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The Impact of domestic remittances on Households' Income Distribution in a context of Global Food Crisis

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Very preliminary draft

Abstract

This paper aims to assess how internal urban-rural remittances can soften macroeconomics shocks in a developing country. This question is of particular interest given the recent food prices crisis between 2007 and 2008 and this paper is particularly interested in evaluating if internal remittances can alleviate income inequalities linked to agricultural prices variation. This study has two objectives: to design a computable general equilibrium model introducing micro-founded internal transfers in order to capture all the redistributive channels and, as a result, to measure the potential impact of these internal transfers. We choose to focus on Senegal and we build an original single-country CGE model that reproduce public redistribution policy and internal transfers, both calibrated on a recent social accounting matrix dated from 2006. We base our work on three important Senegalese households' surveys: ESAM I (1995), ESAM II (2002) and ESPS (2005) which provide specific data on disaggregated households, such as spending and income structures, internal transfers and some data on migration. Using all data available, this original model is supposed to recreate all theoretical mechanisms of redistribution, like public transfers as well as private transfers and their interactions.

Key Words: CGE model, urban-rural remittances, household analysis
Code JEL: R2, C68

1 Introduction

This paper evaluates the impact of households' transfers on internal inequalities in a context of world prices variations. Actually, in the perspective of trade liberalization, world prices will be automatically affected, especially in agriculture where prices volatility is a known fact. Thus, in urban regions, the consumer would benefit from a cost of living decrease, while rural households would suffer from a drop of their net income. In developing countries, where

institutional environment do not allow an efficient internal income redistribution, inter-households transfers are an important source of redistribution and thus they permit to cushion shocks on world prices.

As underlined by Cox (1990, 2002), Cox and Jimenez (1998) and Morduch (1995), private transfers can significantly help households to deal with exogenous risk and similar studies find evidence of an efficient risk sharing between the poorest households thanks to private cash exchanges (Deaton 1997, Townsend 1995, Jalan and Ravallion 1997). Developing countries are actually affected by credit and insurance market failures, thus private transfers can remediate institutional weaknesses and protect individuals of from a fall in income. Stark and Levhari (1982) Rozenzweig (1988), Lambert (1994) qualify private transfers as a mean of risk pooling.

As the previous global food crisis has strongly affected developing countries by increasing the cost of living, especially in urban areas, we then implement a scenario that reproduces the conditions of this food crisis, in order to see how the households' income distribution is affected.

We choose to focus on Senegal using a single-country computable general equilibrium calibrated on a recent social accounting matrix, dated from 2005. We base this work on three important Senegalese households' surveys: ESAM I, ESAM II and ESPS which provide us specific data on disaggregated households, such as spending and income structures, internal transfers and some data on migration. On this basis, we introduce in our model some theoretical foundations of urban-rural transfers.

2 Intra-households transfers: a state of Art

2.1 Altruism or self interest

For the last two decades, large improvements have been made to the economic analysis of remittances with new approaches.

From a microecomic perspective, the role of information and social interactions has been first highlighted to explain transfer behavior, and altruism appears to be one of the most common motivation to remit. Becker (1974) introduces social interactions (including altruism) into the framework of theoretical economics. Since then, altruistic behavior in the microeconomics analysis of remittances can be defined as follows: migrant's utility depends not only on its own level of consumption but also on the value (and therefore the level of consumption) of the people they care about (family, friends, and members of a larger kinship and social circles). This "unilateral altruism" has to be differenciated from "mutual altruism" (or bilateral), in which migrant's family also remit to increase its utility. According to that, we can easily define the probability to remit as a function of migrant's income, its altruism level, and household's income.

Lucas and Stark(1985) extend the analysis of altruistic behavior as a motivation to remit. Rejecting the hypothesis of "pure altruism", they introduce

the concept of "enlightened-selfishness" which take into account an altruistic component, a repayment-of-loan component, an insurance component, an inheritance component, and an exchange of services.

This last component has been further developped by Cox (1987) Cox, Eiser et Jimenez (1998) and Rapoport et Docquier (2006). Their studies show that sending remittances allow the migrant to "buy" various type of services such as taking care of its assets (land, cattle) or relatives (children, elderly parents) at home. Research done by Lucas and Stark (1985), Bernheim, Shleifer and Summers (1985) and Cox (1987) focus on private intergenerational transfers of income, wealth, and in-kind services and find that they are motivated, at least in part, by exchange considerations and thus, motivated partly by self-interest. Cox(1987) shows a positive relationship between parent-to-child transfers and child's income: the highest is this income, the more its marginal utility of consumption decreases and therefore, the more its requires remittances to offset the cost of service given to its parents. This relationship ultimately depends on the bargaining power of both parties. A higher income of the recipient or an increase in public transfers tend to increase its bargaining power, which may require a higher amount of transfers from the migrant for the same level of service.

2.2 Insurance markets weaknesses and private transfers

Remittances sending by the migrant also respond to shocks its relatives left behind might have experienced (inclement weather, insufficient agricultural harvest).

Developing countries are particularly affected by their income volatility, which is strongly correlated with their dependence to agricultural production and failures in risk pooling strategy. In absence of credit market and insurance, poor countries are more vulnerable to prices and income volatility. Migration and Financial transfers can thus be used as a risk pooling strategy. Some studies focus on migration as a family agreement (implicit contracts) to send some members to urban areas or abroad in order to pool the riskagricultural and eligible for re-allocation of resources potential (Stark and Levhari,1982 Rozenzweig, 1988, Lambert 1994).

2.3 Family arrangement and Bargaining power

Aisa, and Larramona Andaluz (2011) define transfers as a result of a negotiation between the migrant and its family. They highlight the key role play by the bargaining power in the amount of remittances sent by the migrant to its family. This theory has been already developed by Cox and al. (1998) which introduces the concept of bargaining power between generations, defining as a "Threat Point" such as a divorce (Manser and Brown, 1980; McElroy and Horney, 1981) or a breach of family contract. The definition of the threat point determines the intra-family allocation in the bargaining process.

Authors adopt a Nash-bargaining solution to define equilibrium in their model . In that way, transfers maximizing utility are Pareto-efficient.

3 Household-focused General Equilibrium Modeling

3.1 The general model framework

For our study, we design an original single computable general equilibrium and use a new SAM constructed on the basis of 2005 data.

3.1.1 The production

First of all, we differenciate market and non market sectors to introduce a public agent, which produces non-markets goods services. Firms are supposed to operate in a perfectly competitive environment. Production technology is defined as a Leontieff function (fixed coefficient) of value added and intermediate consumptions.

$$Xd_i.io_i = ci_i \tag{1}$$

where Xd_i is the total domestic production, io_i the share of intermediate consumption and ci_i the total intermediate consumption in the production of sector i.

$$Xd_i.v_i = va_i \tag{2}$$

where v_i is the share of added value in the total domestic production.

The input-output coefficient between sectors are determined by calibration to the SAM.

At the second level, each sector 's value added employ composite labor and composite capital, following a constant elasticity of substitution (CES) specification.

$$\frac{fdl_i}{mob_i} = \left(xwf_i, \frac{wm_i}{wl}\right)^{\sigma F_i} \tag{3}$$

$$\frac{fdk_i}{mob_i} = \left(xrf_i, \frac{wm_i}{wk}\right)^{\sigma F_i} \tag{4}$$

$$wm_i.mob_i = wl.fdl_i + wk.fdk_i \tag{5}$$

This model also introduces substituability between a specific and a composite of mobile factor. This specification allows us to specify different degrees of specialization between mobile factors and mobile- specific factors. Thus, we suppose a stronger substituability between mobile factors than specific and mobile factors. Furthermore, it is important to underline that agricultural sectors are more concerned by a lower interchangeability between labor and capital.

$$\frac{mob_i}{va_i} = \left(xmv_i, \frac{pva_i}{wm_i}\right)^{\sigma v_i} \tag{6}$$

$$\frac{fsp0_i}{va_i} = \left(xsv_i, \frac{pva_i}{ws_i}\right)^{\sigma v_i} \tag{7}$$

$$pva_i.va_i = wm_i.mob_i + ws_i.fsp0_i \tag{8}$$

$$mob_i = va_i \tag{9}$$

$$pva_i = wm_i \tag{10}$$

The governement is a productor of non-market goods,[1]. In the model, there is one composite public good (which include education, administration activities, health spends and other activities financed by public budget). We suppose that the governement use a Leontieff technology, which means that the structure of its inputs (Labor, Capital and intermediate consumption) do not change. The state employ the same proportion of civil servant every year:

$$X_{pub}.ak = fdk_{pub} \tag{11}$$

$$X_{pub}.al = fdl_{pu} \tag{12}$$

$$X_{pub}.io_{pub} = \sum_j cij_{pub,j} \tag{13}$$

3.1.2 Final demand

Each household maximises a utility function over public and private goods. By definition, the consumption of public good is exogeneous and the consumer cannot choose the quantity consumed. Each individual consumes the same quantity of public good. Private consumption is a CES function of agricultural (composite good) and non agricultural products. The budget constraint is expressed in function of private prices indexes. So the public good is free for the consumer

$$U_h(Cpub, Cpri) = Cpub + Cpri \tag{14}$$

where *cpub* is a composite good of public services, produced by the government, $Cpri$ the total consumption of private goods (produced or imported).

The second level represents the CES function between agricultural and non agricultural goods, with cpag a composite good. The demand function after maximizing the utility function can be expressed as follows:

$$\frac{cpag}{ct} = \left(xagn.\frac{pindex}{pindexag}\right)^{\alpha} \tag{15}$$

$$\frac{dt_i}{ct} = \left(xnagn.\frac{pindex}{pcf_i}\right)^{\alpha} \tag{16}$$

$$pindex.ct = pindexag.cpag + \sum_i pcf_i.dt_i \tag{17}$$

for i non agricultural sectors.

[1] which are defined as a non exclusive and non depletable, thus households consume the same quantity of public goods, whatever are their preferences.

3.1.3 Income and savings

Public Income

$$taxim = q0. \sum_i tm_i.m_i.pwm_i \tag{18}$$

$$rgov = taxim + \sum_i (TI_i) + ID_h + ID_f + Tr_{\text{row},g} + \delta_g^* \sum_i (w_k.FD_{i,k}) \tag{19}$$

$$G = TR_{g,h} + TR_{g,\text{row}} + Subvex + subvprod \tag{20}$$

$$subvex = \sum_i (se_i.q0.pwx_i.x_i) \tag{21}$$

$$subprod = \sum_i (sx_i.xd_i.pp_i) \tag{22}$$

$$sold0 = rgov + lumpsumtax * pop - G - pp_{pub}.X_{pub} \tag{23}$$

Actually, the public balance should be fixed, thus is constant for each period. Assuming a fixed public balance (it can be public balance in terms of GDP,) in a context of trade liberalization means that adjustments between public revenue and expenditures are done through a lump sum tax (in a first stage), but it can also be done through variations in indirect taxes or transferts, or in public good production. All these options can be interesting, but for analysing some specific effects and not the direct impact of trade liberalization. For instance, if households are disaggregated and if the adjustment is done through an increase of TVA (to compensate the decrease of import taxes due to the liberalization) then the impact on each household, depending on their income, is interesting.

Private Income The household total income before taxation is expressed by:

$$YB_h = \sum_i (wl_i.fdl_i) + \delta_h \sum_i (wk_i.fdk_i) + tr_{g,h} + tr_{\text{row},h} + tr_{h,h} + tr_{f,h} \tag{24}$$

The net disposable income after taxation is:

$$YN_h = (1 - ty_h).YB_h \tag{25}$$

$$ID_h = ty_h.YB_h \tag{26}$$

where ty_h can be defined as the fiscal contribution of each household h (which is implemented in the consumer budget constraint).

$$sav_h = pmep.YN_h \tag{27}$$

Where $pmep$ is the marginal propensity to save and YN_h the net disposable income.

3.1.4 Firms income and savings

$$YB_f = \sum_i (\delta_f.wk_i * fdk_i) + (sx_i.xd_i.pp_i) \quad (28)$$

$$sav_f = (1 - ty_f).YB_f. - tr_{f,h} - tr_{f,\text{row}} \quad (29)$$

where YB_f is the total income of firms before taxation and dividend payout, ty_f the imposition rate

3.1.5 Private savings

$$sav = sav_h + sav_f \quad (30)$$

$$q0. \left(\sum_i pwe0_i.e_i - \sum_i pwm0_i.m_i \right) = sav + sold0 - invest + leon \quad (31)$$

3.2 Household disaggregation

We categorize senegalese households into socio-economic classes depending on the region and the level of education. The main point is to distinguish urban and rural households, as well as sectoral activity in order to define a diversification strategy within household members. We define sector-specific factors of production and then deduce socioeconomic income groups.

As described in Dervis, de Melo and Robinson (1982) the income distribution is supposed to follow a log-normal function.

The objective of this paper is to assess the impact of a price shock on the income distribution, especially when rural-urban transfers interfer.

3.3 Modeling intra-households transfers

Aísa, Andaluz, Larramona (2011) use a Nash-bargaining solution to define and identify the amount of remittances within an household. Transfers maximizing utility are Pareto-efficient. In the following optimization program, the migrant maximize its utility by taking into account of its family relative utility:

$$\begin{aligned} Max_{T,Cm,Ch,Q} U^m &= A(Q)(C_m + \beta C_h) \\ s.c.\ U^h &= A(Q)(\beta C_m + C_h) \\ R_h - T &= C_m \\ R_m + T &= C_h + pQ. \end{aligned}$$

with Q the level of family counterpart (children education, investment, inheritance, caring for elderly) that imply a cost noted pQ and β the altruism parameter. By solving this program we evaluate optimal levels of family service Q^*, optimal migrant and family consumptions C_m^* and C_h^* and the amount of transfer T^* that can be written:

$$T^* = \frac{R_m + \beta R_h - \beta pQ^*}{1 - \beta} - \frac{U_m}{1 - \beta) - A(Q^*)}$$

which is the Pareto-efficient level of remittances. At this stage, authors suppose there is still no bargaining power, as they need to define first the threat point of the model. Breach of family contracts or divorce are usually considered as the threat point of non-cooperative solution. Then, at the end of the process of bargaining, the general equilibrium Nash-solution is given by:

$$Max_{U^m} \left(U^m - \overline{U^m}\right)^{\theta} \left[U^h\left(Y, p, U^m\right) - \overline{U^h}\right]^{1-\theta}$$
$$avec \quad \overline{U^m}, \overline{U^h}, \quad \text{non cooperative utilities}$$

avec $\theta \in [0,1]$ the migrant bargaining power and $(1-\theta)$ the family ones, parameters that are exogenous in the model (De Haas, 2007). Then, once the first order conditions given, T^* the optimal amount of transfers is found and

$$\frac{\partial T^*}{\partial \theta} < 0 \quad et \quad \frac{\partial U^m}{\partial \theta} > 0.$$

This result strengthen the idea that the highest is the migrant bargaining power, the lowest are transfers sending to the family.

4 Urban Rural remittances in the case of Senegal

4.1 A food price crisis scenario

4.2 Do private transfers reduce income inequalities

5 Conclusion