1 - \gamma^m)Y^h, 0),$$

where γ^m is an expression combining the altruistic parameters of both family members (assuming bilateral altruism) or at least function of β^m, in case of unilateral altruism. The remitted amount depends positively of the migrant' income and his altruism degree and negatively of the recipient' income. In the same spirit, Laferrère and Wolff (2006) give an alternative specification of unilateral altruistic utility function and the optimal transfer that follows:

$$\begin{aligned} U^m\left(C^m, V\left(C^h\right)\right) &= \ln(C^m) + \beta^m \ln(C^h) \\ T^* &= \max(0, \frac{\beta^m}{1+\beta^m} Y^m - \frac{1}{1+\beta^m} Y^h), \\ with \quad \beta^m &< 1 \end{aligned}$$

this expression is very clear: transfer is a positive function of altruism parameter, migrant's income and it is negatively linked to the recipient income. So one-side or two-side altruism? Many studies have gone though this issue, looking especially at the collateral effects or externalities due to bilateral altruistic behavior. Indeed, it seems that the introduction of bilateral transfers causes puzzle results in terms of welfare, both individual and family welfare, meaning that some negative externalities come to cancel the expected effects of this behavior. In the literature, the main explanation given refers to recursiveness, that Becker (1974) called 'infinite regress' and Kimball (1987) called 'Hall of

Mirros effects'. To be more precise, this explanation consists in taking into consideration the fact that decisions followed from migrants' preferences are altered by the reaction of the household, which depends to its own preferences, what is to say that individual preferences are linked to each other and can lead to a possible conflict into the household.

3.2.2 Strategic Motive and optimal transfers

Lucas and Stark (1985) go further in the analysis of altruistic behavior as a motivation to remit. In their study conducted in Botswana, they found evidence that altruism can not entirely explain remittances. They reject the hypothesis of a "pure altruism", and introduce the concept of "enlightened-selfishness" which takes into account various components: altruism, repayment-of-loan, insurance, inheritance and exchange of services.

Following that, the model developed by Stark (1995, chapter 4) defines remittances as a result of a "strategic" motive and is specific to the context of migration. In this model that we will focus on, potential migrants are heterogeneous in skills and individual productivity is not perfectly observable in the host region labor market. Thus, workers are paid the average productivity of their migrant group. This leads to a positive migrant self-selection behavior and cooperative arrangement. Skilled workers decision to remit incorporates a desire to limit migration of less skilled workers to prevent lower skilled migrants' income affects in the host region. We can apply this model in the case of Senegal as this strategic motive model matches our theoretical framework which is designed for representing the dichotomy between skilled/unskilled workers in formal/informal sectors in each region.

As reported by Rapoport and Docquier (2006), the model of Stark (chapter 4, 1995) presents two kinds of workers m and h, who have different level of skills, assuming that m's productivity is higher. More precisely, Stark assumes that h's productivity level is expressed as a proportion π of the productivity level of m, where $0 < \pi < 1$.

Both kind of workers can migrate in this model, meaning that unskilled and skilled workers can move towards urban areas, matching the dual-dual model. To simplify, we copy-out the payoff matrix from Rapoport and Docquier (2006), that reports the different gains of m and h if they decide to migrate or not:

	Player h	
Player m	Migrate	Not migrate
Migrate	$\left(\frac{1+\pi}{2}Y^m, \frac{1+\pi}{2}Y^m\right)$	$\left(Y^m, Y^h\right)$
Not migrate	$\left(\frac{Y^h}{\pi}, \pi Y^m\right)$	$\left(\frac{Y^h}{\pi}, Y^h\right)$

Following this payoff matrix, the Nash equilibrium is reached when both skilled and unskilled workers migrate, only if the expected gain is higher than the one in the sector and region of origin. Thus, strategic remittances will be

observed only if the following conditions are respected:

$$\begin{aligned} Y^m - T &\geq \frac{1+\pi}{2} Y^m \\ Y^h + T &\geq \frac{1+\pi}{2} Y^m. \end{aligned}$$

Finally, the minimal optimal transfer is the following:

$$T^* = \frac{(1+\pi)}{2} Y^m - Y^h,$$

where π is a parameter reflecting the migrant's productivity. We can notice here that incomes are expressed net of migration costs.

[...]

4 Simulation results and policy implications

We simulate progressive and full trade liberalization and assess the impact of price variations on households' income inequalities and welfare. We especially focus on the potential role of micro-founded transfers after this exogenous shock by comparing the simulation results with a baseline scenario with exogenous inter-household transfers.

To check the robustness of our conclusions, we compare the different simulation in the eyes of alternative micro-founded transfers' specification.

Comments to be drafted

5 References

- Andreoni, J. 1989. Giving with impure altruism: Applications to charity and Ricardian equivalence, Journal of Political Economy, 97, 6: 1447-58.

- Aisa R., Andaluz J. Larramona G. 2011 How does bargaining power affect remittances, Economic Modelling 28(1-2) pp 47-54

- Becker, G.S. 1974. A Theory of Social Interactions, Journal of Political Economy, University of Chicago Press, vol. 82(6), pages 1063-93, Nov.-Dec.

- Booth, A. (1995). The economics of the trade union. Cambridge: Cambridge University Press.

- Cox, D., 1987. Motives for Private Income Transfers, Journal of Political Economy, University of Chicago Press, vol. 95(3), pages 508-46, June

- Cox, D., Rank M.1992. Inter-vivos transfers and intergenerational exchange, the review of economics and statistics 74(2) 305-314

- Cox, D., 2002. Private inter-household transfers in Vietnam in the early and late 1990s, Policy Research Working Paper Series 2853, The World Bank.

- Cox, D. Hansen, B.E ,Jimenez, E. 2004. How responsive are private transfers to income? Evidence from a laissez-faire economy, Journal of Public Economics, Elsevier, vol. 88(9-10), pp 2193-2219

- Cox D., Jimenez E. 1997 Risk Sharing and Private Transfers: What about Urban Households? World Bank

- Cox, D., Eser, Z., Jimenez, E. 1997. Motives for private transfers over the life cycle: an analytical framework and evidence for Peru

- Deaton, A., 1997. The Analysis of Household Surveys. John Hopkins University Press

-Diagne A., Cabral J-F, Cisse F., Dansokho M., Ba,S. 2007. Politiques commerciales, intégration régionale, pauvreté et distribution de revenus au Sénégal/Trade Policies, Regional Integration, Poverty and Income Distribution in Senegal, Cahiers de recherche MPIA 2007-15, PEP-MPIA.

- FALL C.S. 2011. Une matrice de comptabilité sociale (MCS) du Sénégal pour l'année 2006. Working paper CATT N°8

- Fei, J. C. H., & Ranis, G. (1964). Development of the labor surplus economy. Homewood.

- Foster A., Rosenzweig M. 2001. Imperfect Commitment, Altruism and the family: Evidence from transfer behavior in low-income rural areas, Review of economics and statistics 83(3) 289-407

- Frankel, J. 2012 Are bilateral remittances countercyclical, Open Economies review

- Goldberg P.K., Pavcnik, N. 2007. Distributional Effects of Globalization in Developing Countries, Journal of Economic Literature, American Economic Association, vol. 45(1), pages 39-82, March.

- Jimenez-Martin S., Jorgensen N., Labeaga J. 2007. The volume and geography of remittances from the EU, WP

- Kimball, M.S., 1987. Making sense of two-sided altruism. J. Monetary Econ. 20, 301–326. Lucas, R.E.B., Stark, O., 1985. Motivations to remit: evidence from Botswana. J. Political Econ. 93, 901–918.

- Laferrère A., Wolff F-C. 2006. Microeconomic models of family transfers. Chapter 13, Handbook of the economics of giving, altruism and reciprocity, vol 2.

- Lambert, S. (1994): La migration comme instrument de diversification intrafamiliale des risques. Application au cas de la Cote d'Ivoire, Revue d'Economie du Développement, 0, 2: 3-38.

- Lewis,W. (1954). Economic development with unlimited supplies of labor. The Manchester School of Economic and Social Studies, 22, 139–191. (Reprinted in The economics of underdevelopment,by A. Agarwala & S. Singh, Eds., 1971, New York: Oxford University Press.)

- Morduch, J. 1995. "Income Smoothing and Consumption Smoothing," Journal of Economic Perspectives, American Economic Association, vol. 9(3), pp 103-14

- Rapoport H., Docquier F. The Economics of Migrants' remittances. 2005

- Ratha D., Shaw W. 2007; South-South Migration and remittances, World Bank Worling paper N°102

- Rodrik, D. (1997,May24–29). Why is trade reform so difficult in Africa? Paper presented at the African Economic Research Consortium meetings, Nairobi, Kenya.

- Rosenzweig,M.R.,Wolpin, K.I. (1993). "Intergenerational support and the life-cycle incomes of young men and their parents: Human capital investments, coresidence, and intergenerational financial transfers". Jour- nal of Labor Economics 11, 84–112.

- Stark, O. (1995): Altruism and Beyond, Oxford and Cambridge: Basil Blackwell.

- Stark, O. and D. Levhari (1982): On migration and risk in LDCs, Economic Development and Cultural Change, 31: 191-6.

- Stark, O., Zhang, J. (2002). "Counter-compensatory inter vivos transfers and parental altruism: Compatibility or orthogonality". Journal of Economic Behavior and Organization 47, 19–25.

- Stifel, D., Thorbecke, E. 2003. A dual-dual CGE model of an archetype african economy, Journal of policy modeling, 25.207-235

- Townsend, R. M, 1994. Risk and insurance in Village india. Econometrica 62(3) 539-591