

Remittances and poverty: who benefits in the household?

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Abstract:

We use data from a newly designed household survey in Senegal to study intrahousehold allocation of remittances income. In this survey, households are split between sub-groups of individuals, in a way that is natural to households and that corresponds to the internal budgetary arrangements found in the extended families of Senegal. We instrument remittances using the sibling composition of household members. We find that remittances accruing to specific individuals in the household are not completely fungible with other sources of income. In particular the school enrollment of children aged 7 to 13 is found to depend on remittances income accruing to the sub-group he/she belongs to and not on the remittances accruing to other sub-groups. Looking at total expenditures, we also find that transfers received by a sub-group are a significant determinant of its own consumption, contrarily to transfers received by other groups. This is not true for food consumption, suggesting that households tend to satisfy the basic needs of all their members.

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Introduction

For many poor households in developing countries, remittances are assumed to contribute in an important way to living standards. In fact, in these countries, a significant share of households often receives private transfers either from relatives residing elsewhere or from a migrant member who either joined an urban centre or moved abroad.

Private transfers that do not originate from migrant members are rarely discussed, except through the angle of insurance (Townsend (1994) launched a seminal work, reviewed in Morduch (1999) and Dercon (2002)). On the other hand, international migrants' transfers have been extensively studied. An abundant literature tries to assess the aggregate impact of international remittances on poverty (Adams and Page 2003), investment (Chami, Fullenkamp et Jahjah (2003)), or on inequality (Stark et al. 1988, Taylor et al 2005). From the microeconomic point of view, there is now a wide literature on the impact of migrants' remittances on the well-being of the origin household, linked to the literature on migration decisions. In fact, migration of one family member has been analysed since the late 1980's as a family decision aiming at generating a new source of income, of which a part is sent to the members who stayed in the original location either to alleviate credit constraints for an investment, to compensate for a shock or to preventively diversify sources of income. These three motives for migration, investment, ex-post income smoothing or ex-ante insurance, have been widely discussed (Stark and Lucas 1988, Rosenzweig 1988, Paulson, 2000, Yang and Choi 2007). A number of papers examine how migration flows responded to household characteristics or life events to try to assess from this analysis what were the motivations to remit but also to migrate (de la Brière et al 2002). The question of whether remittances are used mainly for consumption or might have a long term impact on well-being through their contribution to investment has also been studied (Azam and Gubert 2006, Mesnard 2004, Yang 2008).

In this literature, migration is viewed as a decision that involves two actors: the migrant, who will or not remit some of his migration earnings, and the staying household, or household of origin. The household of origin is considered as a whole, with no regards for intra-household resource allocation, assumed, by default, to be egalitarian. Remittance flows are perceived as an extra income, assumed to be perfectly fungible with other sources of household income (unless the remittances are in fact the migrant's own savings – Yang (2006)). If it were the case, any flow of income similar in amount and timing to the remittances flow, whether generated by household members or from public transfers, should be spent in the same way. This would hold true if household's decisions were Pareto optimal, an assumption that appears to be violated in the two African cases where it has been tested, that of Burkina Faso households (Udry 1996), and that of

Ivorian ones (Duflo and Udry 2004). Duflo and Udry's paper shows that in Ivorian households, the budget has several components that are not controlled by the same household members and that are earmarked for certain consumption goods. The segmentation is strong enough to prevent the household from achieving consumption smoothing even when shocks are perfectly observable.

If, indeed, all sources of income are not fungible and if, furthermore, members of the household do not all have a similar access to household's resources, two new questions arise about the impact of remittances on the standards of living: who in the household benefits from remittances and what are they spent on?

First, the staying household is in general composed of several members who might not have the same access to resources, whether earned or unearned income. In particular, they might not all have equal access to remittances. If all the sources of income are pooled to form the household total budget and if the allocation of this budget among household members disregards the contribution of each one, as the unitary household model would suggest, then the origin of income doesn't matter. If, however, intra-household sharing of resources is affected by individual contribution to total income, then remittances and earned income alike would affect an individual's share of total consumption insofar as it affects his bargaining power within the household. Within this framework, it might be the case that earned and unearned incomes affect individual bargaining power differently. The impact of remittances and that of labour income on intra-household resource allocation would then be different. Finally, a third possible case is that private transfers and labour income are not fungible. If it implies, for example, that remittances are not pooled within the household even if earned incomes are, the extra income that transfers represent for their designated beneficiaries might not be fully compensated for by changes in the intra-household allocation of other resources.

Whether remittances are fully shared within the household or not, and whether they are fungible with other income source, matters for the evaluation of their impact on household well-being. In the case where they are mostly kept by an individual or a group, they might be spent for personal use without providing any improvement to the lot of other household members.

The second question, related to that of the fungibility of various sources of income, regards the specific use of the remitted income: can the receiving household or receiving member really spend it as they wish, or is the money remitted earmarked for specific expenditures? The adverts of various international money transfer companies are usually suggestive of the fact that remittances are used for the education of offspring or younger siblings, or for the support of aging parents etc. If remittances are fungible with other income sources, then the actual impact of the remittances, for example on educational spending, will not be different from that of any other source of income. If, however, earmarking by the remitter is taken into account by the receiving household, then the

marginal spending of different incomes will differ by type of expenditures. In a context where resources are scarce, earmarking might be an efficient way to avoid dilution in routine consumption and allow investment.

In this paper, we study the allocation of remittances in a country where both migration and household structure are of particular interest, namely Senegal. It is a country characterized by very large household sizes (with an average of slightly more than 8 members, Senegal displays particularly large households, although decreasingly so) and by non nuclear household structures as we will describe later. Field interviews we conducted made clear that budgetary arrangements within the household do not entail income pooling. In fact, members generating income have a specific control over the spending made with it. Furthermore, Senegal, like other countries of the region, has a very mobile population, with both important internal and international migration. Hence, it is likely that a large share of households have close parents in a position to remit some income from outside the household. The first objective of this paper is to see whether remittances are captured by a sub-group of household members or pooled with the general household budget. Additionally, we would like to assess whether the extent of pooling depends on the amount remitted (as a share of total expenditures), on the identity of the remitter (in particular his relation to the various household members), on the location of the remitter and on the identity of the receiver. The second objective is to see whether earmarking is effective, i.e. whether remittances aimed at financing a particular expenditure (such as the education of a particular child) are actually spent more than proportionally for this purpose.

Hence, we want to enquire precisely whether the fact that remittances may be received by a particular household member for a particular purpose indeed affects consumption patterns or whether the reallocation of other sources of income is such that an income increase due to remittances, even when they are earmarked, has the same impact as any other extra income. If the earmarking by the migrant is indeed effective, then the impact of remittances on poverty or well being will differ among household members. While we have no reason to expect public transfers to be allocated in a similar manner as private transfers, the study of remittances may still be a source of information on the use of the latter. If the earmarking by a private provider is effective, this may also hint towards non fungibility of public transfers. If this is the case, substitution between private and public transfers is likely to be very imperfect, perhaps avoiding crowding out. Furthermore, it is quite possible that targeted public transfers be particularly effective in reaching the target person in the household, if they are allocated similarly to private transfers, i.e. not fungible.

One of the reasons why these issues have not been tackled so far in the literature is the lack of adequate data. We use original Senegalese household survey data that are exceptionally suitable for this work. These data emanate from a survey, entitled “Pauvreté et Structure Familiale” (henceforth PSF) that we designed in co-operation with the Senegalese Statistical Agency (ANSD). Information on consumption was collected in detail at the level of subgroups of household members. The data also specifies the sources of funding for each type of good. Hence, it offers a unique opportunity to enquire into the details of the spending of remittances, allowing to answer the two questions of whether remittances are dedicated to specific types of spending (such as health or education) or just poured into the general budget and of whether they benefit more some household members than others. The PSF survey also collected rich information on siblings of each household member, allowing to instrument transfers received by sub-groups and circumvent the endogeneity pertaining to the differential receipt of transfers within the household.

The data

The PSF Survey.

The PSF survey results from cooperation between a team of French researchers and the National Statistical Agency of Senegal.¹ We designed the survey specifically to be able to study the issues of households’ well-being in relation to household structure. Long interviews were conducted with households in order to obtain, in addition to the usual information on individual characteristics, a detailed description of households’ structure and budgetary arrangements.

In order to do this, households were divided into subgroups according to the following rule: the head of household and unaccompanied dependent members, such as his widowed parent or children whose mother do not live in the same household, are grouped together. Then, each wife and her children make a separate group. Finally, any other family nucleus such as a married child of any member with his/her spouse and children also form separate groups. This decomposition emerged from field interviews as being the relevant way to split the households in groups.

¹ Momar Sylla and Matar Gueye of the Agence Nationale de la Statistique et de la Démographie of Sénégal (ANSD), on the one hand and Philippe De Vreyer (University of Paris-Dauphine and IRD-DIAL), Sylvie Lambert (Paris School of Economics(INRA)) and Abla Safir (CREST-INSEE and Paris School of Economics (INRA)) designed the survey. The data collection was conducted by the ANSD thanks to the funding of the IDRC (International Development Research Center) and CEPREMAP.

Considering these subgroups allows us to obtain in a simple way a complete description of family relations within the household. For example we know whether an individual who has no blood relation to the household head is his wife's brother or her child from a first marriage. This is a major difference with usual household surveys that only record relation to the household head.

In order to obtain information on intra-household resources allocation and budgetary arrangements, the recording of expenditures was split between those regarding consumption common to the whole household (notably those for some public goods and some staples) and those that benefit to a specific household member or group of members. For each group, we also collected information on who contributed to each particular expense, whether it is another household member or not. As a result, we know whether a given member receives transfers from outside the household, who is the remitter and whether he resides abroad or not. We also interviewed the household's members directly about the private transfers they receive, and what motivated them. This is the source of information we use throughout the paper.

The survey sample was targeted at 1800 households spread over 150 clusters drawn randomly from the census districts so as to insure a geographically representative sample. About 1750 records can be exploited.

Descriptive statistics

As mentioned previously, the average household size in the survey is very high, in line with what was found in previous household surveys in Senegal. We find slightly more than 8 members on average, with a maximum that reaches 45. This is partly explained by the prevalence of polygamy: 24% of the married men are engaged in a polygamous union, the proportion being 37% among married women. Nevertheless, on average 36% of households' members are neither the household head, nor one of his wives or children. This testifies for the importance of the extended family: 66% of the households include such extended family members.

Such structures fairly naturally give rise to arrangements that differ from those observed in nuclear families. In this paper, we will examine three sets of expenditure. We examine food expenditures, as the very basic and necessary household expenditure. We also examine non food expenditures for which disparities within the household may be greater, as they span a larger set of goods, less necessary. Lastly, we examine education, a long-term investment. As for food expenditures, we find that, in 17% of the households, meals are not shared by all members: subgroups emerge that take

some or all of their meals separately, widening the possibility for differences in nutritional intake among household members. Indeed, it can be observed that the ratio of the per capita food expenditures in different groups of the same household can vary from 1 to 7.8. The inequality is fairly limited though as the ratio is lower than 1.5 in 95% of the households.

When looking at total expenditures, inequalities within the household are more striking: the ratio between the expenditures of the richest group and the poorest group of a household can be as high as 18 and is still equal to 4.4 after trimming off the 5% most unequal households.

There are also important variations in the educational achievement of the various children of the households. Households who include children in the age range 7 to 13, corresponding approximately to the primary school age group, have on average 2.2 such children, of whom only 1.3 are currently enrolled in a formal school and 0.4 never went to school.

When we turn to transfers, we see that 57 % of the households benefit from some. These transfers represent on average 10.4% of the household expenditures. For households who receive at least one transfer from someone in Senegal, the average amount is slightly above 14% and it reaches 30% for households who receive at least one transfer from abroad. Transfers generally accrue to one particular member, this member being the household head in the case of 40% of transfers only. When considering household heads, the amount received, relatively to the group expenses, are higher, sometimes even greater than the total consumption of the group. This is likely due to the fact that household heads receive transfers that they redistribute. For this reason, in the results presented below we concentrate on the groups that do not include the household head. Lastly, examining earmarking, 25% of the transfers are mentioned as catering for the expenditures of a specific household member.

Transfers received come mainly from family members (76 %).

The partition of remittances by motives is given in table 1. 37% of the transfers from close relatives are meant to help facing financial difficulties. Gift are observed with the same frequency. If transfers for other reasons are added to the former two motives, in total, transfers that are not meant to be used for specific purpose represent more than 80% of the total. Out the other fifth, the two main motives for transfers are ceremonies (accounting for half of them) and education. Table 2 shows that the largest amounts are observed for transfers received because of financial problem or to finance the education of a child: they are on average 1.8 times larger than transfers received to pay for health expenditures and 6 times bigger than those aimed at ceremonial purposes (table 2).

Focusing on the geographic origin of remittances, for transfers sent by the parents, spouse or children (hereafter referred to as close relatives) of a household member, they come from abroad 27% of the time. These transfers from abroad account on average for 25% of the amounts received from these relatives, but this share becomes more important as household income increase, becoming greater than what is received from relatives in Senegal only for the top decile of the distribution of household expenditures. We do not display the motives for transfers along the geographic location of senders because, among transfers sent by close relatives, there are no differences depending on whether they live in Senegal or abroad

Table 1: Transfers motivations

Source of transfer Motive (within source)	Close Relatives	Other (relatives and non relatives)
Education	4.16	1.43
Financial problems	37.09	16.03
Health	1.80	1.53
Pilgrimage to Mecca	0.19	0.40
Other pilgrimage	0.19	0.10
Travel	0.47	0.64
Marriage	0.85	6.63
Baptism	1.51	13.71
Bride price	0.19	0.45
Funerals	0.38	2.18
Other ceremony	6.43	8.76
Gift for other reason	38.88	42.11
Religious Contribution (Aadiya)	0.57	1.98
Other	7.28	4.06
N Observations	1057	2021

Table 2 – Amount remitted according to the motive for transfers

	Yearly amount in CFA francs	Yearly amount in Euros	Number of observations
Education	387555	589	73
Financial problems	374504	569	716
Health	216348	328	49
Ceremonies	61722	93	815
Other	159745	242	1417

The bottom decile in terms of household total expenditures receives transfers strikingly less often than the rest of the sample (44.7% of them receive at least one transfer vs about 58% for the other 9 deciles). However, among those households who receive at least one transfer, the share of the expenditures it represents decreases sizably with income, from 25.7% for the bottom decile to 11.5% for the top one.

The question we raise here is whether the pattern of remittances describe in this section can be related to intra-household inequality in food consumption, total consumption and education.

Theoretical discussion

If the household decision process were such that it could be represented by the classical unitary model of a single decision maker, maximizing a household utility function given a single budget constraint, the source of income would not affect consumption decisions.

If transfers received by a particular individual affect differently his group well-being and that of other household members, it can be because this canonical model fails to hold for different reasons.

First, the household decision making process may be such that members negotiate over the sharing of total resources, as represented in the collective household model. In such a case, increasing the household's resources increases one's negotiating power and hence increases the share of total consumption one can capture. In such a case, the source of income should not matter: whether one controls a large share of the household total resources because his labour income is high or because he receives large transfers does not make any difference to the way his negotiating power is affected. Note that it could also happen that even if household decisions are accurately represented by the collective household model, because of their different nature, remittances and labour income

affect the bargaining power of individual household members differently. If for example, receiving remittances is a sign of greater social connection, it may bring more negotiating power than labour income.

Second, the collective household model may not hold either, because of the absence of fungibility of all income, a necessary condition for Pareto optimality to hold. As discussed below, non-fungibility can emerge from separate budgets among various household members or from different use of different income sources, according to their nature.

If various groups have separate budgets and manage them independently from each other, the household decision making process cannot be represented either by the unitary or the collective household model. Each household member has the possibility to decide over the spending of the income he generates and the transfers he receives. S/he could altruistically share the transfers received with the whole household or restrict the benefits to his or her group. This model and the collective household model give rise to the same empirical prediction that who controls the transfer or the income affects who benefits from it.

The other possibility is the existence of social norms such that, according to the source of income (labour or transfers), the non-sharing of it may be more or less acceptable. For example, remittances received from a parent abroad may be perceived as an occasional present that does not need to be shared with the rest of the household. It would be somewhat analogous to the situation described by Duflo and Udry in Côte d'Ivoire. In such a case, the elasticity of own expenditures relative to own transfers will be different from both the elasticity of own expenditures to own labour income and to transfers received by other groups. Hence, the difference in the impact of resources controlled by an individual on the consumption of his group and the consumption of other groups may not be the same according to whether these resources arise from transfers or from labour income. In this case, it could be expected that the social norms apply differently for different types of expenditures. For example, it might not be acceptable to keep transfers to increase one's food consumption without sharing with the rest of the household, while it might well be deemed acceptable to spend the same transfers on the education of one's own children without contributing to the education of other children in the household. Note that if social norms apply in the same way for all expenditures, then it will be empirically impossible to distinguish the predictions of this model from that of a collective model in which the bargaining power is affected differently by remittances and labour income. The conclusions that can be drawn regarding the fungibility of the various sources of income will hence rely crucially on the comparison between the differential effects of remittances and earned income on various consumption expenditures.

Finally, the use of transfers might be controlled by the sender. It could for example be the case that the remitter earmarks the use of the funds he sends for some type of investment: children's education, housing improvement... The receiving individual has only partial control over the use of the funds and the impact of those resources can then be different from the impact of other resources if the amount earmarked is not infra-marginal and pushes the household to a corner solution. In this case, as in the previous one, various sources of incomes are not completely fungible.

Empirical strategy

Given the objective of this paper, we look separately at the various subgroups in the household and for each of them we separate the impact of transfers received by a member of this group and those received by a member of another group within the same household. In keeping with the above discussion, we also want to examine two aspects. First, we want to see whether receiving transfers has a similar effect on group expenditures than earning the same amount from labour. Second, we wish to explore the fact that things might differ according to the types of expenditures; in which case, a potential impact of transfers on group well-being might be of short or long term relevance according to the expenses it affects. We will focus for the time being on food consumption, total expenditures (except lodging), and education outcomes. We have in mind that if transfers generate a difference in educational investment, this difference will perpetuate in the long run, which might be less the case for the other two variables.

Hence, in a first step, we simply look at the way transfers affect group outcomes in terms of food consumption, of total consumption or education according to the identity of the beneficiary, controlling for a number of characteristics, among which earned income of different groups.

The basic specification is linear and relates the consumption of a particular set of goods by group n to the transfers received by the group, T_n , and its income from other sources, Y_n , the transfers received by the other groups in the household and their other income (T_n' and Y_n') and a set of household and group characteristics Z_n (notably demographics):

$$C_n = \alpha T_n + \beta T_n' + \gamma Y_n + \delta Y_n' + Z_n' \zeta + u_n \quad (1)$$

We will study both the consumption of group n in level and as a share of total household expenditures for this category of goods.

The first result of interest will be the comparison between (α, β) and (γ, δ) . If they differ, it will show that transfers and earned income do not affect consumption patterns in the same way, which might be compatible with both the case of a collective model in which bargaining powers are affected differently by different sources of income and with the case of non fungibility between transfers and other incomes. The comparison of these coefficients across estimations of equation (1) for different sets of consumption good will allow to distinguish the two.

The second comparison of interest is that of α and β . If they are different, it will indicate that income is not pooled within the household. A polar case would be $\alpha = 1$ and $\beta = 0$. It would indicate that remittances are entirely kept by the designated beneficiary. The same is true of the comparison of γ and δ . Also, if α and β are very different while γ and δ are equal, this may indicate that transfers are not fungible while other sources of income are.

We first consider the case of education. All models mentioned above, apart from the unitary model, would suggest that transfers received by the group are more than proportionally spent on the education of children belonging to this group than on other children of the same household. Furthermore, as discussed, education is clearly a domain where the wish of the remitter, if it is expressed, cannot easily be overlooked: if transfers received are earmarked for the education of one particular child, it might be difficult for the household as a whole to pool this income with other sources and share its benefit. Hence, in such a case we would expect that children belonging to groups who directly receive a transfer might get more schooling than if the transfer reaches another group in the same household.

We will look at the impact of transfers on a child's probability to be enrolled in school, according to who received the transfer.

It is less obvious that we should expect the identity of the beneficiary of the transfer to have an impact on the allocation of food consumption, if only because transfers in cash are never earmarked for food. Furthermore, it seems easier for a household to share food resources than investment ones, so that even if a particular member benefits from a transfer, it might not increase his own food consumption more than that of other household members. Finally, it is likely that negotiations over the use of resources do not bear on food, for which it can be expected that social norms and altruism combine to make sure that everyone is fed at least according to their needs, when resources are sufficient for that. To study this issue, we construct a measure of per capita food expenditures that has two components. First, the amount of common expenditures dedicated to food is simply divided

by household size in order to get a per capita amount of this common consumption. Second, food expenditures at the group level are measured by dividing the amount spent daily on the preparation of meals for the group by the size of the group. This daily spending is commonly called DQ in Senegal, which stands for “dépense quotidienne”. In households with married couples, the DQ is usually given by the husband to his wife who has to purchase ingredients (other than staples) and prepare the meal. In polygamous households, each wife takes turn to receive the DQ and to take charge of the meal preparations. The DQ provided by the husband to each of his wives is in general equitably determined according to the size of her group. In large extended families though, several groups might eat separately and the DQ for each group might be calculated by different persons and need not be equal.

In a way similar to what is done for education, we look at the impact of the identity of the beneficiary group on each group’s access to food consumption, we test whether differential access to transfers has the same effect as different labour income and we explore whether the origin of the transfers (remittances from abroad or from Senegal) matters.

Finally, we conduct the same exercise on total expenditures. As we saw earlier, there is more within household inequality when looking at total expenditures than just at food expenditures. It is therefore of interest to see whether this inequality is driven by transfers or more generally by a difference in the control over resources.

Transfers received are likely to be endogenous to the consumption decisions (typically if migration is a household decision for example). We attempt to correct for this endogeneity by instrumenting transfers received by a group with the demographic characteristics of the siblings of the adult group members. We use the number of siblings of all adult members who are neither sibling of the group head, nor his children or grand-children. We also use the number of brothers and the number of sisters of the group head. Similar variables are constructed to instrument for transfers received by the other group within the households.

We also estimate the same models controlling for household fixed effects. It does not deal with the endogeneity of transfers received by the group himself, but limits the issues arising from household level unobserved heterogeneity.

Finally, it is worth noting that we exclude the groups that include household heads. In fact, as mentioned in the descriptive statistics section, those groups often receive transfers that are aimed at the whole household (as a result, the ratio of their transfer to their consumption is often greater than

one) and are therefore different from the rest of the household with respect to their use of the transfer. In order to stick to meaningful comparisons, we, therefore, concentrate on the subsample of groups who belong to households composed of at least 3 groups and that do not include the household head. We are left with 1470 observations. It is to be noted that those households are poorer than average, with an average per capita consumption of about 338000 FCFA as compared to 520000 FCFA for the whole sample. They also receive three times less transfers on a per capita basis than average (16000 vs. 46800). When studying educational outcomes we further restrict the sample to group that include at least one child of school age (between 7 and 17 years old). We then consider 1376 children in 821 groups.

Preliminary Results

These results presented here are based on an older specification and a newer version is going to be ready within a few days. Qualitatively, results are unlikely to be altered by the changes.

School enrolment

Table 3 gives the results for school enrolment of children ages 7 to 17 years old. The LHS variable is a dummy equal to 1 if the child is currently enrolled, hence the estimates are obtained by a probit. As indicated above, the estimation is restricted to households containing at least 3 groups and excluding the group of the household head. The specification is slightly different to equation (1), with no introduction of income variables but a control for household per capita expenditures.

In this sample, 51% of the children in the relevant age group are currently enrolled in school. Descriptive statistics for the variables used in these regressions are provided in appendix 1. Only 63% of the children are child of the household head and 5% have been fostered either to the household head or to the group head. Household head is a female in only 5% of the cases, but 82% of the sub groups are headed by females, which can be expected given the definitions of the sub groups in the survey.

Raw results are very clearly compatible with a situation where transfers can be earmarked or captured by the subgroup who receives them. In fact, controlling for total per capita expenditures in the group (except education expenditures), transfers received by a member of the group affect positively the probability of being enrolled. By contrast, transfers received by another group in the same household (whether this group is that of the head or not) have no effect whatsoever on enrolment. Nevertheless, contributions from non-household members to the household common

current expenditures managed by the household head do have a positive impact on a child's probability to be enrolled.

Table 3: Probit on the probability of being enrolled in school

Variables	Coef.	Std. Err.
Child's age	0.567	0.100
Age squared	-0.026	0.004
Child's sex (1 = female)	-0.101	0.073
Father went to french school	0.730	0.086
Child of the household head	-0.083	0.106
Fostered to household head	0.269	0.418
Child of group head	0.085	0.138
Fostered to group head	0.309	0.220
Ln(Transfer per cap. received by group)	0.049	0.011
Ln(Transfer per cap. received by other groups exc. HH Head)	-0.003	0.010
Ln(Contribution per cap. received by HH Head)	0.018	0.011
Ln(Transfer per cap. received by group of HH Head)	0.001	0.008
Ln(Group per cap. exp. excluding education)	-0.023	0.051
Household head is female	-0.324	0.262
Group head is female	-0.176	0.121
Household and group heads are female	0.076	0.343
Number of groups in household	-0.020	0.048
Size of the group	0.022	0.021
Size of the household	0.005	0.011
Urban	0.459	0.092
Intercept	-2.780	0.848
Number of observations	1376	
LR Chi squared statistic (20 df)	281.8	
P>chi2	0.000	
Pseudo R-squared	0.147	

Other controls have the expected impact (urban household, educated parents and age all affect the probability of being enrolled positively).

Instrumenting the various transfers variables just confirm those results (first step regressions are available in the appendix). Instrumented coefficient for own transfers is three times that of the non-instrumented regression, coefficient for all other transfers are not significantly different from zero anymore except for those received by the household head that come out negatively, though only marginally. This latter result is slightly puzzling since the head of the household is likely to contribute to the education of children in other groups. Other results remain stable.

Table 4: Probability of being enrolled at school: Two step probit with endogenous regressors

Variables	Coef.	Std. Err.
Child's age	0.686	0.157
Age squared	-0.032	0.007
Child's sex (1 = female)	-0.138	0.102
Father went to french school	0.755	0.154
Child of the household head	0.059	0.180
Forstered to household head	-0.542	0.681
Child of group head	0.029	0.196
Fostered to group head	-0.041	0.349
Ln(Transfer per cap. received by group)*	0.348	0.149
Ln(Transfer per cap. received by other groups exc. HH Head)*	-0.156	0.154
Ln(Contribution per cap. received by HH Head)*	0.112	0.101
Ln(Transfer per cap. received by group of HH Head)*	-0.127	0.072
Ln(Group per cap. exp. excluding education)	-0.071	0.081
Household head is female	-0.121	0.460
Group head is female	-0.366	0.200
Household and group heads are female	-0.437	0.586
Number of groups in household	0.078	0.119
Size of the group	-0.009	0.034
Size of the household	0.020	0.020
Urban	0.397	0.248
Intercept	-2.983	1.322
Number of observations		1342
Wald Chi squared statistic (20 df)		140
P>chi2		0.000

Food expenditures

As mentioned, we can measure food expenditures in two sets: the expenditures for which the household head is in charge on behalf of the whole household and the food expenditures managed separately by each group, even if some of those are paid by the household head as well. We try to assess here whether transfers received by the group itself have a larger impact on its own food consumption than Transfer per cap. received by other groups exc. HH Head.

The sample is again restricted to households with at least three groups, excluding the group of the household head. In this sample, yearly average per capita food expenditure is about 185000 CFA for the household as a whole. As already mentioned, for 95% of the households there is not that much variation between sub groups.

When using OLS to regress per capita food expenditures on per capita transfers, results show that the only determinant of per capita food expenditure in the group is the level of per capita food expenditures in the rest of the household and the group size. The coefficient is not different from

one, which suggests that an increase in per capita food consumption for one group is accompanied by an equivalent increase in all other groups. Transfers, whether received by the group or by other groups have no impact (table 5). This result holds when instrumentation is carried out, but it is worth noting that instruments are very weak in this case. Hence results are not reproduced here. Finally, this result is again confirmed by the fixed effect estimates; in this latter estimation (table 6), own transfers and other transfers have the same positive impact.²

Table 5: OLS determinants of per capita food expenditures:

Variables	Coef.	Std. Err.
Transfer per cap. received by group	0.061	0.062
Transfer per cap. received by other groups	-0.077	0.060
Contributions to hhold common exp.	-0.178	0.267
Household size	82.45	475.5
Urban	-5554.7	5994.1
Household head is female	-663.7	16024.4
Group head is female	6103.5	6888.8
Household and group head are females	3532.3	20164.9
Group size	-2247.3	1436.5
Total food exp. other groups per cap.	1.017	0.0097
Intercept	4104.3	10049.1
Number of observations		1470
R-squared		0.884

Table 6: OLS on per capita food expenditures, with household fixed effects.

Variables	Coef.	Std. Err.
Transfer per cap. received by group	0.137	0.030
Transfer per cap. received by other groups	0.160	0.062
Group head is female	3591.7	2413.7
Household and group head are females	17587.1	9695.7
Group size	-685.8	515.0
Intercept	178060.1	2950.5
Number of observations		1470
R-squared		0.994

These results suggest that food expenditures are allocated in a fairly equal way within the household and different control over transfers does not introduce dispersion in this dimension. This should

² In the fixed effect regression we do not include the total food expenditure of other groups as a control variable since in a fixed effect regression its coefficient has no economic interpretation. For instance if, in addition to the head of household group, there are only two other groups in the household. Then a negative coefficient of the other groups food consumption variable, just means that if group A has a higher than average consumption then, necessarily, group B has a higher than average consumption level. For this reason this variable is not included in the fixed effect regression. It should be noted however that if we include it other results are not qualitatively changed: transfers received by all groups impact food consumption significantly.

probably be related to the fact that food is a subsistence good and it could be interpreted as an equal satisfaction of basic needs for everyone in the household.

Total expenditures

Estimations of the impact of transfers on total expenditures (except lodging) tell a story consistent with the previous sets of results. Here again, we do not dwell on the results of instrumented equations since instruments are too weak in this case again. The interesting point here is that when the straight OLS (table 8) does not show any effect of the transfers on the level of per capita expenditures, the fixed effect estimates show a different impact for own transfers and other transfers, contrarily to what was found in the case of food expenditures (table 9). Here own transfers affect positively group expenditures, while other transfers do not. This result says that a group that receive more transfers than average in his household has a higher level of per capita consumption than other groups.

Table 8: OLS on per capita group total expenditures:

Variables	Coef.	Std. Err.
Transfer per cap. received by group	0.165	0.170
Transfer per cap. received by other groups	0.041	0.165
Contributions to hhold common exp.	1.27	0.732
Household size	5330.9	1313.4
Urban	83997.7	16841.8
Household head is female	-33380.7	44121.8
Group head is female	8036.7	18966.8
Household and group head are females	59162.3	55526.1
Group size	-20728.1	3952.3
Total consumption other groups	.558	.014
Intercept	70997.2	27855.3
Number of observations		1470
R-squared		0.558

Table 9: OLS on per capita group total expenditures with household fixed effects

Variables	Coef.	Std. Err.
Transfer per cap. received by group	0.282	0.124
Transfer per cap. received by other groups	0.223	0.254
Group head is female	-4646.3	9957.5
Household and group head are females	124354.6	39997.9
Group size	-11188.6	2124.7
Intercept	341535.2	12171.9
Number of observations		1470
R-squared		0.949

Clearly, endogeneity might be an issue, and it prevent us from interpreting this result causally. Nevertheless, the difference between this result and what was found in the case of food consumption is telling. A difference in access to transfers is associated with a difference in total per capita expenditures, as it was associated with a difference in school enrolment, but not with a difference in per capita food expenditures. It is consistent with a situation in which household share resources when it comes to food consumption, but do not pool all their incomes. Not surprisingly, the unitary household model would therefore be rejected.

To go a bit further in this exploration, we turn to the issue of whether transfers and labour income have the same impact. In the case of total expenditures, concentrating on the fixed effects estimation (table 10), it is interesting to notice that labour income does not play a role while own transfers remain a significant determinant of own expenditures. In other words, a greater than average income from transfers translates into a greater than average per capita consumption, but a higher than average labour income does not. This difference should be explored further but those preliminary results suggest that transfers and labour income are not perfectly fungible sources of income. If this were to be confirmed, it would suggest that the collective model of household behaviour does not either provide an accurate description of Senegalese households' behaviour.

Table 10: Total per capita expenditures, with households fixed effect, controlling for labour income.

Variables	Coef.	Std. Err.
Transfer per cap. received by group	0.282	0.124
Transfer per cap. received by other groups	0.223	0.255
Group head is female	-4571.3	9979.3
Household and group head are females	124347.2	40062.9
Group size	-11153.9	2134.5
Group income per cap.	.083	.721
Other groups income per cap.	-.277	.780
Intercept	341704.5	12200.5
Number of observations	1470	
R-squared	0.949	

Conclusion

These preliminary results add to already existing evidences on the absence of income pooling within African households. It nevertheless sketches a more subtle story, whereby the impact of different access to income on consumption and well being depends both on the good considered and on the source of income. As a result, it suggests that not only the unitary household model is likely to be inadequate, but the collective household model is probably hardly more suitable to the description of Senegalese households. The observed pattern of consumption seems consistent with a situation where norms interfere with decisions, so as to ensure that basics needs are covered for everyone and to allow exclusive use of some types of income (remittances) but not others (labour income).

If this is to be interpreted causally, implications in terms of individual welfare are important. In fact, an increase in income will translates into an improvement in the situation of the various household members in a way that depends on who controls the extra income and how it was obtained. It suggests that potential crowding out of private transfers by public transfer might be less of a problem than usually anticipated, if the beneficiary of the public transfer is adequately targeted. Hence, those results underline the need for a careful analysis of intra-household resources allocation that encompasses the analysis of the origin of the household income, if one wants to be able to target efficiently public policies aimed at poverty alleviation.

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Appendix 1: Descriptive Statistics on the sample used for the education models

Variable	Mean	Std. Dev.	Min	Max
Currently enrolled in school	0.51	0.50	0.00	1.00
Child of the household head	0.63	0.48	0.00	1.00
Fostered to household head	0.01	0.10	0.00	1.00
Child of group head	0.85	0.35	0.00	1.00
Fostered to group head	0.04	0.21	0.00	1.00
Child's age	11.73	3.19	7.00	17.00
Child's sex (1 = male)	0.50	0.50	0.00	1.00
Father went to french school	0.31	0.46	0.00	1.00
Ln(Transfer per cap. received by group)	2.30	4.02	0.00	13.02
Ln(Transfer per cap. received by other groups exc. HH Head)	2.86	4.40	0.00	12.71
Ln(Contribution per cap. received by HH Head)	1.96	3.78	0.00	11.51
Ln(Transfer per cap. received by group of HH Head)	3.96	5.30	0.00	14.40
Ln(Per cap. expenditures out of education by group)	12.08	0.83	10.20	16.81
Household head is female	0.05	0.21	0.00	1.00
Group head is female	0.82	0.38	0.00	1.00
Household and group heads are female	0.03	0.17	0.00	1.00
Number of groups in household	4.11	1.32	3.00	10.00
Size of the group	5.52	2.10	1.00	15.00
Size of the household	14.92	6.12	1.00	36.00
Urban	0.36	0.48	0.00	1.00

Appendix 2: Descriptive Statistics on the sample used for the regression on food expenditures and total expenditures.

Variable	Obs	Mean	Std.	Min	Max
Per capita food exp. (group level)	1471	185363.7	317020	0	4693193
Per capita food exp. (household level)	1471	183962.7	295079.4	0	3808194
Non-food exp. except housing p.c. (group level)	1471	311422.5	443182.2	24348.35	4857936
Non-food exp. except housing p.c. (hh level)	1471	333175.3	474016.7	29693.27	4392875
Total exp. p.c (group level)	1471	316127.8	446505.9	24348.35	4857936
Total exp p.c. (household level)	1471	337736.2	477098	29693.27	4392875
Transfers received (hh level)	1471	206223.2	403382.4	0	1950000
Transfers received p.c. (hh level)	1471	16079.48	33690.94	0	300000
Transfers received p.c. (group level)	1471	10884.49	45641.39	0	600000
Transfers p.c. received by other groups	1470	19719.75	48253.75	0	800000
Contribution in kind received by the household	1471	3417.551	10713.84	0	100000
Household size	1471	13.65602	6.224482	1	36
Urban	1471	.3902107	.4879633	0	1
Household head is a woman	1471	.0883753	.2839364	0	1
Group head is a woman	1471	.743032	.4371102	0	1
Household head and group head are women	1471	.0523453	.2227982	0	1
Group size	1471	3.793338	2.028567	1	15
Dep_pc_res..	1470	182796.4	287401.6	0	3808194

Appendix 3: First stage regressions for table 4:

npcltrans	Coef.	Std.
nb of brother of the group head	.0589707	.048867
nb of sisters of the group's head	.0266586	.0495968
nb of brother of the other groups heads	.0627067	.0272997
nb of sisters of the other groups heads	-.0460418	.026741
nb of brothers of the household's head	-.3186681	.057479
nb of sisters of the household's head	.1788927	.058104
fsnoyrel	-.0553615	.1000049
fsautrenoy~l	.1780363	.0761298
Household head is a woman	-1.464886	.834506
Group head is a woman	1.045269	.3591921
Household head and group head are women	1.895289	1.0695
number of groups in the hh.	-.4928695	.1768069
group size	.083207	.073026
household size	.0062207	.0389523
Urban	.3047477	.2707101
ltdep_~d_noy	.2868684	.1517178
ever attended school	.93366	.2463361
Child of the household head	-1.347461	.3154448
Child fostered to the household head	3.932881	1.140317
Child of the group head	.1895163	.3941109
Child fostered to the group head	-.0413994	.6344084
Total household size	.0327302	.0265726
age	-.3524883	.2895349
agesq	.015955	.0121559
male	.0912329	.2133189
intercept	.584996	2.559964

Number of obs = 1342

F(25, 1316) = 6.45

Prob > F = 0.0000

R-squared = 0.1092

Adj R-squared = 0.0923

Root MSE = 3.8237

test nbfrereCN nbsoeurCN nbfrereCNautresn nbsoeurCNautresn nbfrereCM nbsoeurCM fsnoyrel fsautrenoyrel

F(8, 1368) = 5.61

Prob > F = 0.0000

lpcttransf~M	Coef.	Std. Err.
nb of brother of the group head	.0467393	.0537718
nb of sisters of the group's head	.0174872	.0545749
nb of brother of the other groups heads	.0510765	.0300398
nb of sisters of the other groups heads	.0260558	.029425
nb of brothers of the household's head	-.242386	.0632482
nb of sisters of the household's head	.1887358	.063936
fsnoyrel	-.1081853	.1100425
fsautrenoy~1	.02443	.0837711
Household head is a woman	-2.184785	.9182663
Group head is a woman	.5964815	.3952446
Household head and group head are women	-.1837841	1.176847
number of groups in the hh.	.0360281	.1945532
group size	.0852889	.0803557
household size	.0138683	.042862
urban	1.021521	.2978816
ltdep_~d_noy	.2429887	.1669458
ever attended school	.8442621	.2710611
Child of the household head	-.6787214	.3471063
Child fostered to the household head	2.643582	1.254772
Child of the group head	.2320026	.4336682
Child fostered to the group head	-1.074829	.6980847
total household size	-.0948959	.0292397
age	-.0135183	.3185959
agesq	.0006566	.0133761
male	.0945895	.2347299
intercept	-1.876936	2.81691

Number of obs = 1342

F(25, 1316) = 5.78

Prob > F = 0.0000

R-squared = 0.0990

Adj R-squared = 0.0819

Root MSE = 4.2075

test nbfrereCN nbsoeurCN nbfrereCNautresn nbsoeurCNautresn
nbfrereCM nbsoeurCM fsnoyrel fsautrenoyrel

F(8, 1362) = 3.75

Prob > F = 0.0002

Ipck3espext	Coef.	Std. Err.
nb of brother of the group head	-.0114582	.0467412
nb of sisters of the group's head	.031471	.0474393
nb of brother of the other groups headsa~n	.0769799	.0261122
nb of sisters of the other groups heads	-.0197475	.0255777
nb of brothers of the household's head	-.2492547	.0549786
nb of sisters of the household's head	.0907516	.0555765
fsnoyrel	-.1267444	.0956546
fsautrenoy~l	-.1411433	.0728182
Household head is a woman	-2.107604	.7982048
Group head is a woman	.7356535	.3435672
Household head and group head are women	1.330581	1.022977
number of groups in the hh.	-.3864351	.1691158
group size	-.0684918	.0698493
household size	.0645921	.0372578
urban	-1.114156	.2589342
ltdep_~d_noy	.5424512	.145118
ever attended school	.062136	.2356204
Child of the household head	-1.08163	.3017229
Child fostered to the household head	.2861147	1.090713
Child of the group head	-.1816261	.376967
Child fostered to the group head	.8230979	.6068115
total household size	.0199773	.0254167
age	.35471	.2769401
agesq	-.0139159	.0116272
male	.177867	.2040395
intercept	-4.954917	2.448605

Number of obs = 1342
 F(25, 1316) = 4.70
 Prob > F = 0.0000
 R-squared = 0.0819
 Adj R-squared = 0.0645
 Root MSE = 3.6573

test nbfrereCN nbsoeurCN nbfrereCNautresn nbsoeurCNautresn nbfrereCM nbsoeurCM fsnoyrel fsautrenoyrel

F(8, 1368) = 4.67
 Prob > F = 0.0000

Ipctransfr~M	Coef.	Std. Err.
nb of brother of the group head	.2174186	.0657828
nb of sisters of the group's head	-.0853155	.0667652
nb of brother of the other groups heads	-.0257703	.0367498
nb of sisters of the other groups heads	.0537899	.0359976
nb of brothers of the household's head	-.2916361	.0773759
nb of sisters of the household's head	.0373151	.0782173
fsnoyrel	-.0824691	.1346226
fsautrenoy~l	-.0092172	.102483
Household head is a woman	.0886568	1.123379
Group head is a woman	1.169094	.4835302
Household head and group head are women	.8237719	1.439719
number of groups in the hh.	-.5503105	.2380104
group size	-.0422539	.0983046
household size	.1238522	.052436
urban	-1.776015	.3644192
ltdep_~d_noy	.4115334	.2042364
ever attended school	1.039041	.3316078
Child of the household head	-1.357733	.4246392
Child fostered to the household head	.3254913	1.535049
Child of the group head	-.5999943	.5305364
Child fostered to the group head	-.9122058	.8540154
total household size	.0317755	.035771
age	.3359947	.3897604
agesq	-.0134542	.0163639
male	.1072588	.2871614
intercept	-1.712035	3.446121

Number of obs = 1342
 F(25, 1316) = 4.30
 Prob > F = 0.0000
 R-squared = 0.0755
 Adj R-squared = 0.0579
 Root MSE = 5.1473

test nbfrereCN nbsoeurCN nbfrereCNautresn nbsoeurCNautresn nbfrereCM nbsoeurCM
 fsnoyrel fsautrenoyrel

F(8, 1362) = 5.31
 Prob > F = 0.000