

Inside Beninese Households: How Spouses Manage their Personal Income¹

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Abstract

This paper draws on an original dataset collected in Benin which features data at the individual level. We first provide evidence that suggest that husband and wife are not pooling their respective incomes and thus are not making expenditure decisions on the basis of one common budget. As we show, husband and wife are secretive and are individually allocating their personal revenue on private and public goods. We look at a simple model that helps us predict determinants of spouses' pattern of consumptions. Our empirical results indicate that spouse's influence, through his/her income, is always smaller than one self's income impact on both personal private and public goods consumption. Moreover, we find that individual private goods consumption is isolated from spouse's income effect which is not the case for public goods consumption.

Keywords: Intra-household allocation, Gender, Benin

JEL Classifications: D12, D13, C21, O15

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1. Introduction

As Rangal and Thomas (2005) underlines, there are numerous anthropological accounts casting doubts on the fact that the standard unitary model may be an appropriate representation of the West African household decision unit. Contrary to the idea that the household behaves as though it is maximizing a single household utility function, husbands and wives seem to have their own budgets. In that case who brings the money home should have an impact on spending decisions and not only the level of household income. Alongside these ethnographic findings there are considerable pieces of evidence in the literature on intra-household consumption decisions that the unitary model may not be true for many decisions. In fact several case studies of households located in developing countries have shown that the identity of persons earning is affecting the outcomes chosen by the household.³ Amongst the many theoretical alternatives suggested, a great deal of attention has been put on a model of cooperative household decision making in which different preferences and weights or individual's bargaining power affect the outcome. This model also posits that however decisions are made, the outcomes are Pareto efficient. Thomas (1990), among others, gives credit to this model by using Brazilian data.⁴

However, investigations pertaining to risk sharing within households implicitly reject a cooperative model of the household. See Dercon and Krishnan (2000) who investigates whether individuals are able to smooth their consumption over time and within the household by using data on adult nutrition in Ethiopia.⁵ Studies on intra-household production decisions also tend to find less support for the assumption of cooperative decision making. Notably, Udry (1996) draws on agricultural data from Burkina Faso and finds that crop yields are different depending on the gender of who controls a given parcel. Moreover he finds that households would be able to achieve higher total output by reallocating fertilizer and labour from men's plots to women's plots. Since marginal productivity for an additional unit of fertilizer or labour is not equal across all household's plots, he rejects a cooperative outcome. There is also another area of the literature concerned by the impacts of the introduction of new production opportunities on household's production decisions. Several studies concerned with this have rejected the hypothesis of a cooperative outcome.⁶

In this paper we first give evidence of non-cooperative behaviour within West-African households by using answers to open-end questions included in our survey questionnaire. [Hence we seek to highlight the determinants of spouses' individual consumption outcomes in a context where both husband and wife are retaining the sole control over their personal income.](#) Indeed what appears as a striking fact from our field investigations in Benin is that husband and wife are

³ Hoddinot and Haddad (1995) draws on data from Côte d'Ivoire and shows that changes in gender-specific control of income translate into different expenditure outcome. Attanasio and Lechêne (2002) by using Progres data from Mexico confirm that wife's relative income share is a significant determinant in household's outcome. See also Doss (1999) and Hallman (2000).

⁴ Results that are similar have been reported by Thomas and Chen (1994) for Taiwan and Thomas, Contreras and Frankenberg (2002) for Indonesia. Quisumbing and Maluccio (2003) with data on four developing countries also reject the unitary model and fail to reject the hypothesis that households are Pareto-efficient.

⁵ See also Doss (2001) who uses data on Ghana and Duflo and Udry (2003) who study resource allocation in Côte d'Ivoire.

⁶ Doss and McPeak (2005) presents a review of this literature and uses data on nomadic pastoral setting in Kenya to test models of household decision-making. Their empirical evidence suggest that household decisions are disputed: wives' ability to market milk is contested by husbands using migration decisions.

secretive with respect to income matters. They avoid sharing information on their personal earnings and are thus not making common budget. These behaviours, detailed in the following section, discredit common budget and cast doubts on the unitary and widely used cooperative models. Bringing such evidence was made possible since our first hand survey contains individual level data. The originality of this paper lies in the fact that our survey contains detailed information on each person's earned income and expenditure. African datasets and even those of developed countries rarely exhibit such feature, since most of them record data at the aggregate household level.

Such behaviour raises the question as to why spouses avoid disclosing information on their incomes and expenditure and keep this information private. Foremost they try to retain maximum control over their personal income and make expenditure according to their own preferences either on the consumption of the private or the provision of public goods. This way unwanted scrutiny from spouse is minimized if not avoided. *It also allows them to deal strategically with their partner with respect to public goods expenses. By giving a distorted downward image of their revenues, they try, to some extent, to depart from the status-quo public good expenses by passing on to the other some share of their common burden. This way more resources are available for their own private consumption. Our data allows us to test the significance of numerous determinants of individual consumption allocations. Thus we try to see to what extent intra-household secrecy really isolates one's expenditure both on private and public goods from his or her spouse's influence. To help us in our empirical analysis we build a simple non-cooperative model of spousal interactions.*

In the following section we present field evidence which underline the non-cooperative nature of Beninese spouse interactions. Section 3 describes a non-cooperative model based on which we formulate conjectures as to what variables in our estimated model would be expected to drive individual allocations. Section 4 gives a description of the survey on which our analysis is based. We present descriptive statistics on spouses' characteristics and expenditure. We then proceed in section 5 to test our conjectures by using our household dataset and present some consistency checks. Section 6 concludes.

2. Spouses Interactions

During our survey, we carried out several informal interviews with people which highlighted that spouses were secretive with one another concerning financial matters. A large proportion of women and men with whom we spoke in poor neighbourhoods of Cotonou said that their spouse was unaware of the course of their occupational activities and was thus unable to guess their income. No matter the gender or age or the respondent, many said: "the less he/she knows about my activities, the better it is." We also frequently heard statements such as: "I don't want him/her to know my income otherwise he/she will ask me to meet the cost of such and such expenses." Spouses seem overwhelmingly secretive and it even looks as if giving as little information as possible to his/her partner is quite natural. Our large scale survey included questions related to this and were addressed to **576 respondents** (out of 1179) being at least sixteen of age and in couple. Among those, we asked "Can you estimate your spouse's

revenues?": 79% answered no, 11% yes and 10% partially. Similar results were obtained for the question: "Do you think your spouse knows your revenues?": 76% answered no, 16% yes and 8% partially. What stems from this is a vision of couples consisting of secretive spouses who seem to rarely inquire about their partner's income or activities. It is a kind of convention allowing each member of the couple to keep his/her income more or less secret. Thus, by being secretive, spouses avoid sharing their personal earnings or making a common budget and retain the sole control over their personal income.

Evidence that we exhibited is also corroborated by the work of anthropologists. In his work entitled "Paths of Power: Control, Negotiation and Gender Among the Fon of Benin" Falen (2003) gives a lengthy account of how Beninese Fon⁷ couples interact and confirms their secretive behaviour: "The principle economic rule for a married couple is that finances are separate. Marriage by no means entails a complete sharing of money, property or any other wealth. On the contrary, spouses rarely share access to each other's money or belongings. The notion of a married couple's communal property or joint bank accounts is totally foreign to most *Fon* people. Indeed, keeping common finances would be a dangerous proposition, since money is always scarce and people are generally willing to take, borrow, beg, or in any way extract money from another." (p.164)

Guyer (1981) offers a nice review on the anthropological literature related to the problem of identifying a decision-making unit, such as the household. She reports similar evidence from other West-African societies. On Yoruba in Nigeria: "A woman's income is kept separate from that of her husband. There is no common budget for a man and his wife" (Marshall, 1964:189). Lloyd (1968) mentions that: "Yoruba women have a high measure of economic independence. They do little or no cultivation of farms, and those who process or sell farm products do so independently of their husbands; many are craft workers or traders in imported goods. This occupational independence facilitates the woman's right to use her own income as she pleases." From the Ewe in Ghana: "Household expenditure patterns in Battor certainly demonstrate that the household cannot be considered as a single unit in which effort and expenditure are directed towards optimizing welfare" (Lawson, 1972:95). Verduijn et al. (1974) reports that women in the Fante communities in Ghana also enjoy some degree of economical independence. The work of Hill (1975), cited in Guyer, states that: "It is abundantly clear... that West African husbands and wives seldom form a unified production unit...Of course this is not to deny that there is much mutual dependence and complementarity within the household." (p.123) Other field studies in West-Africa by Keita (1983), Lecarme-Frassy (2000) and Einarsdottir (2004) also underline a high degree of secrecy in spousal relationships and the independence of wives as to how they manage their income. Le Cour Grandmaison (1971) adds to this: "One must underline that women's economic independence is a very widespread custom in West-African societies. They had, and still have, a total independence in managing their inherited wealth from their lineage and in the use of goods they acquired through work. Women's insertion in urban area has not

⁷ Fon people represent the dominant ethnic group in south and central Benin. A quarter of all individuals in our dataset have this ethnic affiliation. Falen's account is also representative of other ethnic groups and to a certain extent of contemporary Benin.

changed this rule and salaried or self-employed women enjoy the same rights." (*Translation by the author*).

Before we launched our large scale survey we were aware that spouses were not making common budget. It was thus obvious that interviewing solely Beninese chiefs of households to get household level data would not be appropriate and would certainly lead to biased estimates. To reflect the fact that a household is a collection of separate individual economies we had to survey husbands and wives separately and privately. We obtained data that specify expenditure and how much income is controlled by each individual household member. As we mentioned, our goal is to check if non-cooperative behaviour renders one's expenditure independent from his or her spouse's influence. To what extent are spouses' financial spheres disconnected? To answer this we expose a simple model that helps us setting up econometric specifications for testing linkage between husband and wife's financial sphere.

3. A simple non-cooperative Model

In this section we present a model of non-cooperative interaction between husband and wife that allows studying how one's spouse income may influence his/her pattern of expenditure.⁸ Spouses avoid disclosing information on their financial activity in order to keep their income outside their spouse's reach and to fully benefit from it with maximum latitude. It is also, as we mentioned, because each tries to lower his/her contribution to the provision of the public goods as it is detrimental to his/her own consumption of private goods. Indeed, in order to implement this strategy, each one of them hides their income and tries to give the partner a blurred image of their earnings. This implies that spouses also hide their expenses as much as they can, otherwise it could lead one's partner to have a guess at his/her revenues.⁹ Were one individual able to know that their partner could spend more for the household, he or she would demand to pay less or claim some for his/her own private consumption. Therefore, neither of the spouses gets incited to reveal the true amount of their earnings.

Secrecy, as described here, does not imply that spouses do not interact with one another concerning the provision of public goods they provide. Of course a minimum of common management is required in a couple with respect to their respective gender role. Contributions to public goods are often made in Benin according to local social norms, fixing the intra-household allocation of expenses on different items according to gender. As the breadwinner, the husband has to take care of everything related to the house (rental fees, repair costs, electricity). Additionally he has to give money for housekeeping, to pay the schooling fees, apprenticeships, and the family's medical bills. His wife should take care of the family, cook and pay for water. In

⁸ Ulph (1988) and Rasheed (1996) also present non-cooperative household decision process with voluntary contributions to a public good.

⁹ Hiding revenues can appear an easier task than hiding expenses. However as a large fraction of couples don't interact during working hours because their work brings them in different parts of the city, meal expenses, transportation or medicines, money transfers for relatives or colleagues, gifts for funerals and momentary luxury spending such as alcohol and cigarettes can be concealed. Moreover even larger expenses can be kept away from spouse knowledge. A woman buying stocks of provisions to store can conceal them in her shop, taxi drivers paying for regular motorcycle or car repairs or fishermen buying new equipment can hide their investments.

many cases, the husband's income is not sufficient to cover the needs of the family, so the wife has to spend more for the household than what had been allotted to her.¹⁰

We do not assume that husband and wife can enter into binding and costless enforceable agreements. What we understand by this is that couple interactions are the results of self-enforcing agreements that correspond to individual strategies that the husband and wife are choosing to carry out. Both are designed by the subscripts $i=h,w$. Individually they allocate their income according to their own preferences and get utility from consuming a purely private good, x_i , with price normalized to one, their own public good provision k_i , with price p_i , and their spouse's public good provision k_{-i} . For the time being we make no assumption on the degree of substitutability or complementarity between k_i and k_{-i} . Usual assumptions on continuity and concavity apply to the utility functions of h and w : $u(x_i, k_i, k_{-i})$. The wife receives an exogenous income I_w and optimizes her utility by choosing x_w and k_w under the Nash conjecture about her husband's choice \underline{k}_h . Her decision problem can be described as follows:

$$\text{Max } u(x_w, k_w, \underline{k}_h) \text{ w.r.t. } x_w, k_w \quad (1)$$

$$\text{Subject to: } x_w + p_w k_w = I_w \quad (2)$$

In the setting we describe, spouses are selfish. There is no love or altruism and spouses' interdependence in the marriage operates only through the consumption of the public good.¹¹ The solution to this maximization problem can be described by the best-response function of the wife (and can be symmetrically expressed for the husband):

$$x_w = x_w(p_w, I_w, \underline{k}_h) \quad (3)$$

$$k_w = k_w(p_w, I_w, \underline{k}_h) \quad (4)$$

Individual consumptions of private and public good are functions of price, personal income and expected spouse's public good provision which in turn is function itself of spouse's income. What we are interested in is the differences of impacts from a change in I_{-i} and in I_i on x_i and k_i . How one's consumption reacts to changes in one's own income and to changes in their perceived partner's income. We aim at making prediction on the difference of magnitudes between these effects. This will of course depend on the degree of substitutability or complementarity between goods. By using the implicit function theorem we find that:

$$\frac{\partial x_w}{\partial I_w} = \frac{p_w u_{21} - u_{22}}{(p_w u_{12} - u_{22}) - p_w (p_w u_{11} - u_{21})} \quad (5)$$

$$\frac{\partial k_w}{\partial I_w} = \frac{(u_{21} - p_w u_{11})}{(p_w u_{12} - u_{22}) - p_w (p_w u_{11} - u_{21})} \quad (6)$$

For most cases both derivatives have positive signs. Indeed, in case of independence or complementarity between one's private and own public good consumptions ($u_{12}=u_{21}=0$ or u_{12} and $u_{21}>0$), both derivatives are positive. For low level of substitutability, having simultaneously

¹⁰ For additional details on marital roles see chapter 5 of Falen (2003).

¹¹ With a similar framework Bergstrom, Blume and Varian (1986) show that for such a game there exists a Nash equilibrium.

both $p_w u_{12} > u_{11}$ and $p_w u_{12} > u_{22}$, or high level ($p_w u_{12} < u_{11}$ and $p_w u_{12} < u_{22}$) the sign is also positive. Otherwise the sign is uncertain. Income effect on private good is larger than on public good if this condition is satisfied: $(p_w - 1)u_{21} > u_{22} - p_w u_{11}$. We then compute derivatives with respect to spouse's income:

$$\frac{\partial x_w}{\partial I_h} = -p_w \frac{\partial k_w}{\partial I_h} = \frac{(u_{23} - p_w u_{13})}{p_w u_{11} - 2u_{12} + \frac{u_{22}}{p_w}} \left(\frac{\partial k_w}{\partial I_w} \right) \quad (7)$$

To analyse equation (7) we first focus on the simplest case where private and public goods are independent ($u_{12} = u_{13} = 0$). We can obtain equations (8) and (9) which give respectively conditions under which personal income effect is greater in absolute value than spouse's income effect both on x_i and k_i .

$$1 > \left| \frac{u_{23}}{u_{22}} \left(1 - \frac{\partial x_w}{\partial I_w} \right) \right| \quad (8)$$

$$1 > \left| \frac{-u_{23}}{p_h^2 u_{11} + u_{22}} \right| \quad (9)$$

We see that these conditions hold for a wide range of levels of substitutability or complementarity between both public goods (u_{23}). They hold up to a certain point which is even larger than perfect substitutability or complementarity (point where $u_{22} = u_{23}$). If both public goods are substitute ($u_{23} < 0$), from equation (7) we see that the derivative of x_i with respect to I_{-i} is positive and negative for k_i . Each respective sign of derivative is reversed for complementarity ($u_{23} > 0$). These results are in accordance with intuition. These conditions and the signs of the derivatives also hold for more general cases: if we depart from independence by having relatively low or reasonable levels of substitutability or complementarity between private and public goods (u_{12} and $u_{13} \neq 0$).

Thus under reasonable assumptions on the independence or substitutability between private and public goods (u_{12} and u_{13}), we get two conjectures that we check empirically in Section 5. First, we expect that personal income has a greater effect on one's consumption pattern than spouse's income. Second, we expect that if public goods consumptions (k_i and k_{-i}) are substitutes then marginal effect of I_{-i} on x_i is positive and negative on k_i . If both public goods are complements the signs are reversed. Finally, we aim to compare the magnitude of the effects of I_{-i} on x_i and k_i . Our simple model predicts that for relative price on public good (p_i) smaller than one, the effect would be larger on public good consumption. Since we lack data on prices we are unable to check this prediction. Still below we look at the differences in terms of magnitudes and significances of the appropriate coefficients and obtain interesting results.

For the purpose of establishing a simple empirical methodology we only sketched a one-shot game but to mimic long-term marriage relationship we can think of infinitely repeating this non-cooperative game. It is more than plausible that this infinitely repeated stage game has multiple Nash equilibria. Social conventions regarding the respective responsibilities of husbands and wives can suggest to spouses a particular equilibrium. From this context, as Kreps (1990)

points out, there may emerge a self-evident way to contribute to the public goods that can lead to a particular Nash equilibrium.

Spouse's secrecy prevents the household to benefit from efficiency gains usually reachable with the repetition of the game. The Folk theorem indeed claims that cooperative outcomes are sustainable in infinitely repeated non-cooperative games as long as the discount factor is not too high. In this case, however, as neither incomes nor strategies are observable, no such pareto superior outcome can be reached. In these conditions, detection of fraud or deviation from the cooperative agreement is in fact rendered impossible. This explains why agents may be stuck in a pareto-inferior equilibrium, supported by social norms. Indeed, the threat points of this game consist mainly of reputation losses: wives can complain to their parents-in-law (and then to their own parents) about their son, unable to provide decent living conditions to his family (see Falen 2003, chapter 5). Her husband endowed by custom with most of the burden is able to force his wife to provide a bigger share in the family budget. Would she refuse to make efforts, she, in last resort, could be repudiated (which bears important social consequences).

3.1 Methodology

We now intend to estimate equations (3) and (4) for various types of expenditure in order to check our two conjectures. From our setting, individual consumption of private good and public good are functions of price, personal income and expected spouse's public good contribution. We can thus think of a linear function to estimate both x_w and k_w in nominal terms that would incorporate these three variables. For potential problems of measurement errors in the individual income variable we use instead individual total expenditure (*totex*).¹² Since k_{-i} is not directly observable we need to find a proxy. Taking the actual k_{-i} value in our specification could lead to endogeneity problem: this variable being itself a function of the explained variable. A better way to work in order to obtain consistent and unbiased estimators is to proxy expected spouse's public good provision by taking spouse's income I_{-i} , which is in turn replaced by *totex*_{-i}. This allows us to obtain an estimation of both income effects. Despite the fact that we advocated widespread secrecy we can justify the presence of spouse's total expenditure in our specification. Indeed, in order to maximize their utility and to manage the joint provision of public goods they provide, spouses try to guess, accurately or not, their partner's income so that they can gauge k_{-i} . We can thus rewrite our specification as follows:

$$x_{ij}, k_{ij} = \alpha_{0j} + \alpha_{1j} \text{totex}_i + \alpha_{2j} \text{totex}_i^2 + \alpha_{3j} \text{totex}_{-i} + \sum_{r=1}^{R-1} \delta_{ij} z_r + \varepsilon_j \quad (10)$$

We add to our specification the square of *totex*_i so that a quadratic relationship is allowed. To control for potential price effects we use z_r which is a vector of dummy variables indicating household's district location and ε_j is the error term. Expenditure data are aggregated

¹² One can argue that individual income may be endogenous: other variables contained in the error terms such as tastes and preferences, which would reflect a decision to consume goods rather than leisure, could also be correlated with this regressor. We argue that by using total expenditure instead this source of endogeneity is likely to be mitigated. Total expenditure, reported on a monthly basis, is the sum of all expenditure made in our five categories, plus savings, rent paid and expenditure on a series of durable goods (funeral ceremony, pieces of furniture, etc).

into five categories denoted by j . They are expressed in nominal terms and reported on a monthly basis. Three of those are public goods expenditure: food and other daily non-durables (charcoal, gas for cooking, petrol for lamp, etc), health (medications, hospital fees, etc) and schooling expenditure. Two are private goods consumption: personal expenditure (alcohol, meals out, cigarettes, entertainment, etc) and clothing. Clothing includes mostly personal clothing and may contain a small fraction of clothing for children that we were unable to disentangle in our data. To get those precise data, each individual interviewed was asked to complete a personal spending diary for a period of one week concerning food and personal expenditure, for a period of six months for clothing and health and for a period of 12 months for schooling expenditure. In [Table 1](#) we show means and standard errors for these monthly budget shares.

In equation (4), k_i is function of spouse's expected public good contribution. By estimating several public goods expenditure categories with respect to spouse's total expenditure, the interpretation of this coefficient becomes less obvious to interpret. In a one public good setting the coefficient's meaning is straightforward: total expenditure is positively linked with the provision of that good and the sign of the marginal effect depends on substitutability. However with multiple public goods, when regressing on a particular k_{ij} , marginal spouse's total expenditure effect can represent the effect of a variation of contribution in k_{-ij} or in a different public good, or both. For example, a wife can react to her husband expected increase in medication expenditure by varying her own health expenditure or by varying her expenditure on daily food. In this case we should interpret $totex_{-i}$'s coefficient as the marginal effect from variation in spouse's aggregate level of public good provision. If we think that public goods contributions are somehow isolated from one another then the interpretation is simplified. The coefficient of $totex_{-i}$ on k_{ij} can be read as the marginal effect of an expected change in k_{-ij} . Whether categories of public goods expenses are isolated from one another has to be checked with formal tests. This would require panel data which we lack. In any case, interpretations of results presented in Section 5 should be made with that in mind.

Our specification in (10), directly inspired by our model, uses nominal expenditure values. Therefore it does not satisfy adding up, a property of the standard Working-Leser expenditure function. This function is widely used in works on household-level analysis of pattern of expenditure (see Hoddinott and Haddad (1995) and Quisumbing and Maluccio (2003)). Nevertheless, inspired by these two papers we can enrich our specification, as a consistency check, and add a series of variables dem_v which represent the proportion of demographic groups v in one household (male between 16-59, female older than 60, etc). The idea being that one individual may spend his/her income differently according to the demographic distribution within the household. Moreover, since we are working with individual-level data we also add variables that may bring additional explanatory power to our estimations: *gender*, *age* and *education*. We restrict ourselves to these three basic and relevant variables that we suspect to have explanatory power. The variable *gender* may highlight intrinsic gender preference or gender roles (gender is represented by the dummy *female* taking value one for wives) and *education* can affect spending pattern (*deduc* is a dummy taking value one if individual has not attended primary school). Age may reflect the fact that irrespective of the household's demographic distribution, young

individuals have different expenditure patterns than long established members of household. Our new specification takes then this form:

$$\begin{aligned}
 x_{ij}, k_{ij} = & \alpha_{0j} + \alpha_{1j}totex_i + \alpha_{2j}totex_i^2 + \alpha_{3j}totex_{-i} + \alpha_{4j}gender_i + \alpha_{5j}age_i \\
 & + \alpha_{6j}deduc_i + \sum_{r=1}^{R-1} \delta_{rj}z_r + \sum_{v=1}^{V-1} \lambda_{vj}dem_v + \varepsilon_j
 \end{aligned} \tag{11}$$

4. Description of our Survey

Data used here was collected in spring 2004 in the two districts of Vossa and Enagnon located in the outskirts of Cotonou (a city of about 1.1 million inhabitants) and known to the city's authorities as being the poorest. Enagnon is a dense slum located by the Atlantic Ocean shore. It received low attention from the authorities of Cotonou and important sanitary problems have not yet been tackled with. Half of its area of 60.1 hectares has been divided into plots. Part of Enagnon is called Enagnon-plage inhabited by fishermen living in huts on the beach. Vossa also has a community of fishermen as it is located near an inner bay of fresh water. It also has sanitary problems since its 63 hectares are encircled by stagnating waters which represent an important vector of disease. Vossa has not yet been divided into plots and none of its roads is paved. The district is clearly left to itself. Both of these districts are close to downtown Cotonou: a significant part of their inhabitants work and commute on a daily basis.

Overall we surveyed 496 households in Vossa, Enagnon and Enagnon-plage. We selected each household randomly. During interviews we collected housing information and information on each member: activity, religion, work, education, etc. Enumerators were required, for all members older than fifteen, to fill in a sheet detailing their expenses on durable goods made during the last six months and to report as precisely as possible their expenses on non-durable goods for the week previously ended. In order to privately tackle tricky issues related to expenses or income, all members of each household were interviewed separately. Particular attention was thus put on confidentiality in order to obtain maximal accuracy and our enumerators strictly abided by those rules. We thus obtained data that specify expenditure and how much income is controlled by each individual household member. Additional details on our survey methodology can be found in Appendix. Overall households represent 2083 individuals. From that, only 576 are members of a couple, this remaining sample divided into 294 women and 282 men. It is important to note that members of couple considered here are those for which both spouses were surveyed. This means that both spouses are living in the same household (at least partly) and thus having regular interactions. We therefore discarded couples for which one spouse was living away.

Since we have polygamous households there are more women than men in our dataset. For some rare households (eleven in total) we registered on the questionnaire numerous wives for one husband. A significant share (21%) of all individuals are involved in a polygamous relationship. However it does not translate into a wide gap in terms of gender proportions in our survey (51%/49%) since many husbands who practise polygamy live in the presence of only one wife. Therefore only one wife was surveyed. Polygamy can appear to be a problem with respect

to the modelling of intra-household decision process we showed previously. Indeed, it brings additional players which might complicate the resolution of the game (possibility of collusions, etc). However, one needs to know how polygamy works in Benin. Falen (2003) describes how spouses interact among one another in their daily activities. According to his account, and to our own informal interviews, a polygamous household can be considered as many separated couples. Through various ways the husband makes sure that each of his wives knows as little as possible with respect to his involvement with the other(s). Moreover, as jealousy is widespread among wives of men practicing polygamy, seldom do they interact and share daily expenses or public good expenditure. Each has a tendency to take care of her own offspring and to manage her 'household' separately. Dissension among wives is a source of problems. Falen reports that: "because of co-wife jealousy, a polygynous man may invite one wife to live in his own house, while renting a house elsewhere for other wives. If he has multiple wives living in his compound, he must provide separate lodging for each one." (p.57) For polygamous households we thus consider, for regression purposes, the relationship between the husband and each of his wife independently. In those specific cases we allocated the same value for spouse's total expenditure for each wife. For husbands we take an average over all his wives' total expenditure. That only concerns eleven households for which we have data on all wives. Otherwise the vast majority of polygynous husbands live with only one wife and it was thus impossible to compute an average.

Table 1 shows descriptive statistics of all types of budget shares expenditure, some spouses' characteristics and households' composition. It appears that men are on average significantly older, more educated and have larger levels of total expenditure than women in couple. Women put on average a larger share of their total expenditure in clothing, saving devices and food and non durables whereas men are spending larger shares on personal expenditure, health and schooling. These figures are in accordance with local social norms in terms of public goods expenditure that we described earlier.

5. Estimating Expenditure Functions

In [Tables 2a to 2e](#) we present the results of ordinary least squares estimations of equation (10) and (11). In each table, the first column shows the simplest specification. In the second column we add the proportion of demographic groups in one household and the third incorporates age, education and gender variables. The fourth column displays results based on the restricted sample of non-zeros expenditure. For the restricted sample we only show estimates from the second specification: other specifications' estimates are similar.

We see that results from all specifications are indicating that total expenditure is strongly significant in explaining the five expenditure categories we have constructed. It has an overall positive and increasing impact, whether its quadratic effect is significant or not. In all cases by including or not a quadratic term (specifications without total expenditure square are not shown), marginal effect from total expenditure is significantly larger (at 5%) than the one from spouse's total expenditure. This validates our first conjecture.

Regarding our second conjecture, estimates of the coefficient of spouse's total expenditure is positive only for food and daily expenditure. According to equation (7), if private and public goods are lightly substitutes or independent then these estimates indicate that the partner's public provision is a complement to one's provision of food and daily expenditure. If we consider this coefficient as the partner's provision of food and daily expenditure it means that as it increases, spouse will also tend to increase its own provision as both are complements. This result conforms to our own field observations and Falen (2003)'s accounts: "a man typically buys the family's stock of dry food goods such as sacks of dried corn kernels, manioc flour, and rice. With the money a wife makes in her business at the market or at home, she is responsible for buying the more perishable ingredients of sauce: tomatoes, onions, hot peppers, garlic, salt, oil, meat, fish, and leafy greens. She may also be responsible for supplying the family with soap and collecting wood or buying charcoal for cooking." (p.131) This pattern of expenditure shows that both spouses' contributions can be considered as complements. All specifications concerning health and schooling expenditure indicate that husband and wife contributions are substitutes. To our knowledge no such specific sharing rule exists, as the one we related for food, for both these categories and results do appear intuitive.

Results from the series of Tables 2a-e show that *female's* coefficient is negative and significant for health and food and daily expenditure. It is negative but non-significant for schooling. These results are in line with the breadwinner status that is traditionally granted to the husband and with social conventions making him the first responsible for schooling and health expenditure. According to our estimates, husbands are also more susceptible to make larger personal expenditure. This also fits the fact that socially it is more accepted for husband to eat outside, smoke cigarettes, enjoy alcohol in cafés and buy other forms of entertainments. Interestingly education seems only to significantly matter for schooling expenditure: less educated parents are investing less in their children education everything else being constant (see Drèze and Kingdon (2001)).

One can consider that estimation equation by equation is not appropriate. Indeed decisions on expenditure, with respect to a series of goods, can be thought of being made simultaneously over all available goods with respect to a given income. That is to say if you increase the share in some specific expenditure, it will have an effect on the others. Then estimations should then be done on a system of equations. We thus perform a seemingly unrelated regression estimation on a system that integrates all five categories. Results are displayed in Tables 3a and 3b and they confirm our previous results with respect to our first two conjectures and this for all expenditure equations.¹³ Moreover, if we want to compare magnitudes of the coefficients of spouse's total expenditure the testing across categories requires the joint estimation of a system of demand equations. Tests results (see Table 4) show that this coefficient is significantly larger for health than for all other categories. It is relatively smaller for personal expenditure (except when compared to clothing). As we mentioned earlier since we lack measures of prices we are not able to check formally if these estimates are in line with equation (7). Remember that our model predicts that for relative price on public good (p)

¹³ Tables only show SURE estimates for the first two specifications. They are similar for the third.

smaller than one, spouse's total expenditure effect should be larger on public good consumption. However according to these preliminary results it does not seem to be the case. Most probably health goods' price index is relatively larger than the one of private goods categories. This is plausible considering that an important share of public health expenditure are made on drugs, hospital fees or consultations which have high prices relative to personal expenditure (alcohol, meals out, cigarettes, entertainment, etc).

More interestingly, our results show that only for private goods categories spouse's total expenditure is non significant (except for the third specification for personal expenditure). Contrary to public goods purchases, private goods consumptions appear to be isolated from the spouse's total expenditure. This result tends to show that spouses are subject to the influence of their partner resources when it comes only to their purchase of public goods. Individuals will consider strategically their spouse's income in setting their public goods provision whereas private goods consumption is only dependent on the level of their own expenditure. It conforms to our separate spheres framework. Secretive individuals deal with their own income and minimize spouse's influence on their pattern of expenditure. This result may also be attributed to the fact that spouses have a minimum of interactions with one another concerning the provision of public goods but very limited concerning private good consumption.

Our survey contains a series of questions related to [vehicles of saving](#) used by individuals and how much money was put aside in those, see Table 1 for descriptive statistics on this. In Cotonou, different means to secure savings are available. On the one hand, for the vast majority of poor inhabitants only informal associations and institutions are accessible, such as tontinier (itinerant banker or money collector), insurance groups and rotating savings and credit association (roscas)¹⁴. On the other hand, less risky vehicles of savings such as a bank account in either a private bank or a public institution (amongst other: the Beninese National Post Service) are only accessible to rich individuals because they entail important charges. This way individuals' savings are measured imperfectly. Savings accumulated outside these vehicles – notably those put under the mattress- were not reported and computed. With this data we first compute probit estimates on whether or not one individual uses at least one of those vehicles without distinction by using the same three specifications as previously. [Table 5](#) displays those estimates which show that total expenditure has a positive and slightly declining effect on the probability of joining. Spouse's total expenditure is not significant in all specification. It appears that female are more inclined to use saving devices (being female increase the probability by 8%) while education and age have no significant impact. Whether these savings are to be used for the purchase of a private or public good is difficult to say. However Dagnelie and LeMay (2007) shows that in analysing roscas in Cotonou, uses of pots by individuals are mainly directed towards small business investments and possibly private consumption. It would then not be entirely wrong to think of savings as an expenditure that does not directly benefit to the spouse. As for our previous expenditure categories, in [Table 6](#) we present estimates for savings in nominal value. Similarly to probit results: spouse's total expenditure is not significant, savings is

¹⁴ Dagnelie and LeMay (2007) provides a description of roscas and LeMay (2007) gives a description of informal insurance groups based on the same Beninese survey.

mainly driven by one's total expenditure and females tend to put larger sums of money in saving devices. With respect to the influence of spouse's total expenditure, our precedent results on private consumption estimates are thus reinforced.¹⁵ Table 5 and 6 also show that education seems to have no impact on saving behaviour.

Consistency Checks

Polygamy can represent a problem in terms of modelling since it involves additional players and may complicate interactions in our simple framework. However, we said previously that we could consider a polygamous household as many separated households since the male head deals with his wives independently. Anthropological and informal field evidence indicates that we could interpret and model polygamy as multiple independent couple interactions. This way the previous non-cooperative model we sketched should still be adequate in describing multiple one-on-one relationships among polygamous households. To ensure empirically that polygamy was not affecting our results, we have carried out all the regressions presented in Tables 2a-e, 3a-b, 5 and 6 by incorporating a dummy for members of polygamous households (123 individuals in total). We also ran the same regressions on a restricted sample including only members of monogamous couples. Our results (not shown here) are robust to these modifications.

To further check consistency, we ran forward and backward stepwise ordinary least squares regressions on each of the expenditure shares, with a threshold p-value of 0.2. We did regressions adding the square of the spouse's total expenditure so that a quadratic relationship is allowed. Despite potential endogeneity, we also ran regressions by replacing the variable *totex_i* by *income_i*,¹⁶: all the estimates obtained confirm our previous results. Moreover we ran least median squares regressions to check the values of our coefficients estimates and found that they were similar. In addition, we present in Table 7 Tobit estimations for the first specification (equation (10)) which take into account the truncation of some of the dependent variables. Results for the other two specifications are similar and not presented. These new results agree with the ones we obtained previously: one's total expenditure has a positive and larger impact in absolute value than spouse's total expenditure. Sign and significance of I_i 's coefficients are the same for each respective expenditure category. The Tobit model is appropriated if we think that zero values are corner solutions of households whom, given their preferences, choose not to consume due to realised prices and income. Zero values can also be values that are not set so by truncation: individuals can afford to consume but prefer not. In this case our previous ordinary least square regressions are more appropriate.¹⁷

¹⁵ All the results we display in Section 5 are robust to heteroskedasticity.

¹⁶ The income variable is defined as the monthly sum for each individual of all income-generating activities including those from formal and informal sectors and those from self-employed activities. It also included earnings from interest on loans made, rents on house or apartment and received transfers. In our overall sample only 10% work in the formal sector, being either employed privately or by the state.

¹⁷ Another explanation for zeroes is infrequent purchase. Some of the goods may be consumed during the survey period but not purchased during that period. In this case a purchase-infrequency model is indicated as it treats zeroes as resulting from the durable nature of a good. This can be the case for two of our expenditure categories: health and clothing. However, in our case it is less likely since we ask for data on consumption over the past six months.

6. Conclusion

Our very first field evidence showed that Beninese households are more of a collection of separate individual economies. We thus surveyed husbands and wives separately and privately. With our non-cooperative model we are able to make simple predictions in terms of spouse's influence on one's pattern of consumption. What we show is that spouses' financial spheres are relatively disconnected. For our two private goods categories and for savings, spouse's income is not significant in explaining one's individual consumption. Moreover, from our estimates on the three public goods categories the magnitude of spouse's income impact is significantly smaller than one's own income. Raising wife's income will influence her private and public consumption through her capacity to buy more according to her preferences. In turns this will only influence significantly her husband's provision of public goods through his best response function. Our findings are robust to changes in functional forms and to Tobit and SURE estimations. They indicate that members of a couple are secretive and relatively independent and that their union is best depicted as interdependence through the consumption of public goods.

Policy implications of this investigation are important. If a policy maker were to aim at raising women's financial capability, he could simply transfer them money directly, knowing that risk of leakage into their husband's pocket is minimized since spouses are not pooling income. Raising a certain type of public good expenditure would have to be done according to social conventions regarding the respective responsibilities of husbands and wives and to potential spouse's income effects that we highlighted. As we said and showed, contributions to public goods are often made in Benin according to local social norms influencing the intra-household allocation of expenses on different items according to gender. Notwithstanding that, spouses are involved in a strategic game and are attempting through their best response function to minimize their role in public good provision.

7. Appendix 1: Survey Methodology

We selected households according to a random process. In Enagnon we succeeded in obtaining a map of the city and performed a simple selection of lots according to an implemented random process. In this district it often happens that many households live on the same lot in semi-detached rooms. Enumerators selected one room on a lot according to a clock-wise selection varying from lot to lot (for the first lot of the day they selected the first room clock-wise, for the second one the second room clockwise and so on). In Enagnon-plage and Vossa we used a pseudo-random process by which every tenth lot according to a specific direction was picked and then room selections were done in a similar fashion as in Enagnon. Overall only 3 households categorically refused to be surveyed and were replaced by other randomly selected households. Enumerators were asked to pass several times and at different moments of the day, until contacts were established in such a way that none of the selected households were skipped. The most qualified of our enumerators also acted as a supervisor and visited many households already interviewed in order to check the accuracy of the responses. Other than that we analysed every completed questionnaire closely. Several appointments were held with each team of enumerators and in case of incoherence or lack of answers we regularly sent them back on the

field. Questionnaires often needed successive rounds of checks until final approval. As mentioned above we emphasized the fact that the interview with every single household member had to be carried in his/her sole presence in order to get as precise and reliable information as possible. Fear of divulging information in front of other members would have led individuals to lie or to refuse to answer. On average our four teams of two enumerators completed eight questionnaires a day. The taking account of intra-household secrecy greatly lengthened the survey by requiring specific appointments with each adult member. We compensated every household for their precious time by donating 1500 francs CFA.

Tables

Table 1: Individual Characteristics

	Sample In Couple		Women in Couple		Men in Couple	
	mean	se	mean	se	mean	se
<u>Expenditure (monthly budget shares where applicable):</u>						
Food & non durable expenses (gaz, transport, etc)	0.683	0.008	0.713	0.010	0.651	0.011
Personal expenditure (meals out, cigarettes, alcool, etc)	0.040	0.001	0.036	0.002	0.044	0.002
Clothing (for all members of household)	0.054	0.002	0.060	0.004	0.048	0.003
Health	0.033	0.003	0.019	0.003	0.048	0.005
Schooling	0.031	0.003	0.011	0.002	0.052	0.004
Use of a saving device (tontinier, rosca, bank account, IMF account, indemnity group)	0.694	0.019	0.718	0.026	0.670	0.028
Expense in saving device	0.138	0.006	0.157	0.008	0.119	0.008
Total expenditure (nominal value)	76723	2769	56452	2357	97856	4785
Total spouse's expenditure (nominal value)	78975	2917	101477	4920	55516	2327
<u>Spouses characteristics:</u>						
Female	0.510	0.021	1.000	0.000	0.000	0.000
Polygamous	0.214	0.017	0.228	0.025	0.199	0.024
Age	38.220	0.490	34.833	0.604	41.752	0.721
Has no education	0.462	0.021	0.656	0.028	0.259	0.026
Household size	5.182	0.098	5.272	0.142	5.089	0.134
Vossa	0.283	0.019	0.282	0.026	0.284	0.027
Enagnon	0.462	0.021	0.466	0.029	0.457	0.030
<u>Proportion of households members:</u>						
Male, aged 16-59	0.277	0.006	0.275	0.008	0.278	0.008
Female, aged 16-59	0.288	0.005	0.288	0.007	0.289	0.007
Male, child of head, 6-15	0.105	0.006	0.108	0.008	0.102	0.008
Female, child of head, 6-15	0.095	0.006	0.096	0.008	0.093	0.008
Children of head, < 6	0.176	0.008	0.174	0.011	0.179	0.011
Male, not child of head, 6-15	0.012	0.002	0.012	0.003	0.012	0.003
Female, not child of head, 6-15	0.021	0.003	0.020	0.004	0.021	0.004
Children, not of head, < 6	0.004	0.001	0.004	0.002	0.004	0.002
Members older than 60	0.023	0.003	0.023	0.005	0.023	0.005
Number of observations	576		294		282	

Table 2a: Determinants of Food and Daily Expenditure

	OLS full sample								
	coeff.		se	coeff.	se	coeff.	se		
Total expenditure	0.610	***	0.044	0.605	***	0.044	0.596	***	0.049
Total expenditure square	-6.28E-07	***	1.39E-07	-6.28E-07	***	1.38E-07	-6.15E-07	***	1.39E-07
Spouse's total expenditure	0.037	**	0.019	0.033	*	0.020	0.043	*	0.023
Household size				225.02		484.44	557.289		481.81
Male, aged 16-59				43592.45	**	17061.33	42498.6	***	15645.46
Female, aged 16-59				17864.15		21464.55	15461.44		20603.08
Male, child of head, 6-15				36413.70	**	16556.10	35352.98	**	15144.19
Female, child of head, 6-15				28806.45	*	15878.14	28074.73	*	14384.74
Children of head, < 6				32692.27	**	15607.15	26661.87	*	14732.90
Male, not child of head, 6-15				14417.47		28177.61	10055.93		26531.36
Female, not child of head, 6-15				15647.83		16850.17	17470.17		15180.52
Members older than 60				36361.23	**	16977.58	49979.05	***	16896.82
Vossa	-6360.98	***	1543.78	-4988.05	***	1726.37	-5080.917	***	1723.38
Enagnon	262.60		1419.90	941.01		1500.10	1002.53		1515.24
Female							-4211.89	**	2091.66
Age							-219.42	*	118.11
No education							498.72		1657.27
constant	5376.15	**	2291.56	-26649.47		18062.19	-16371.28		17949.50
# obs.	576			576			576		
adj R2	0.70			0.71			0.71		
F-statistic overall regression	80.83	***		35.85	***		33.04	***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 2b: Determinants of Health Expenditure

	OLS full sample						OLS restricted sample	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.472 ***	0.085	0.459 ***	0.079	0.396 ***	0.078	0.555 ***	0.111
Total expenditure square	-7.25E-07 ***	1.46E-07	-6.98E-07 ***	1.38E-07	-6.17E-07 ***	1.32E-07	-8.88E-07 ***	1.92E-07
Spouse's total expenditure	-0.084 ***	0.020	-0.090 ***	0.027	-0.065 **	0.029	-0.125 **	0.052
Household size			994.54	1462.00	659.19	1491.13	1377.06	2570.52
Male, aged 16-59			-48812.83	137318.10	-44959.69	138876.10	-163725.70	230956.10
Female, aged 16-59			-24995.65	142857.10	-19187.24	144128.00	-125397.80	236755.50
Male, child of head, 6-15			-42148.97	138389.00	-38381.59	140291.20	-149041.30	230310.70
Female, child of head, 6-15			-28962.47	137596.30	-25384.11	139150.80	-104658.80	230298.50
Children of head, < 6			-31235.47	137668.90	-21138.59	138278.50	-131462.50	230050.80
Male, not child of head, 6-15			38851.98	168434.10	47586.60	169219.70	-66423.88	267956.00
Female, not child of head, 6-15			-49663.95	137721.40	-49190.53	139973.80	-132896.70	230878.50
Members older than 60			-23226.07	136521.60	-38836.53	140517.90	-133983.80	230314.00
Vossa	7932.70 *	4074.21	4530.55	4371.62	4373.70	4357.93	7587.89	7336.35
Enagnon	518.16	3722.40	-75.52	3859.56	-224.63	3831.44	2724.69	6387.43
Female					-6359.65 **	2895.75		
Age					277.77	190.56		
No education					-82.27	2812.93		
constant	-7919.83 **	3844.50	23859.62	140566.60	15384.21	140383.50	127891.30	234502.00
# obs.	576		576		576		322	
R2	0.14		0.15		0.16		0.16	
F-statistic overall regression	7.75 ***		3.17 ***		3.78 ***		2.43 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 2c: Determinants of Schooling Expenditure

	OLS full sample						OLS restricted sample	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.096 ***	0.021	0.087 ***	0.020	0.070 ***	0.022	0.101 ***	0.025
Total expenditure square	-4.62E-08	7.87E-08	-3.09E-08	7.79E-08	-9.79E-09	7.98E-08	-8.21E-08	7.95E-08
Spouse's total expenditure	-0.009 *	0.006	-0.015 **	0.006	-0.010 *	0.006	0.007	0.009
Household size			732.99 ***	235.28	621.52 **	258.29	1331.33 ***	348.26
Male, aged 16-59			-44309.20	38735.70	-43373.82	37665.38	-101955.20 **	48236.19
Female, aged 16-59			-54485.67	39608.41	-52922.83	38470.96	-126149.70 ***	48387.86
Male, child of head, 6-15			-50846.98	39038.80	-49575.89	37944.87	-123245.20 ***	47671.48
Female, child of head, 6-15			-50268.34	38235.48	-49526.01	37204.37	-120884.30 **	47317.25
Children of head, < 6			-52385.51	38560.26	-49614.18	37220.16	-126146.80 ***	47334.58
Male, not child of head, 6-15			-70357.02 *	42719.45	-68708.11 *	41605.69	-148696.30 ***	50597.48
Female, not child of head, 6-15			-48000.61	38580.88	-47934.75	37658.66	-122986.00 **	48024.36
Members older than 60			-38615.79	38488.00	-44026.23	38496.23	-93089.89 *	48399.95
Vossa	1758.11 **	723.92	578.77	636.73	545.59	627.96	1100.16	1291.77
Enagnon	723.62	549.47	461.39	560.32	427.26	562.40	-105.01	1236.18
Female					-833.40	700.82		
Age					93.63 **	38.76		
No education					-974.99 *	525.30		
constant	-3558.03 ***	1074.29	44161.10	38957.33	41444.74	37456.09	108585.80 **	48120.55
# obs.	576		576		576		236	
R2	0.34		0.41		0.42		0.50	
F-statistic overall regression	14.75 ***		9.55 ***		11.48 ***		7.06 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 2d: Determinants of Clothing Expenditure

	OLS full sample					OLS restricted sample			
	coeff.	se	coeff.	se	coeff.	se	coeff.	se	
Total expenditure	0.281 ***	0.047	0.271 ***	0.045	0.283 ***	0.049	0.238 ***	0.054	
Total expenditure square	-2.01E-07	1.73E-07	-1.85E-07	1.76E-07	-1.99E-07	1.75E-07	-4.59E-08	2.10E-07	
Spouse's total expenditure	0.022	0.017	0.017	0.019	0.019	0.021	0.018	0.019	
Household size			738.81	1071.14	1261.45	1140.52	558.02	1144.88	
Male, aged 16-59			84153.69 **	40356.00	81240.07 **	39569.97	52330.62	48044.29	
Female, aged 16-59			92894.05 **	41800.68	87709.01 **	40902.76	66819.06	51192.50	
Male, child of head, 6-15			72279.50 **	32526.55	69831.79 **	31634.72	45032.60	38542.06	
Female, child of head, 6-15			77472.89 **	33317.69	74990.76 **	32607.02	49598.31	40790.42	
Children of head, < 6			80960.63 **	34268.06	69646.19 **	32725.56	49988.76	42408.57	
Male, not child of head, 6-15			84354.78 **	40877.74	74837.60 *	38821.50	58769.51	48494.51	
Female, not child of head, 6-15			102334.10 ***	36631.98	104414.50 ***	36404.15	79516.16 *	45009.98	
Members older than 60			67258.82 *	37735.63	88989.93 **	40622.34	34562.18	44897.71	
Vossa	7293.01 ***	2520.09	7106.61 ***	2477.09	7055.58 ***	2476.88	5430.89 **	2717.59	
Enagnon	5229.00 ***	1922.12	4437.99 **	2105.23	4577.44 **	2113.72	4193.06 *	2241.31	
Female					-2077.71	2476.19			
Age					-360.41 ***	133.63			
No education					-376.72	1828.00			
constant	-3383.05	2686.89	-89737.19 **	40901.77	-74023.02 *	38878.17	-54985.81	49477.33	
# obs.	576		576		576		478		
R2	0.29		0.30		0.31		0.32		
F-statistic overall regression	16.05 ***		7.61 ***		6.56 ***		6.20 ***		

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 2e: Determinants of Personal Expenditure

	OLS full sample						OLS restricted sample	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.0354 ***	0.0046	0.0383 ***	0.0047	0.0318 ***	0.0052	0.0381 ***	0.0050
Total expenditure square	-2.92E-08 **	1.31E-08	-3.39E-08 ***	1.29E-08	-2.54E-08 **	1.29E-08	-3.34E-08 **	1.33E-08
Spouse's total expenditure	-0.0011	0.0021	0.0005	0.0021	0.0040 *	0.0023	0.0001	0.0021
Household size			-163.50 **	63.70	-160.73 ***	62.34	-147.88 **	65.42
Male, aged 16-59			-832.09	2632.09	-569.92	2565.04	331.20	2776.18
Female, aged 16-59			-656.15	2717.95	-350.89	2646.54	377.89	2810.45
Male, child of head, 6-15			-132.26	2423.92	71.35	2344.43	941.65	2543.63
Female, child of head, 6-15			-503.71	2435.74	-216.03	2354.30	519.84	2566.42
Children of head, < 6			21.34	2376.51	378.98	2316.46	1341.00	2500.07
Male, not child of head, 6-15			-2108.39	3389.11	-1610.66	3266.77	-2006.69	3358.44
Female, not child of head, 6-15			-635.92	2563.01	-422.40	2470.35	313.24	2749.71
Members older than 60			445.08	2761.35	442.85	2730.69	2870.74	2965.72
Vossa	-853.67 ***	175.09	-691.61 ***	192.94	-715.23 ***	186.88	-701.16 ***	197.28
Enagnon	11.27	186.58	30.49	192.02	21.74	189.33	191.00	194.21
Female					-1074.25 ***	196.46		
Age					2.47	12.82		
No education					179.96	220.26		
constant	675.72 **	287.88	1664.48	2564.55	1886.53	2534.21	519.03	2697.47
# obs.	576		576		576		539	
R2	0.41		0.43		0.45		0.43	
F-statistic overall regression	29.49 ***		12.9 ***		16.18 ***		11.16 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 3a: Determinants for all Expenditure Categories: Seemingly Unrelated Estimates

	Food and Daily Exp.		Health		Schooling		Clothing		Personal Exp.	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.610 ***	0.026	0.472 ***	0.057	0.096 ***	0.011	0.281 ***	0.034	0.035 ***	0.003
Total expenditure square	-6.28E-07 ***	6.32E-08	-7.25E-07 ***	1.38E-07	-4.62E-08 *	2.56E-08	-2.01E-07 **	8.27E-08	-2.92E-08 ***	7.31E-09
Spouse's total expenditure	0.037 ***	0.011	-0.084 ***	0.025	-0.009 **	0.005	0.022	0.015	-0.001	0.001
Vossa	-6360.98 ***	2043.96	7932.70 *	4467.89	1758.11 **	829.45	7293.01 ***	2675.80	-853.67 ***	236.70
Enagnon	262.60	1855.90	518.16	4056.82	723.62	753.13	5229.00 **	2429.61	11.27	214.93
constant	5376.15 **	2104.55	-7919.83 *	4600.34	-3558.03 ***	854.04	-3383.05	2755.12	675.72 ***	243.72
# obs.	576		576		576		576		576	
R2	0.70		0.14		0.34		0.29		0.41	
Chi2-statistic overall regression	1374.68 ***		92.55 ***		291.99 ***		231.19 ***		398.52 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 3b: Determinants for all Expenditure Categories: Seemingly Unrelated Estimates

	Food and Daily Exp.		Health		Schooling		Clothing		Personal Exp.	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.605 ***	0.027	0.459 ***	0.058	0.087 ***	0.010	0.271 ***	0.035	0.038 ***	0.003
Total expenditure square	-6.28E-07 ***	6.33E-08	-6.98E-07 ***	1.39E-07	-3.09E-08	2.45E-08	-1.85E-07 **	8.28E-08	-3.39E-08 ***	7.28E-09
Spouse's total expenditure	0.033 ***	0.012	-0.090 ***	0.026	-0.015 ***	0.005	0.017	0.015	0.000	0.001
Household size	225.02	424.98	994.54	931.60	732.99 ***	164.63	738.81	556.30	-163.50 ***	48.90
Male, aged 16-59	43592.45	29371.81	-48812.83	64386.09	-44309.20 ***	11378.05	84153.69 **	38448.09	-832.09	3379.65
Female, aged 16-59	17864.15	30317.47	-24995.65	66459.06	-54485.67 ***	11744.37	92894.05 **	39685.96	-656.15	3488.46
Male, child of head, 6-15	36413.70	29146.20	-42148.97	63891.51	-50846.98 ***	11290.65	72279.50 *	38152.75	-132.26	3353.69
Female, child of head, 6-15	28806.45	28950.74	-28962.47	63463.05	-50268.34 ***	11214.93	77472.89 **	37896.90	-503.71	3331.20
Children of head, < 6	32692.27	28633.60	-31235.47	62767.85	-52385.51 ***	11092.08	80960.63 **	37481.76	21.34	3294.70
Male, not child of head, 6-15	14417.47	35557.46	38851.98	77945.68	-70357.02 ***	13774.24	84354.78 *	46545.19	-2108.39	4091.39
Female, not child of head, 6-15	15647.83	30439.25	-49663.95	66726.02	-48000.61 ***	11791.55	102334.10 **	39845.38	-635.92	3502.47
Members older than 60	36361.23	30012.92	-23226.07	65791.47	-38615.79 ***	11626.40	67258.82 *	39287.31	445.08	3453.41
Vossa	-4988.05 **	2147.70	4530.55	4707.99	578.77	831.98	7106.61 **	2811.37	-691.61 ***	247.12
Enagnon	941.01	1887.29	-75.52	4137.13	461.39	731.10	4437.99 *	2470.48	30.49	217.16
constant	-26649.47	29351.99	23859.62	64342.64	44161.10 ***	11370.37	-89737.19 **	38422.15	1664.48	3377.37
# obs.	576		576		576		576		576	
R2	0.71		0.15		0.41		0.30		0.43	
Chi2-statistic overall regression	1415.39 ***		102.65 ***		396.4 ***		248.17 ***		431.73 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 4: Comparisons of Coefficients of Spouse's Total Expenditure from SURE Estimates

Expenditure Categories: Wald stats (p-value)	Food and Daily Exp.	Health	Schooling	Clothing	Personal Exp.
Food and Daily Exp.		17.13 (0.00)	14.37 (0.00)	0.65 (0.42)	12.46 (0.00)
Health			8.96 (0.00)	13.09 (0.00)	11.14 (0.00)
Schooling				3.97 (0.05)	2.81 (0.09)
Clothing					2.36 (0.12)
Personal Exp.					

Table 5: Determinants of the Probability of Using a Saving Device

	Probit full sample					
	coeff.	se	coeff.	se	coeff.	se
Total expenditure	1.18E-05 ***	2.67E-06	1.20E-05 ***	2.63E-06	1.59E-05 ***	2.99E-06
Total expenditure square	-2.42E-11 ***	7.22E-12	-2.44E-11 ***	6.83E-12	-2.95E-11 ***	7.22E-12
Spouse's total expenditure	1.07E-06	9.36E-07	1.11E-06	9.84E-07	-5.55E-07	1.05E-06
Household size			-0.022	0.034	-0.015	0.035
Male, aged 16-59			1.648	2.043	1.776	2.106
Female, aged 16-59			1.966	2.139	2.085	2.196
Male, child of head, 6-15			2.558	2.012	2.601	2.074
Female, child of head, 6-15			3.685 *	2.004	3.860 *	2.065
Children of head, < 6			2.562	1.977	2.602	2.049
Male, not child of head, 6-15			6.058 **	2.630	6.509 **	2.658
Female, not child of head, 6-15			1.823	2.121	1.985	2.175
Members older than 60			1.448	2.083	1.965	2.205
Vossa	-0.261	0.161	-0.266	0.174	-0.268	0.174
Enagnon	-0.610 ***	0.149	-0.560 ***	0.155	-0.573 ***	0.156
Female					0.403 **	0.156
Age					-0.006	0.008
No education					0.196	0.130
constant	0.168	0.178	-1.961	2.048	-2.283	2.129
# obs.	576		576		576	
# censored obs.	176		176		176	
Pseudo R2	0.08		0.11		0.14	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 6: Determinants of Savings

	OLS full sample						OLS restricted sample	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.245 ***	0.085	0.257 ***	0.088	0.293 ***	0.099	0.400 ***	0.105
Total expenditure square								
Spouse's total expenditure	-0.003	0.023	0.014	0.021	-0.018	0.030	0.001	0.022
Household size			-1692.09 *	918.35	-1629.39 *	932.62	-2142.55 **	905.40
Male, aged 16-59			-13426.88	27468.45	-14921.10	26420.24	24024.69	48797.77
Female, aged 16-59			-10822.13	28980.97	-12600.64	28193.07	29289.54	49156.00
Male, child of head, 6-15			-5050.22	25395.56	-6896.21	24368.86	32811.24	47447.53
Female, child of head, 6-15			7731.68	25008.90	6188.52	23815.15	41772.54	48309.92
Children of head, < 6			516.79	24458.37	-1878.93	23277.24	35216.33	46863.75
Male, not child of head, 6-15			506.43	32780.64	-1160.83	30442.46	16476.08	53107.43
Female, not child of head, 6-15			15034.22	26266.13	14195.84	25391.29	59314.65	48290.51
Members older than 60			-8251.74	26292.49	-6258.88	28376.52	36040.42	49448.15
Vossa	267.31	2452.08	761.75	2935.45	708.83	2822.14	1499.45	2985.15
Enagnon	-4029.67 **	1730.13	-3872.67 **	1695.01	-3899.00 **	1690.25	-4061.23 *	2172.12
Female					9342.28 **	3820.13		
Age					-50.34	132.46		
No education					513.03	1584.65		
constant	-4564.34	4972.49	8101.47	26649.45	6232.35	25118.71	-33705.18	49005.66
# obs.	576		576		576		397	
R2	0.34		0.36		0.39		0.57	
F-statistic overall regression	5.25 ***		2.91 ***		2.49 ***		3.85 ***	

* significant at 10%, ** significant at 5%, *** significant at 1%

Table 7: Determinants for all Expenditure Categories: Tobit Estimates

	Health		Schooling		Clothing		Personal Exp.		Savings	
	coeff.	se	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Total expenditure	0.805 ***	0.090	0.232 ***	0.022	0.339 ***	0.040	0.039 ***	0.003	0.291 ***	0.019
Total expenditure square	-1.23E-06 ***	2.09E-07	-2.56E-07 ***	4.79E-08	-3.07E-07 ***	9.58E-08	-3.55E-08 ***	7.72E-09		
Spouse's total expenditure	-0.149 ***	0.041	-0.028 ***	0.009	0.024	0.017	-0.001	0.001	0.006	0.018
Vossa	9685.21	7066.96	4187.86 **	1716.99	9700.53 ***	3142.66	-946.30 ***	249.34	-2612.08	3310.15
Enagnon	-675.37	6433.65	1897.67	1576.49	6707.02 **	2861.96	-89.82	226.03	-10374.65 ***	3052.35
constant	-45714.09 *	7577.56	-19702.01 ***	1976.54	-11334.89 ***	3281.53	463.71 *	257.37	-12385.30 ***	2856.58
# obs.	576		576		576		576		576	
# left censored obs.	254		340		98		37		179	
Pseudo-R2	0.01		0.04		0.02		0.03		0.02	
LR Chi2-statistic overall regression	102.95 ***		223.48 ***		181.15 ***		301.00 ***		207.77 ***	

* significant at 10%. ** significant at 5%. *** significant at 1%

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