DOCTOR OF ECONOMICS AND BUSINESS MANAGEMENT

Essays on Informai Saving and Insurance Groups in Benin

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Award date:
2007

Awarding institution:
University of Namur

Facultés Universitaires Notre-Dame de la Paix
Faculté des Sciences Economiques, Sociales et de Gestion

Dissertation en vue de l'obtention du titre de
Docteur en Sciences Economiques

Sujet de la dissertation:

Essays on Informal Saving and Insurance Groups in Benin

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August 2007

Je tiens d'abord à souligner ma gratitude à Jean-Marie Baland et Jean-Philippe Platteau qui ont, dès le début de cette thèse, manifesté de l'intérêt et surtout une grande confiance pour ce projet. Jean-Marie Baland m'a offert sa supervision grâce à ses relectures et conseils pertinents. Ils ont tous les deux facilité mes missions au Bénin et permis nos collectes de données. Je remercie également Stefan Dercon et Jean-Paul Azam d'avoir accepté de faire partie de mon jury de thèse.

Olivier Dagnelie mérite toute mon affection pour ses nombreuses qualités qui par un merveilleux hasard se combinent très bien à mes nombreux défauts. Ce n'est pas tous les jours que l'on rencontre un homme aussi bon et généreux.

L'amiral du sud, Charlemagne Codjo Tomavo, a été déterminant dans la réussite de nos enquêtes à Cotonou. Sans son professionnalisme je serais certainement devenu miséreux ou envoûté. Awanou kaka à notre équipe d'enquêteurs : Félicité, Maurille, Shadia, Calixte, Euphrem, Pierre et Raoul.

Je remercie chaleureusement Hélène, Roger et Marion du Fleuve-Est pour m'avoir encouragé et surtout avoir supporté mes longs vagabondages européens.

Je m'incline de reconnaissance devant Amélie Bodson qui m'a donné tant d'énergie alors qu'il en a souvent manqué dans mes réservoirs. Vous comprendrez que c'est une femme exceptionnelle.

Une accolade à Vincent Somville qui s'est récemment joint à notre projet Minangan. Son flegme et son immense générosité font de lui un compagnon idéal de terrain. Santé Bob.

Thanks are also due to Tessa Bold who provided me the data on Ethiopian insurance groups.

Trois dames ont permis ma résurrection à une époque où la quinine me faisait halluciner dans une chambre des soins intensifs : Tatiana Geotghebuer, Pascaline della Faille et Yolanda Georlette-Balteau. Sans elles et l'équipe du Docteur Demeulder de la clinique Ste-Elizabeth, je ne crois pas que j'aurais eu le luxe d'écrire ces quelques lignes... Merci.

Contents

Preface

Preface

This collection of four essays is entirely based on data that we collected in Benin during spring 2004. This large scale survey was preceded by two shorter field missions (autumn 2002 and 2003). These missions were needed to target a precise research question and to check if empirically there was hope of gathering sufficiently interesting data. We also spent time during autumn 2003 at testing with households and groups' members various parts and versions of our questionnaire. The neighbourhoods of Cotonou where we surveyed were selected because of their relatively high inhabitants and informal groups densities. All four chapters of this thesis are applied empirical studies.

The first two chapters present two informal institutions in Benin. These are creation of poor individuals to cope with hardship and lack of access to formal services. A visit in most districts of any large West African cities shows strikingly how important are market imperfections. Informal insurance and savings groups that we are studying are vivid demonstrations of poor people's ability to circumvent such imperfections. What makes these indigenous groups so interesting and particular is that they are endogenous creations. They were initiated by locals without the help or assistance from NGOs, health providers or any other formal institutions. There are interesting parallels to be drawn with similar savings groups that were active in Europe during the nineteenth century.

Benin is of course not the sole country in which such endogenous groups exist and are well established. Many other papers in the development literature have underlined their presence and importance in many places in various developing economies. The third chapter is an attempt to compare insurance groups in their Ethiopian and Beninese forms. What emerges is that two far separated geographically local societies are dealing informally with insurance issues in a surprisingly similar manner. Such comparison may shed light on what aspects can be improved. Unfortunately, at this stage we are unable to discuss comparative efficiency between both of these institutions. This would require panel Beninese data whose collection is underway.

The last chapter is, to our knowledge, an unprecedented attempt to explore husband and wife economical relationship with the help of individual level data. For years, numerous anthropological accounts have related the economical independence that both husband and wife enjoy within their couple in West African societies. It has been extensively emphasised that the household decision unit is not a centralized one. There are rather two poles, two separate spheres of decisions which interact with respect to public goods provisions. Thanks to our initial field investigations we avoided the pitfall of surveying at the household level and gathered a unique set of evidence which corroborate this view.

Rosca Participation in Benin : a Commitment Issue*

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July 2007

Abstract

In the light of first-hand data from a Beninese urban household survey in Cotonou, we investigate several motives aiming to explain participation in Rotating Savings and Credit ASsociations. We provide empirical findings which lead us to think that the main reason why individuals join a rosca is to commit themselves against self-control problems.

Keywords: ROSCA, self-control, Benin

JEL Classifications: G2, O16, O17

*We would like to thank the CRED (University of Namur) and the National Bank of Belgium for their financial support. We are grateful to Jean-Marie Baland, Frédéric Gaspart, Jean-Philippe Platteau, Christian Tritten and seminar participants at the University of Namur, Oxford University and AFSE 2005 conference for helpful comments. We also whish to thank our team of enumerators: Shadia Gbaguidi, Maurille Gandemey, Calixte Houedey, Euphrem Lankoutin, Félicité Chadare, Pierre Meliho, Raoul Tchiakpe and specially Charlemagne Tomavo. The tedious but fructuous encoding process was done with the help of Amélie Bodson and Gaëtan Dagnelie. In accordance with the sacred formula, the authors alone claim responsability for the final version.

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1 Introduction

There have been numerous studies underlining the importance of rotating savings and credit associations (roscas) in developing countries. Roscas are commonly found in rural areas and in the poorer neighbourhoods of the cities in developing countries and drive a considerable part of individuals' savings. Bouman (1995) refers to many african countries showing high degrees of participation and the importance of the savings concerned. In developed countries, these institutions are mainly used by migrants[1].

A basic description of these associations can be given as follows: A group of people gather on a regular basis for a cycle of meetings. During one meeting all members contribute a fixed amount of money to a common pot allocated to one of them. The latter is excluded from the reception of the pot in subsequent meetings but is still obliged to contribute to the pot for the rest of the cycle. This process repeats itself until each member has received the pot, a cycle is then completed. Then, the rosca may begin another cycle or decide to break up. Groups vary widely in terms of amount of contributions, number of members and frequency of meetings. In fact some groups may function on the basis of weekly or monthly compulsory meetings whereas others which do not hold meetings send a member for collecting payments. Operating modes of roscas can differ considerably. The pot can be allocated either according to a random process[2] (*random roscas*), through a decision imposed by the governing body of the group (*decision roscas*) or through a bidding process (*bidding roscas*).

Rosca members are mainly poor individuals who have little access to formal savings and credit markets because of high transaction costs and incomplete markets.[3] In the literature roscas are usually regarded as a means for poor people to save money in order to make an indivisible expense (a lumpy expenditure). Empirical analysis by Handa and Kirton (1999) and van den Brink and Chavas (1997) confirm this view. Evidence we collected from a sample of 496 households in Cotonou, Benin, supports this as well.

Rosca participation implies costs. They do not provide interest rates. Moreover, members suffer from the risk of default from other members - which could eventually lead to the breakdown of the rosca -, from less flexibility than saving on their own - as the rosca saving rate is likely to differ from their optimal saving rate - and, in most cases, from opportunity costs of time spent by taking part in meetings of the group.[4] Despite

[1] See among numerous references, Srinivasan(1995) and Summerfield(1995).

[2] This can be done once at the beginning of a cycle (establishing the order for its entire duration) or the random draw can be repeated at the beginning of each meeting.

[3] As an example, a small survey of Beninese banks showed us that conditions for opening an account in any public or private banks of Cotonou - such as a fixed guarantee deposit, the possession of an identity card (the costs of which are prohibitive) and literacy skills for the understanding of contracts - all act as strong deterrents against poor people.

[4] Nevertheless our evidence shows that few members, if any, considered meeting as valuable time wasted. It rather seems that members like meeting and spending time together. Several groups organize

all these costs, these groups enjoy popularity which proves that it must be beneficial to their members, who, in need of a saving device, are ready to pay for it[5]. This brings the question as to why individuals would decide to join a rosca instead of saving on their own.

This important question has received various answers in the literature. One formulated by Besley, Coate and Loury (1993) is that roscas allow individuals to receive the pot earlier than through individual savings and hence to buy the desired indivisible goods before it would have been possible in autarky. This can obviously be the case for all members except the last one in the cycle. A second motive for joining a rosca is that such associations can act as substitutes for insurance, this being particularly true in developing countries where markets for insurance are absent. These two answers appear however to be unfit for the evidence we collected in Benin and we discuss why below.

Another rationale was provided by Anderson and Baland (2002) on the role that roscas can play as a commitment device. Their work relies on intra-household conflicts in consumption decisions and on the existence of asymmetric preferences for household goods between men and women. Still this rationale does not fit our empirical findings partly because of the Beninese intra-household decision process but also for additional reasons that we will exhibit.

In the light of our evidence it appears that the fundamental reason as to why one individual would join a rosca is rather the need of commitment due to self-control problems. If people have present biased preferences or suffer from short-term temptations and are aware of their consequences, it is likely that they would prefer to limit the set of options available to them. They could then adhere to a rosca to bind themselves to their second best optimal saving rate thus securing part of their revenues against everyday temptations. Examined by Ambec and Treich (2007), this rationale was proposed by Aliber (2001) and Gugerty (2007). In their respective surveys they indicate that in the absence of alternative commitment saving strategies, people aware of their time inconsistency problem would turn to roscas. Our paper distinguishes itself with respect to the main literature in two ways. First it provides original empirical findings in favour of the self-commitment argument. While Aliber (2001) and Gugerty (2007) provided some with their database, our allows us to complete them and provide additional evidence. Second, it documents the fact that Beninese spouses evolve in a non-cooperative framework and that the decision to join a rosca is an individual one. This brings additional light along with rare studies pertaining to the West-African intra-household decision process. Furthermore, it underlines that, contrary to a widespread belief, there does not

many activities aside the pot distribution that allowed members to get involved in various ways (folklores, singing, etc). Meetings are also a precious opportunity for exchanging information although we think it is not a reason that drives membership in itself. Indeed, to the question 'What is the fundamental reason why you joined a rosca?', included in our survey, this reason was never mentioned.

[5]See in particular Rutherford (1999) on this issue of costs.

seem to be any gender effect as to rosca participation in Cotonou.

We therefore intend in the following section to briefly review reasons for participation previously given in the literature. We then present in section 3 field evidence that describes how husband and wife interact with each other. Section 4 investigates the self-control commitment issue, section 5 presents conjectures and section 6 describes the survey on which our analysis is based. We then proceed by offering in section 7 empirical estimates to support our conjectures. Section 8 sets out alternative explanations for joining a rosca and section 9 concludes.

2 Explanations from the literature

2.1 Quick Financing of the Purchase of Durable Goods

As argued in Besley, Coate and Loury (1993), roscas allow individuals to receive the pot earlier than through individual savings and thus to make the desired indivisible expenses sooner than if they had saved on their own. This is of course the case for all members except the last one in the cycle. Ex-ante, roscas having a non-predetermined order, either because they are bidding or random roscas, make all members better off in expectation by saving through them. Once the indeterminacy of the entire cycle order is unraveled the last pot recipient is ex-post worse off presuming that the saving rate imposed by the rosca is not optimal for her. Observations collected in Benin do not support such an hypothesis. Out of the 183 roscas included in our dataset 50% have their entire order known before the cycle begins, before any contribution has been paid. In those cases, when the cycle starts there is no uncertainty about the timing of the pot receipt. Either the order is determined by the governing body in a decision rosca according to various reasons (ponctuality, good payment records, seniority, member of the governing body, etc). Either in a random rosca the entire order is chosen randomly and known at the beginning of the cycle. Thus as the cycle starts, the median cycle length being 11.54 months, the last recipient could well decide to opt out ex-ante knowing to be worse off. Backwards induction would then predict the breakdown of the rosca.[6]

Another piece of evidence rendering the Besley, Coate and Loury (1993) reasoning unfit to the Beninese case is that only a minority of 24% of rosca members in our sample declared that if they could choose they would prefer to receive the pot at the beginning

[6]In our sample, 93% of all roscas change the order after each cycle is completed. The order of pot reception is therefore rarely repeated from cycle to cycle. But this does not change our argument. For half of the roscas having no uncertainty with respect to the order, members motivated by an early reception of the pot can still decide to opt out, whether or not the cycle order will be repeated. Interestingly, according to our characteristic variables there is no difference between a representative member of a rosca with or without uncertainty with respect to the order.

of the cycle while a majority of rosca members (60%) preferred the end.[7] For those wishing for an early reception of the pot we do not rule out the Besley, Coate and Loury rationale but it remains that this motive is more of an exception.

2.2 Insurance

Another motive for joining a rosca is that such an association can act as a substitute for insurance. This interpretation is mainly valid for the case of bidding roscas and not for random or decision roscas. Bidding roscas is indeed the type of rosca which can combine best the allocation process and the timing of pot reception with respect to members' specific shocks. In our sample only random (64%) and decision roscas (36%) are represented, bidding roscas being seemingly absent in Cotonou. However random and decision roscas can provide insurance to a small extent. Indeed some flexibility is provided by allowing a member in need to receive the pot at an earlier round. Of all the roscas surveyed 26% stipulated in their rules that changes in the ordering were permitted and to be agreed upon by either consensus of all members or by the governing body. Moreover 44% of all roscas allow two members to change order without knowledge of the rosca's governing body or any other member. This opportunity seems to be used since 12% of the rosca members said there has been at least one exchange of place with another participant in their group during the last cycle.

Roscas can also provide insurance by offering loans to their members. Indeed 20% of all roscas offer this possibility in their rules. In the vast majority of those associations (94%) a loan can only be offered to a member who has not yet received the pot. On top of that, conditions are often imposed (72% of groups) as for what reasons the loan can be granted (sickness, financial problems, funerals, accidents, etc).[8] Loans are regurlarly solicited in groups offering this opportunity: during the last six months 58% of them granted at least one loan.

Decision roscas, both those imposing an order for the entire cycle and those making meeting-to-meeting decisions often consider desires and needs of members. Of all 65 decision rocas, 53% base their decision on each individual member's needs.[9] Of course this insurance aspect is enhanced for roscas based on meeting-to-meeting decision. A

[7] 6% declared preferring to receive the pot at mid cycle and 12% were indifferent. Of those preferring to receive first in the cycle: 61% said that they would rapidly invest the pot and ease the payment of future contributions with the profits earned, another 25% said that they could rapidly repay debts or enjoy the benefits of having the pot. In his South African case-study, Aliber (2001) also reports a predominance of preference for being last.

[8] In all cases no formal collateral (such as belongings) is required. The pot to be received by this member acts as such. Indeed the amount granted is often limited to the pot and deadline payment coincide with the time of pot reception or the end of the cycle. 58% of these loans are granted without payment of interest. Before granting a loan 72% of all roscas carry on investigations to check the truthfulness of each demand.

[9] Other criteria for such a decision are: good payment records and punctuality (30%) and seniority (11%).

member to whom something unexpected happened and who has not yet received the pot can come to a meeting and formulate her demand. For roscas fixing the entire ordering before the cycle begins the insurance they can provide is limited. It can only take into account foreseen or potentially known shocks. For instance, they can take into account harsh fishing seasons and make pot reception for fishermen coincide with it.

Even though these two types of roscas have tried to incorporate some insurance aspects in their functioning, once the pot is received and a shock occurs, there is little if nothing available.[10] Beninese roscas are therefore an imperfect substitute for insurance.[11] Instead surveyed individuals tend to resort to indemnity funds[12], a major informal institution for insurance services.

2.3 Intra-household Conflicts

Anderson and Baland (2002) present a model of intra-household conflicts in consumption decisions. In their cooperative bargaining framework there are asymmetric preferences for household goods regarding men and women who share a common budget. They model a conflict within the household for an indivisible good based on those asymmetries: women having always a larger preference for the indivisible good and therefore willing to save at a higher rate than men. Members being an overwhelming majority of female[13], as they observed in Kenya, would join a rosca in order to render their savings out of reach of their husband (or hide them). They could then buy an indivisible good, which they prefer, whereas men would rather opt for present consumption. By joining a rosca, women thus commit the household's income against the husband's preferences.

This however does not seem to comply with the evidence we collected in Benin. On the one hand, our dataset shows that women seem to have a slightly smaller probability of being in a rosca than men: while they represent 51% of all adults, women form a minority (45%) of all rosca members. According to our sample, in Cotonou, the probability that a woman participates in a rosca is 15%, this slightly increases to 21% when she lives

[10]Some roscas do offer additional help called "alô jè nude ji hun enan" (24% of the roscas in our sample). One member in need can raise her hand and tell the group which kind of problem she has to cope with. The group might give her a financial help which needs not be reimbursed. This help is closer to solidarity than insurance since its granting is uncertain and its amount widely variable.

[11]Contrary to our field observations, Calomiris and Rajaraman (1998) find a prevalence of bidding roscas in an Indian city and stress their insurance role. See also Klonner (2001).

[12]LeMay (2007) presents an analysis of those groups based on this Beninese household survey. These groups, called in Fon "nujè mèji gbê" (a direct translation of which would be "happiness-unhappiness funds"), offer insurance against a wide range of shocks.

[13]This bias towards female participation is also confirmed by other studies such as Ardener (1964) - offering several case studies located in India among others - Geertz (1962) and Tsai (2000) who respectively focus on Java and China.

in a couple and 22% if she works (24% if she does both). Compared to that, men have an overall probability of 19% of participating in a rosca, 32% when they live in a couple and 31% if working (35% if both). There is also no tendency towards favouring women in group composition: 18% of all roscas surveyed were exclusively composed of women while 26% exclusively of men. For the remaining of groups composed of both genders 63% have a majority of male members. Moreover from the general groups' typology that we can depict from this large scale survey we cannot assert that roscas are primarily oriented towards women's needs neither do they intend to favour their membership. We met no group having clear primary objectives such as assisting women, providing for their needs or those of children or empowering women in their interactions with their husband. [14] This is confirmed by the coefficients we obtain using the Heckman FIML displayed in Section 7. Indeed neither the 'female' nor 'female * couple' variables are significant in the first step of our regressions. This shows that gender does not seem to be a relevant variable explaining participation to roscas. Combined to that, these variables are still non significant in our second step estimates. This would tend to show that household's members seem not to exhibit asymmetric preferences with respect to saving decisions.

On the other hand, were roscas used as a means to put money aside from the husband, membership would have to be kept secret from the husband's knowledge[15]. In our sample, most roscas meetings are only open to members but groups do not insist upon secrecy showing that participants are not primarily seeking to commit money against spouses. Indeed only 15% of the membership due to people living in a couple (71% of all rosca memberships) is unknown by spouse.[16] In order to avoid potential disputes concerning mainly adultery issues, 40% of groups allowing female membership impose husband's approval for new female members. Moreover 56% of the groups organize at the end of a cycle (or of the year) a celebration with dances and folklore where friends and neighbours are invited. Even defiles or marches preceed those celebrations to attract attention from people in the neighbourhood. It can also serve to advertise the

[14]Neither did any group attempt to elaborate a strategy of expense for their members in order to favor any gender or ethnic group. In fact no group imposed spending scheme or favored goods deemed valuable to them. Latitude as to what can be bought with the pot is large: rules limiting the pot use are rarely imposed (in only 2% of all roscas).

[15]It can be argued that, once a woman joins a rosca, she could use the threat of social sanctions to convince her husband to continue allowing her to participate. However, this reasoning is valid only in the course of one cycle. Once the cycle is completed, one can freely chose to quit the group, what is commonly accepted. An unwilling husband could easily pressure his wife to quit the group at the end of a cycle without incurring social sanctions. Nonetheless, in what we observe in our sample, reasons given by members for leaving a group are not related to that motive (Dagnelie, 2007).

[16]Gugerty (2007) finds similar evidence. In her kenyan sample roscas have a structure that is not designed to encourage secrecy among spouses. Gugerty also presents evidence against the intra-household conflict hypothesis.

success of their association and generate new memberships.

One could still argue that roscas would be a tool for hiding revenues to one's partner. This could be the case for a minority of members as 29% of them declare the contributed amount to the pot is unknown to their partner while 54% of them say the time of receiving the pot is not known. Although roscas could be a tool for helping secretive partner in hiding money, these figures do not suggest it would be a widespread motive for joining a rosca[17].

3 Secrecy and Individual Decisions within Household

During our survey, we carried out several informal meetings with residents of Vossa and Enagnon. These showed us that, regarding money matters, secrecy is the rule between spouses. An important proportion of women and men with whom we spoke declared that their spouse was unaware of the course of their occupational activities and was therefore unable to guess their income. Many said, no matter the gender or age of the respondant: "the less he/she knows about my activities, the better it is." Or "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 are overwhelmingly secretive and it even seems that giving as little information as possible to their partner is quite natural. Hence, spouses rarely ask questions concerning their partner's income or inquire about their activities. It is a kind of convention allowing each member of the couple to keep her income more or less secret. The result of this is that each individual has a lot of latitude in managing personal income. Thus by being secretive, spouses avoid sharing their personal earnings or making common budget and retain the sole control over their personal expenditures.

Questions related to these observations were addressed to the 587 respondants (out of 1179) who were older than 15 and in couple. To the question "Can you estimate your spouse's revenues?" : 79% answered no, 11% yes and 10% partially. Results were similar for: "Do you think your spouse knows your revenues?": 76% answered no, 16% yes and 8% partially. This gives the impression that unions or couples are considered as business arrangements between partners who want the household needs in terms of public goods to be provided for.[18]

Another remarkable fact is that, in Benin, social norms determine the intra-household allocation of expenses by gender. The majority of the contributions to the household's

[17] In fact this answer was not given by a single of the 222 members in our sample to the question: "What is the fundamental reason why you joined a rosca?".

[18] LeMay (2007) substantiates this dichotomy between wife and husband finances inside couples by providing an empirical analysis of the determinants of spouses' pattern of consumptions based on the same sample. He also gives a review of the anthropological literature pertaining to that issue in West-Africa; see notably Falen (2003).

public goods devolve on the husband who has to take care of everything related to the house (rental fees, repair costs, electricity), give money for housekeeping, pay the school fees, clothing, etc. His wife has to take care of the family, cook and pay water bills. In general, the male income is not sufficient to cover the needs of the family, so that the wife has to spend more for the household than what had been allotted to her.

As long as the basic needs of the family are fulfilled, 'selfish'[19] individuals would prefer to spend more on private goods, the utility of which is superior. Each spouse therefore tries to depart from the status-quo expenses, by passing on to the other some share of their common burden. They then enter an infinitely repeated non-cooperative game in which they try to lower their contribution to the provision of the public good as it is detrimental to their own consumption of private goods.

In order to implement this strategy, both spouses hide their income and try to give their partner a blurred image of their earnings. This implies that husband and wife also hide as much as they can their expenses which could lead their partner to have a guess at their revenues. Were agents able to know their partner could spend more for the household, they would claim to pay less. Therefore, none of the spouses gets incited to reveal the true amount of their earnings.

This is not to say that spouses do not interact as to the provision of public goods. A minimum of common management is required with respect to their respective role in the couple. Still, it remains that spouses avoid disclosing information on their income and their expenditures, the latter of which seeming more difficult. However, a large fraction of couples do not interact during working hours as their work brings them in different parts of the city. It means that meal expenses, transportation or medicines, transfers for relatives or collegues, gifts for funerals and luxury spending such as alcool and cigarette can easily be concealed. Moreover, even larger expenses can be kept away from spouse knowledge. As we show in Table 2 almost half of the rosca members invest the pot in their small business. 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 easily hide their investments.

Secrecy - as strategic information transmission (Crawford and Sobel, 1982) - prevents the household from benefitting from efficiency gains usually reachable with the repetition of the game. In this case, as neither incomes nor strategies are observable, detection of fraud or deviation from a cooperative agreement is in fact rendered impossible. This can explain why agents may be stuck in a pareto-inferior equilibrium, supported by social norms[20]. In these conditions, both spouses have no incentives to

[19] 'Selfish' is to be taken in the sense that the utility of one agent does not depend on any other agent's utility.

[20] The means of pressure of the partners consist mainly of threats 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. Her husband endowed by custom with most of the burden is able to force

reveal their real income or personal expenses - which could lead to rough estimations of their earnings.

We observed that these behaviours are widespread and accepted to such an extent that few are those who try to break this tacit rule and inquire about their partner's income. A selfish spouse will thus individually decide whether or not to join a rosca. This decision depends on their available income net of public goods expenses and on other relevant individual characteristics.

4 Commitment Device Against Self-control Problems

Two different economic theories suggest that agents might prefer to commit themselves and limit the set of options available to them. Gul and Pesendorfer (2001 and 2004) present a dynamic consistent preferences explanation of this phenomenon, namely the temptation theories. According to their theory, agents undergoing short term temptations in conflict with their long run self interest would be "unambiguously better off when ex ante undesirable temptations are no longer available" (Gul and Pesendorfer, 2001, p.1406). And even if they do not expect to succumb to the temptation in the future, individuals with self-control problems will expend resources to remove tempting alternatives from their choice sets (ibidem, p.1420). In this case, preference for commitment arises from a desire to avoid temptation rather than from a change in preference.

The second approach, well known in the literature[21], departs from the dynamic consistent preferences hypothesis and corresponds to a reversal of the preferences when the date of decision-making approaches. It appears from psychological experiments that people tend to have present-biased preferences - the shape of which is roughly hyperbolic - and discount time at a non constant rate - higher in the very short than in the longer term[22]. An individual having self-control problems and being sophisticated - aware of the problem and its consequences - would prefer to commit herself. Her current self may want to restrict the choice set available to her future selves to overcome such time-inconsistencies.

Even if the underlying motives are slightly different according to each of the two theories presented above, their implications appear similar in terms of rosca participation. Roscas seem indeed to respond to a need of commitment against one's time inconsistency preferences and temptations. According to Gugerty (2007), in the absence of alternative commitment savings strategies, people having self-control problems and

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 would mean the end of her social life and bearing important consequences thereof).

[21] see among many others, Laibson (1996, 1997), O'Donoghue and Rabin (1999)

[22] where $\delta \leq 1$ and $0 < \beta < 1$ in $U^t(u_t, u_{t+1}, \ldots, u_T) = \delta^t u_t + \beta \sum_{\tau=t+1}^{T} \delta^\tau u_\tau$

being sophisticated turn to rosca since they would indefinitely renegotiate with themselves[23] if trying to save money on their own. This is supported by empirical evidence from a randomized control methodology study in the Philippines. In fact, Ashraf et al. (2004) show that women with time inconsistent preferences desire commitment savings devices. They are indeed more likely to take up the SEED product which is a pure commitment savings product (bank account with restricted access to deposits without compensation for this restriction), this leading to higher savings levels. Moreover, Ashraf et al. show that poorly educated individuals with hyperbolic preferences are more likely to join roscas.

Besides rendering the current savings illiquid and safe, roscas restrict the set of future options, as long as the end of the cycle is not reached, compelling the individual to go on saving. Unfortunately we are unable to identify if individuals in our dataset suffer from time inconsistency. Hence we cannot formally test the hypothesis according to which individuals having hyperbolic preferences are more likely to join roscas. However we have a series of empirical evidence which suggest the need of a commitment device as a motive for membership. Indeed 89% of the rosca members (198 out of 222), answered that they joined a rosca to discipline themselves to save. "Discipline" or "the willingness to force savings" being by far the most cited answers suggest that a vast majority of members use the rosca as a mean to commit themselves to save.[24] Despite the evidence we provide in Table 2, according to which all members use the pot for non durable expenses, the answer "buying an indivisible good" came short as only 22.5% of all participants mentioned it as the reason of their membership.

Moreover the fact that 60% of rosca members prefer to receive the pot at the end of a cycle provides an additional argument.[25] Of all those who preferred being at the end 78% said it was because they did not want to feel indebted towards the group. They consider receiving in the early turns of a cycle as a debt towards the group to be repaid by future contributions to the pot and as a situation that they would prefer to avoid (this answer was provided without any proposed list of answers). Such debt aversion certainly confirms the incentive and disciplining role of the group which is exerted through pressure from the peers towards a defaulting member. As Aliber (2001) writes: "The debtor-creditor relationships created by roscas between members are characterized by an uncomfortable sense of obligation by the former towards the latter." An early recep-

[23] At each period, the current self would have present-biased preferences towards consumption and would renegotiate the savings decision made by the previous selves.

[24] Multiple answers could be provided by participants to the open-ended question "why did you join a rosca?". Even then we still find that discipline is the most cited motive representing 52% of all answers. Aliber (2001) and Gugerty (2007) also reports that a majority of respondents in South Africa and Kenya gave similar answers highlighting the need of discipline.

[25] This preference is not correlated to the duration of the group membership and therefore not likely to be related to any learning effect.

tion of the pot means that an individual faces the risk of a negative shock throughout the cycle which might make him unable to repay the effective "loan". Moreover, in case of default, leaving prematurely the rosca can be costly. Indeed, sanctions are more severe towards a defaulting member once he has received the pot.[26] Thus preference for late reception may simply be due to the agents' risk aversion towards default and increased punishment and not by the need of a commitment device. With that respect, we expect that in our sample, salaried individuals, who receive a regular and certain income, are less risk averse than non salaried. However we find that both types of agents seem to have similar preferences with respect to the timing of the pot receipt. This seems to give some credit to the commitment story. Still we argue that both reasons are likely to be intertwined. Many members told us in informal interviews that apart from minimizing the threat of sanctions, receiving the pot at the end of a cycle provides in itself additional motivation to make payments and complete successfully a cycle. Fear of sanctions and credibility of threats are important factors influencing preferences on the timing of pot receipt and at the same time, they are key elements for making a rosca a good commitment device. Would members put too much value on potential sanctions they would quit the rosca and try to save on their own and we would notice high turnovers. It is however not what we observe: the average membership duration of all those who provided this answer is 47 months, and only 4.4% said that they joined the group for a fixed number of cycles (the vast majority not knowing how long they were to stay member). All this tend to demonstrate that for a substantial number of individuals, benefits from an early receipt of the pot are outweighed by a mix of risks and debt aversions and the need of commitment.

5 Conjectures

Important implications can be derived from the intra-household consumption behavior that we depicted earlier. It allows us to put forward a conjecture that we intend to confront with our empirical findings. We claim that each individual makes decision about his/her own consumption and saving. Secrecy protects individual earnings to a large extent from spouse pressure and gives husband and wife a very limited ability to bias his/her partner's choice. In the absence of a common decision over an aggregated household budget, spouses have the latitude to make decisions about their savings as if they were single. They both have the ability to manage their income according to their respective will. We can thus formulate a conjecture that would not allow us to test of the commitment hypothesis, but rather the intra-household conflict hypothesis :

Conjecture 1 *The probability of joining a rosca does not depend on whether an individual is*

[26] Further details on those sanctions can be found in Appendix 10.2.

single or in a couple.

A great deal of latitude is left to both husband and wife in terms of managing their income net of public goods expenses and deciding if they are going to join a rosca. Thus the probability of joining a rosca boils down to a function of individual characteristics: income, age, schooling, stability of one's job and the number of dependents. Simple predictions can be made on the effects of these variables. As saving is a normal good[27], income will positively influence the probability of joining. However we expect that rich individuals would rather opt for a formal and less risky vehicle of savings. A bank account in either a private bank or a public institution[28] offers more flexibility and a more secure vehicle than roscas informal arrangements. So for high levels of income we expect the probability of joining to fall having thus an overall inverted-U shape curve with respect to income.[29] Age would also follow a quadratic pattern: the needs to save would be maximum for middle age individuals establishing a family or small commercial activities (petty retail, fishing, etc.) and would be expected to diminish as age increases. The number of dependents has an ambiguous effect on the probability of joining a rosca. A larger number of children would give higher incentives to parents for saving in order to face future indivisible expenses, conversely more children would involve additional expenses and reduce potential savings. Variables describing job's stability[30] would be positively linked to the probability of joining. More stable income entries over the past means that one individual expects to be able to commit themselves more easily to regular payments to the pot.

Should the commitment motive be valid, we would expect rosca participation and rosca contributions to raise with individual income. It is likely however that both of them are concave in income as less risky opportunities become available. A similar prediction on commitment is also proposed by Ambec et. al (2007) who theoretically investigate the formation of stable informal agreements in developing countries. However we have to admit that this would be a necessary but not sufficient condition for certifying our hypothesis. We make the point clear below that this result could also match other motivations for rosca participation. The intuition tells that as income rises agents would tend to further protect themselves against increasing temptations. Moreover, sophisticated individuals would want to overcome time-inconsistencies by restricting

[27]LeMay (2007) empirical investigations based on the same sample tend to support this view as individuals' savings are rising in income in a convex manner

[28]The Beninese National Post Service, the CLCAM (a National Co-op offering loans and saving accounts) are, among others, public institutions present in Cotonou.

[29]Our data show that, for the first income quantiles, practically no individual has a bank account contrarily to a maximum of 26% of individuals in the highest quantile.

[30]To check this, we use two binary variables: one takes value 1 if the individual keeps her job for 24 months or more and another one takes value 1 when the individual receives regular wages.

their current self facing a wider set of choices available to their future selves. This forms a second conjecture:

Conjecture 2 *At least at low levels of income, payments made to roscas by individuals in need of a commitment device will be positively linked to income.*

In the next section we present the survey on which our analysis is based, then in section 7 we confront our conjectures with empirical findings.

6 Description of our Survey

We use data we collected during the first three months of 2004 in the two districts of Vossa and Enagnon located on the outskirts of Cotonou (a city of about 1.1 million inhabitants). They are known to the city's authority as being the poorest. Vossa is located near an inner bay of fresh water and has a community of fishermen. Its 63 hectares are encircled by stagnating waters and swamps which represent an important vector of disease. This district has not yet been divided into plots, though a long term project has been launched during our stay. Vossa is let to itself: the authorities of Cotonou have not yet paved any of its roads even its principal axis. The recurrent and important problem of floods has not been dealt with even if it critically and annually paralyses the area during a few months. Enagnon, a dense slum located on the Atlantic Ocean shore, has also received low attention and important sanitary problems have not been tackled yet. Half of its area of 60.1 hectares has been divided into plots in 1998. Enagnon encompasses an adjacent slum called Enagnon-plage which is inhabited with a majority of fishermen living in huts on the beach. Vossa and Enagnon are near downtown Cotonou where a large part of their inhabitants work and commute everyday. No formal saving and investment institutions, either public or private, such as banks and NGOs are present in these two districts, the selection of which dates back to a first mission in 2002 that revealed that many informal groups such as insurance funds and roscas were active there.

We surveyed 496 households: 110 in Vossa and 386 in Enagnon (of which 116 are located in Enagnon-plage). Selection of each household was done randomly. The first wave of interviews aimed at creating contacts, getting housing information and obtaining information on each member: religion, activity, education, work, etc. For all members older than fifteen, we required enumerators to fill in a sheet detailing their expenses on durable goods incurred during the last six months and to carefully report their expenses on non-durable goods for the week previously ended. A second round was needed for members of informal groups. During this visit enumerators collected detailed information on the group(s) they belong to. For a maximal accuracy, all members of each household were interviewed separately throughout the successive waves

of our survey so that tricky issues related to expenses or income were only tackled privately. Particular attention was thus put on confidentiality which was strictly followed by our enumerators. Further details on our survey methodology can be found in Appendix 10.1.

We present a table below with basic information on roscas according to their gender composition. Roscas composed only of women or men have memberships of similar median size. However the median durations (in months) for living male only roscas is larger than female only roscas. Female only roscas tend to have a shorter length of cycle and a smaller monthly contribution. Male only roscas make their payments more frequently on a monthly basis and fewer of them were started by a group of friends or relatives. With respect to the way the pot is allocated, either randomly or by a decision, and with ethnicity composition there is not much of a difference between female and male roscas. It is to be noted that a large majority of roscas are not designed along ethnic or religious patterns. About one group out of five has one alternative function. These groups, beside organizing regular rosca activities, offer mainly insurance services (17% of all roscas), only three roscas (1.6% of all roscas) reported holding investment or credit activities. In all cases, these functions are clearly separated from the ones roscas usually perform. Investment or credit services would require separate contributions and accounts. Insurance schemes take the form of separate informal groups namely indemnity funds. Participation to parallel indemnity funds is voluntary although often restricted to rosca members. Those funds have distinct contributions schemes, meetings, rules and organization.[31]

While the quick financing rationale is unfit for our data as we saw previously, saving through roscas is done in order to make an indivisible expense. As displayed in Table 2, this appears to be the case from our investigations even though as evoked before, it is far from being the most mentioned motive for joining a rosca[32]. We proceeded by asking all rosca members what they did with the pot during the present cycle or what they intended to do with it if their turn was to come. Nearly all of them reported that they bought or were willing to make an indivisible expense: 49% mentioned investment in their small business (buying important stocks of provisions for stores, motorcycle or car repairs for taxis, equipment for fishing, etc), 18% planned to repair or build a house, 11% reported plot purchasing, 7% paid for school tuitions [33]), 5% planned to reimburse

[31]Some of the 183 roscas in our sample represent the secondary activity of an indemnity fund. Since both functions clearly demark themselves we did not make any difference in our analysis as respect to this primary/secondary role and considered all roscas on an equal basis.

[32]Contrary to Gugerty (2007) who finds that more than half of rosca participants in her kenyan sample use rosca winnings for two or more purposes, offering thus evidence that roscas are not formed solely to purchase lumpy durable goods. We observe that only 14% of rosca members intended to use the pot for more than one purpose.

[33]The fact that school fees represent such a low percentage is explained by the fact that a majority of

	All roscas	Women only	Men only	Mixed
Number of members (median)	22	19	20	28
Months existed (median)	36	12	24	60
Monthly contribution (median)	8667	4800	6000	8667
Length of cycle (median. in months)	11.54	6.92	15	11.54
Contribute every day	0.0055	0.0312	0	0
Contribute every 4 days	0.11	0.125	0	0.16
Contribute every week	0.36	0.28	0.28	0.42
Contribute every 10 days	0.016	0.06	0	0.01
Contribute every 2 weeks	0.09	0.09	0.09	0.1
Contribute every month	0.39	0.34	0.64	0.29
Group comprises only women	0.17	1	0	0
Group comprises only men	0.26	0	1	0
All members are same ethnicity	0.22	0.31	0.36	0.125
Fixed order	0.36	0.25	0.32	0.4
Random order	0.64	0.75	0.68	0.6
Order is unchanged each cycle	0.07	0.1	0.09	0.05
Order known for the entire cycle	0.5	0.625	0.47	0.47
Order known for the entire cycle when fixed	0.34	0.375	0.27	0.36
Order known for the entire cycle when random	0.65	0.79	0.625	0.61
Constrained utilisation of the "pot"	0.02	0	0.04	0.02
Started group with friends/relatives/neighbours	0.73	0.78	0.57	0.78
Group has a secondary role	0.19	0.16	0.11	0.23
Number of observations	183	32	47	104

Table 1: Group Characteristics

a personal debt and 14% to buy a durable good. What is meant by "other durable good" is any type of object or commodity such as tv set, radio, mobile phone, etc.

Incidently if we look at answers provided by women, we find that 72% of them made (or intend to) an investment in their business[34]. Men's answers are more diversified, they mainly use the pot for business, house repair or building, other durable goods and plot purchase. One can notice the significant difference between male and

public schools ask for very small tuition fees. For other selective schools, flexibility is allowed by which high fees can be paid in several instalments.

[34]Despite the fact that profits from these investments may eventually benefit the household, this statistic does not coincide with the notion that women would join a rosca in order to save primarily for their children or the household's well-being.

	All members	Women	Men
Don't know yet	0.02	0.01	0.03
Tuition fees	0.07	0.06	0.07
Health expenses	0.02	0.02	0.02
Financial aid / debt	0.05	0.07	0.02
Luxury expenses	0.05	0.08	0.03
Party / funeral	0.03	0.02	0.03
Brideprice	0.00	0.00	0.01
Plot purchase	0.11	0.10	0.12
House repair / building	0.18	0.08	0.26
Small business	0.49	0.72	0.30
Travel expenses	0.02	0.01	0.02
Other durable good	0.14	0.03	0.23
Other	0.02	0.03	0.01
Number of observations	222	97	125

Table 2: Pot Uses (multiple answers).

female expenditures on small business, other durable goods[35] and on house repair and building which is likely related to the customary expenses pattern.

Besley and Levenson (1996) tested a hypothesis according to which, controlling for income, the rosca members would possess more durable goods than non members. We ran similar tests on the durable goods possessed by the households (such as fridge, freezer, stoves, tv set, vcr, stereo system, radio, bed, clock, watch, telephone, mobile phone) but obtained no significant differences between members and non members. A look at Table 2 tells us that a large majority of pot uses do not lead to durable goods purchases for the household, for which we tested the Besley-Levenson hypothesis. Indeed durables purchases appear in the categories "other durable good" or "luxury expenses", which represent only 19% of all pot uses. The majority of pot uses being targeted towards indivisible expenses do not translate into accumulation of such goods. One could argue that small business expenses, being the most common answer, would eventually enhance profits, improve living condition and potentially lead to durable purchases. Our tests, however, do not allow us to highlight such spill over effects.

[35]The large difference between "small business" and "other durable good" with respect to men and women is likely to be exaggerated since answers provided by a proportion of men could be counted in both categories.

	Total Sample				Women				Men			
	All		Rosca memb.		All		Rosca memb.		All		Rosca memb.	
Participates in Rosca	0.17	(0.03)	1	(0)	0.15	(0.02)	1	(0)	0.19	(0.03)	1	(0)
Total monthly rosca contribution	1804	(256)	10492	(1452)	1646	(259)	10898	(1617)	1969	(274)	10161	(1329)
Female	0.51	(0.00)	0.45	(0.02)								
Age	33.1	(0.25)	39.8	(0.97)	32.9	(0.49)	39.7	(1.09)	33.3	(0.05)	39.8	(0.87)
In couple	0.52	(0.04)	0.74	(0.07)	0.52	(0.04)	0.69	(0.09)	0.52	(0.04)	0.79	(0.06)
Primary degree	0.28	(0.02)	0.23	(0.07)	0.18	(0.01)	0.12	(0.05)	0.40	(0.02)	0.32	(0.09)
Salaried	0.12	(0.01)	0.19	(0.02)	0.03	(0.01)	0.05	(0.03)	0.22	(0.01)	0.30	(0.02)
Monthly individual income	48223	(2672)	86377	(5235)	40554	(1739)	69386	(2673)	56237	(3720)	100212	(12663)
Monthly individual expenditures	30789	(2912)	47682	(2075)	27671	(2711)	43746	(3289)	34049	(3124)	50888	(859)
Number of dependents	1.91	(0.19)	3.18	(0.30)	2.05	(0.12)	3.37	(0.11)	1.77	(0.27)	3.02	(0.48)
Number of months, same job	85	(2)	159	(19)	82	(2)	155	(16)	87	(5)	163	(22)
Number of months, same block	191	(15)	226	(12)	174	(19)	183	(12)	209	(11)	261	(11)
Native Language : Ashanti	0.01	(0.00)	0.01	(0.01)	0.00	(0.00)	0.01	(0.01)	0.01	(0.01)	0.01	(0.01)
Native Language : Fon	0.33	(0.14)	0.29	(0.13)	0.31	(0.12)	0.23	(0.07)	0.34	(0.16)	0.34	(0.18)
Native Language : Popo	0.35	(0.05)	0.43	(0.09)	0.37	(0.04)	0.48	(0.13)	0.33	(0.07)	0.38	(0.08)
Native Language : Yoruba	0.04	(0.01)	0.04	(0.01)	0.04	(0.02)	0.06	(0.02)	0.04	(0.01)	0.03	(0.01)
Native Language : Fulani	0.03	(0.03)	0.03	(0.03)	0.02	(0.02)	0.02	(0.02)	0.04	(0.04)	0.04	(0.04)
Native Language : Goun	0.23	(0.12)	0.19	(0.14)	0.24	(0.10)	0.18	(0.13)	0.22	(0.14)	0.19	(0.14)
Vossa	0.58	(0.38)	0.53	(0.37)	0.58	(0.38)	0.56	(0.37)	0.58	(0.38)	0.51	(0.38)
Enagnon	0.31	(0.34)	0.25	(0.29)	0.31	(0.34)	0.23	(0.27)	0.31	(0.35)	0.27	(0.30)
Beach	0.11	(0.15)	0.22	(0.26)	0.11	(0.15)	0.22	(0.26)	0.10	(0.14)	0.22	(0.26)
Number of observations	1179		222		604		97		575		125	

standard errors in parentheses
statistics corrected with sampling weights

Table 3: Individual characteristics with respect to rosca participation.

All the 496 households we surveyed represent 2083 individuals of which 894 are aged less than sixteen, we are thus left with a sample of 1179 individuals divided in 604 women and 575 men. We show in Table 3 relevant statistics according to gender and participation status. These are used as variables on which is based our econometric analysis. One can find a detailed description of some of these variables in Appendix 10.3. We see an important difference in terms of age: mean age of total sample is significantly (at 5%) lower than those of rosca members. Women seem less educated than men as a significantly smaller proportion of them got a primary degree. There is also a larger proportion of male salaried, this being true whatever the participation status. Differences in monthly income show that rosca members are significantly richer than non members, this remains valid in the female subsample and in the male subsample for monthly expenses. It appears as well that female rosca members are in charge of larger households than female non members.

7 Empirical Results

We check the validity of our conjectures with our data by estimating participation and contributions with a single procedure: Heckman Full Information Maximum Likelihood[36]. As people self-select their participation to a group, the observations taken into account in the structural equation are not a random sample. In fact, we suspect unobserved individual characteristics to influence both the probablility to join and the amount contributed. We have therefore to tackle the problem of selection bias, producing inconsistent estimates, induced by the correlation between the error term and the regressors. Heckman FIML addresses this problem by simultaneously estimating the selection and structural equations, allowing residuals to be correlated.

As FIML rests upon a hypothesis of independence of observations which is not guaranteed by the design of our survey carried in three different areas, we introduced fixed effects removing the area-specific component from the residuals and eliminating the endogeneity caused by unmeasured area characteristics. As errors within those neighbourhoods are likely not to be independent, we used cluster effects taking account of correlation between observations coming from the same environment. This produces robust standard errors which would have been wrongly estimated without this correction. Furthermore, the design of our survey was such that the probability of being selected in our sample was different in the three studied areas which could lead to in-

[36]We preferred this technique to Ahn and Powell semi parametric estimator (whose finite sample properties are barely known) as it is likely not to perform better than Heckman FIML in such a sample (around 1200 observations and a level of censoring about 80%). (see Fernández Sainz, Rodriguez-Poo and Villanúa Martín, 1999) Moreover, Ahn and Powell does not produce a 1st step estimate which is of primary importance in our analysis.

consistent estimates. We therefore introduced sampling weigths for our estimates to be independent of the sample design. (Deaton, 1997)

The first part of Table 4 gives empirical estimates with respect to participation which is the dependent variable of the first step[37]. We regress alternatively on the whole sample and on a subset incorporating only members of a couple. The only difference between the first two columns and the last two is the addition of two regressors namely female share of household income and its square. We control for ethnic affiliation even though we think that it plays a minor role in rosca participation in Cotonou as only a minority of groups are designed along ethnic patterns. These variables can be seen as very rough proxies for social identification and networking. Neighbourhoods are also controlled for and account for all potential interactions and effects specific to Vossa and Enagnon[38]. We include additional regressors such as the number of dependents, which is a proxy for household expenses. Since this variable is not significant, none of the two contradicting interpretations presented before is confirmed. We checked whether education would have any effect: it appears not to have any as the variable 'Primary degree' is not significant for any regression. Stability in one's job, which we measure by whether one has kept one's present job for at least 24 months, affects positively and strongly the probability to join a rosca. Being salaried (not self-employed) is however not significant. The district fixed effects, Vossa and Enagnon, are strongly significant suggesting that unobserved factors specific to each neighbourhood are important. A look at all the regression results also show that ethnic identity is rarely significant which confirms our impression that native language or ethnic affiliations is not a strong determinant of rosca participation.

Most importantly, these estimates allow us to validate our first conjecture. In the first column the coefficients displayed show that neither couple nor the interaction variable between female and couple are significant. An alternative regression displayed in the third column confirms these results. Indeed it strengthened the validation of our first conjecture by showing that the variables female share of household income and its square are not significant at 10% controlling for the same individual characteristics. This certainly provides evidence in favour of our framework where the decision to join a rosca is individual and independent of marital status considerations[39].

[37] Although both equations are estimated simultaneously, for clarity, we will use 1st and 2nd step to refer respectively to the selection and structural equations.

[38] Time spent in a neighbourhood could also represent a proxy for trustworthiness. However problems of convergence with FIML technique prevented us from using this variable. It is to be noted that individuals in our sample tend to have a rather long stay in their respective neighbourhoods with a mean of almost sixteen years: see variable "Number of months same block" in Table 3. Movements across neighbourhoods and migration are more of an exception than usual observation.

[39] We also ran two tests of joint significance on the coefficients of couple and female * couple and on female share and its square. Results do not allow us to reject joint non-significance at a 10% level for both tests.

Heckman FIML Estimates of Participation and Monthly Contribution

	All sample			In couple			All sample			In couple		
1st step: participation												
Female	-0.195		(0.180)	-0.056		(0.447)	0.192		(0.653)	-0.054		(0.444)
Couple	0.218		(0.273)				-0.171		(0.210)			
Female * Couple	-0.144		(0.092)				0.401		(0.357)			
Individual income (1000 CFA)	0.008	***	(0.003)	0.006	**	(0.002)	0.008	***	(0.003)	0.006	***	(0.002)
(Individual income)^2	-7.34e-06	***	(2.14e-06)	-5.16e-06	***	(1.68e-06)	-7.43e-06	***	(2.10e-06)	-5.20e-06	***	(1.88e-06)
Female share of household income							-2.099		(1.518)	-2.407		(1.529)
(Female share of household income)^2							1.709		(1.228)	1.981		(1.249)
Age	0.096	***	(0.013)	0.039	***	(0.006)	0.098	***	(0.013)	0.041	***	(0.011)
(Age)^2	-1.03e-03	***	(0.20e-03)	-4.39e-04	**	(1.73e-04)	-1.05e-03	***	(0.21e-03)	-4.53e-04	**	(2.30e-04)
Number of dependents	0.023		(0.035)	0.020		(0.041)	0.022		(0.034)	0.019		(0.038)
Primary degree	0.163		(0.671)	0.102		(0.545)	0.160		(0.624)	0.098		(0.503)
Same job for at least 24 months	0.440	***	(0.020)	0.417	***	(0.021)	0.452	***	(0.020)	0.426	***	(0.045)
Salaried	0.299		(0.398)	0.275		(0.478)	0.321		(0.418)	0.317		(0.520)
Ashanti	0.304		(0.274)	0.801	***	(0.261)	0.087		(0.173)	0.608		(0.376)
Fon	-0.160	*	(0.087)	0.140		(0.150)	-0.149		(0.101)	0.165		(0.167)
Goun	-0.099		(0.142)	0.230	*	(0.134)	-0.101		(0.177)	0.241		(0.162)
Fulani	0.343	*	(0.192)	-0.339		(0.446)	0.336	*	(0.198)	-0.333		(0.395)
Popo	0.076		(0.158)	0.416		(0.378)	0.067		(0.118)	0.412		(0.350)
Vossa	-0.512	***	(0.077)	-0.584	***	(0.074)	-0.534	***	(0.051)	-0.626	***	(0.051)
Enagnon	-0.626	***	(0.166)	-0.784	***	(0.136)	-0.643	***	(0.156)	-0.824	***	(0.117)
Constant	-3.099	***	(0.549)	-2.013	**	(0.831)	-3.115	***	(0.429)	-1.403	***	(0.210)

2nd step: monthly contribution								
Female	5849.2	(3734.8)	97.5	(748.6)	390.8	(10651.9)	31.3	(879.7)
Couple	-5410.7	(4062.8)			17.4	(10408.7)		
Female * Couple	1429.1	(1477.6)			-778.4	(4855.0)		
Individual income (1000 CFA)	59.5 **	(29.1)	63.8 ***	(22.7)	65.1 ***	(9.6)	68.3 ***	(6.5)
(Individual income)^2	-6.29e-02***	(1.82e-02)	-6.64e-02***	(1.18e-02)	-6.64e-02***	(4.60e-03)	-7.01e-02***	(4.63e-03)
Female share of household income					4763.0	(12958.1)	-631.1	(11694.4)
(Female share of household income)^2					780.5	(11896.2)	5348.2	(13241.4)
Age	-1138.2	(1000.4)	-561.2	(705.9)	-1171.3	(972.5)	-618.6	(811.8)
(Age)^2	12.5	(10.8)	5.8	(7.6)	12.8	(10.2)	6.3	(8.5)
Number of dependents	-462.2 ***	(58.1)	-389.1 **	(187.0)	-486.5 ***	(123.3)	-389.6 *	(225.1)
Same job for at least 24 months	-2257.3	(4055.5)			-2487.6	(4351.5)		
Ashanti	-5620.0 *	(3194.1)	-7835.7	(6395.3)	-3445.8 ***	(1027.3)	-6425.5	(4486.3)
Fon	543.4	(2345.3)	-3000.5	(4248.4)	644.4	(2260.0)	-2680.1	(4148.9)
Goun	540.2	(3512.1)	-1737.9	(2732.2)	664.5	(3326.2)	-1454.1	(3036.4)
Fulani	-4663.6 *	(2469.4)	2249.3	(6071.5)	-4441.3 **	(2263.2)	3172.3	(6944.7)
Popo	-1062.4	(2151.0)	-2328.3	(5616.7)	-790.7	(1851.3)	-1843.6	(5151.7)
Vossa	7550.5 *	(4319.5)	7374.1 *	(4464.9)	7822.5 *	(4632.1)	7645.3	(5060.2)
Enagnon	4669.8	(4839.6)	4488.0	(4944.3)	4820.1	(5065.3)	4671.9	(5394.1)
Constant	34408.7	(35056.6)	22467.4	(28108.6)	35114.8	(33722.2)	22680.5	(25633.7)
Number of observations	1179		587		1174		582	
Number of censored observations	957		530		953		426	
Number of uncensored observations	222		157		221		156	

standard errors in parentheses,
**** significant at 1%, ** significant at 5%, * significant at 10%*

Table 4: Heckman FIML.

As anticipated, rosca participation is quadratic in income. However the maximum is reached at a very high level of income indicating that for most of our sample the probability increases in income. Indeed only five individuals out of 1179 have a larger income than the maximum of this quadratic function. The income variable used in all our regressions is a measure of individual earned income including transfers. Our inverted-U shape prediction concerning age is also verified, the relationship begins to decrease at 46 years of age. This tends to confirm that demand for indivisible expenditures is increasing among young agents and decreases as they get older[40].

The second part of Table 4 displays estimates with respect to monthly contributions[41]. The dependent variable is the monthly equivalent of the total amount of CFA francs given to all the roscas in which a member participates. Regressors such as ethnic dummies and district fixed effect are overall non significant. Other personal characteristics: gender, age, job stability and female share of household income have no significant effect on contributions. Clearly from our four different regressions only three variables account for rosca contributions: income, income square and the number of dependents. These results are all intuitive knowing that both decisions of joining and contributing are independent as we show below. Once an individual has decided to join a group based on her characteristics, she will decide the amount to contribute according only to economic variables. Higher income would potentially lead an agent to save more and thus make larger contributions whereas a very wealthy agent would at some point turn to formal banking and reduce her rosca contribution. Conversely having more dependents will reduce savings for a given income and thus reduce payments made to rosca. Rosca contributions are quadratic in income, but the maximum value of its inverted-U shaped curve is this time larger than the highest income value of all rosca members. Income has thus an exclusively positive effect on contribution in our sample and this confirms our second conjecture. As income increases one individual in need of commitment will raise the total amount of her contribution. This result provides thus one additional argument in our advocacy of the need for commitment. However it does not allow us to discriminate between the different reasons underlying the need of a commitment device. Even if descriptive statistics and field evidence tend to show that individuals want to commit themselves to deal with self-control problems, we cannot rule out two alternative motives for committing: protection of savings against social pressure and risk of theft. We present these motives in details in the next section. Another simple explanation of this result could be that agents prefer different kinds of

[40]Note that 2005 estimates for the life expectancy at birth in Benin is 55 years. (Worldbank, 2007).

[41]Monthly contributions will vary from one individual to another. They often have the choice among several roscas to choose from, each requiring a different contribution. Moreover individuals can decide to belong to several roscas, which is the case for only 6% of all rosca members in our sample. Additionally a member can give multiple contributions in one rosca and thus receive the pot more than once during the same cycle. This is allowed in 29% of the roscas in our sample.

durable goods at different levels of income. However, with the exception of plot purchase and house repair or building[42], there does not seem to be a clear income pattern in the expenses made with the pot. Moreover, in general, across all the range of income, people do not claim to have joined a rosca for buying specific durable goods.

Empirical results are in accordance with our rationale: secrecy and non-cooperation allow spouses to make individual decisions concerning their expenditures net of public good spending and hence to commit themselves according to their available revenues. The decisions to join as well as to how much to contribute are undoubtedly individual.

On top of the FIML estimations we ran a test on the independence of residuals between both equations (the first and second step). The hypothesis that both equations residuals are independent is not rejected with a p-value of 55% for the corresponding statistic. This suggests that the decision to join a rosca and the amount one will contribute in such a device are independent. This may be due to the definition of our variable "monthly contribution" which is a monthly extrapolation of the sum of all the contributions to roscas. We believe that individuals have the choice among a few roscas in their neighbourhood and others known through colleagues, friends or relatives. After this filter, the selection in this small set is likely to be made with respect to the amount contributed. The optimal saved amount can then be reached by having several 'hands' - paying several contributions - in the rosca or by joining other roscas. Being familiar with other members seems to be the predominant criterion in group selection. In our sample, 68% of all rosca members indeed said that they had selected the group they are in because they knew or had links with other members. The second most cited answer to "why did you choose this specific rosca?" is because its president was known for well managing the group (14%). Following in importance are answers related to the amount of contribution (12%) and the strictness of the rules (10%). Once individuals have identified groups in which they are familiar with some or all members and likely to trust them, they will join the one(s) more suitable to their saving preferences.

It can be argued that rosca participation can influence one's income, not directly since savings placed in a rosca bear no interest but indirectly through social connections or others beneficial side effects and through returns on investment made with the pot. About 26% of all 222 members answer that they experienced some extra economical advantages by participating in a rosca: 18% say that fellow members prefer to buy at their shop or doing business with them and 6% say that they have met their employer

[42]Even if descriptive statistics do not allow us to capture this effect, we cannot exclude that agents buying a plot or building/repairing a house are in general wealthier than the rest of the members. In some specifications of a multinomial logit with the pot uses as dependent variable, the income coefficient is positive and significant for those making theses expenses. These estimates are however to be taken with a pinch of salt given the possibility of multiple pot uses per member and the recoding of the dependent variable. Actually, we had to aggregate in a single category the items rarely cited. Those who chose the latter category are likely to be poorer than most of the members.

(past or present) in the group. These answers tend to confirm that roscas provide social connectedness and that they can bring additional advantages. However measuring the importance of these side effects is practically impossible. To account for such potential benefits on income and thus endogeneity with respect to the probability of joining a group we have carried out the same regressions as in Table 4 by replacing income with expenses on non durable goods (mainly food and other weekly expenses such as gas for cooking, transportation, etc). This way we proxy income by a variable which can be considered as independent of such extra benefits. Results from these regressions are similar to the ones we obtain and also confirm our two conjectures.

8 Alternative Explanations for Joining a Rosca

From the secrecy framework depicted before, one could imagine that roscas are simply used to help spouses to reduce their contribution to the provision of public goods. Once put in a rosca, money would not be available for the household's needs. In this case we would expect the probability of joining to increase with the expenses on public good that the household has to face. The variable number of dependents is a good proxy for such public good expenses. This rationale is however not supported since this variable is never significant in all the regressions. Moreover, the variable 'in couple' is neither significant and therefore does not seem to drive the participation in roscas. We do not entirely discard this motive for rosca participation but would rather think that people use this commitment device against self-control problems.

A significant proportion of members we interviewed, declared that it was impossible to save money if they were to leave it home (see also Anderson and Baland (2002)). Indeed, it would disappear in various expenses. Savings would quickly evaporate due to all sorts of social pressures and demands coming from the entire family, friends and neighbours. Ranging from financial help for a friend, payment for medicines for an uncle, to unexpected claims by children, financial help can be requested on a regular basis. Demands could as well come from the spouse and roscas would help agents to commit against those claims, but the household budget structure and secrecy are such that this kind of claims is greatly reduced. By opting for a rosca, one opts for a socially accepted alibi to protect one's savings against all types of social pressures (see Platteau 2000). In our sample, 20% of members mentioned that they joined a rosca for protecting their savings. That can mean two things that can not be discriminated: on the one hand, protection against potential income sharing and social pressure from relatives. But on the other hand, it can also mean protection against risks of theft, fire or other catastrophies which were also evoked during informal interviews. To reduce risks people would prefer not to save at home and put money out of reach in a rosca which would serve as a means to protect earnings against such adversity. Far from being the most

important answer explaining members' participation, the fact that one out of five members emphasizes protection certainly gives credit to this alternative rationale. Moreover protection of savings is a motive for participation which also satisfies our second conjecture. Indeed, an individual facing a fixed probability of theft and an increasing demand from relatives in income can be strictly better off by joining a rosca at higher levels of income (Anderson et al. 2002).

Although our evidence leads us to think that people join a rosca to commit themselves to deal with self-control problems, we cannot rule out that their participation may be driven by the need to protect savings from social obligations or other hazards - theft, fire, etc.

9 Conclusion

Our empirical evidence shows that rosca participation is not a gender issue in Cotonou. Given secrecy and the household budget structure, each spouse retains the control over his/her spendings and therefore decides individually to join a rosca. This feature, probably pervasive in West Africa, should be taken into account before implementing policies designed to favour any gender participation.

Recent studies have emphasized that roscas can be used as a commitment device against two categories of potential threats. Individuals could indeed join roscas to protect themselves against external threats such as pressure from their spouse stemming from asymmetric preferences (Anderson and Baland, 2002) or social pressure (assistance to relatives or friends). Alternatively, agents could like to secure their income against internal threats such as temptation and present-biased preferences, both hindering their saving. Our investigations lead us to think that, in Cotonou, individuals participate in roscas to discipline themselves to save. Although no direct question diagnosing time inconsistent preferences was included in our survey, our body of evidence suggests that self-control problems are widespread and that people, living in the poor districts covered by our survey, value savings commitment mechanisms such as roscas. The willingness to discipline savings was indeed the most expressed motive for joining a rosca among members. Projects favouring the establishment of formal saving and commitment vehicules in Vossa and Enagnon, and certainly in other poor districts of Cotonou, would therefore most probably meet with success.

10 Appendix

10.1 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 a parcel according to an implemented random process. In these two districts 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 clock-wise 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 household was 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 two questionnaires a day. The taking account of intra-household secrecy greatly lengthened the survey by requiring specific appointments with each adult member. Another time consuming factor was the detailed part of our questionnaire concerning groups: we often needed more than an hour for a single group. We compensated every household for their precious time by donating 1500 francs CFA. Finally, with two previous missions, in 2002 and 2003, we carried out about eighty group interviews. We attended regular meetings or met members of their governing body in order to get a better understanding of their functioning.

10.2 Groups Functionings

Groups have different ways of coping with payment problems depending on if the member in default has received or not the pot already. Before reception one default on contribution would lead to the following sanctions: fine (40% of groups) and deduc-

tion of contribution from the pot upon reception (28%). Several defaulting payments before pot reception mean more important sanctions: 35% of groups would expel member with full reimbursement of contributions, 23% would charge him a fine and 16% would not allow the member to receive the pot and reimburse contributions at the end of the cycle. Once the pot is received sanctions are more stringent. For one defaulting payment: 47% of group charge a fine, 23% give an additional delay after public warnings and 17% seize a good of equivalent worth to the pot's value. Several defaults after pot reception lead to: seizure (34%), call for police of chief of district (20%) or additionnal fine (16%). By comparing rules we found that 60% of all groups have more severe sanctions on members who had received the pot. We only gave here the most important means of sanctions and it is to be noted that a significant proportion of groups use more than one of those in combination. Sanctions do not only have a financial impact: a defaulting member will often feel ashamed by facing public warning or reprimands. This information will spread rapidly in the neighborhood and may prevent him from joining other groups in the district. Indeed, before accepting a new member, 82% of all groups carry an investigation on applicant's social behavior (theft, act of violence, etc) and on previous memberships. Sanctions such as warnings and fines made publicly can thus have long lasting "social" impact by giving applicant a bad reputation. Moreover to prevent defaults three groups out of four require the applicant to be sponsored by a member. The sponsor being financially responsible for the new member if he were to default in the first cycle. Rules in 60% of groups impose that applicants must be known by at least one member to be accepted. The decision process varies and depends heavily on rosca's structure: either the president decides alone (28%), the governing body (42%) or all members (30%). In order to check their trustworthiness and provide greater insurance against potential defaults, 20% of rosca place new members at the end of the cycle.

10.3 Definitions of Key Variables

Live in couple: Individual having a partner (married or not) who is member of the household. Those who were engaged in a couple for whom the spouse was not living in the household and for whom we did not have any data were not considered to live in couple.

Salaried: Individual is salaried if he/she receives a salary on a regular basis (either daily, weekly, bi-weekly, monthly, bi-monthly, etc) in the formal or informal sector. Only 12% of all individuals are salaried and there is an important gender difference: 22% of men are salaried and only 3% of women. Women are massively self-employed in our sample.

Individual income: 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.

Number of dependents: Total number of people within the household depending financially on either member of the head couple. It is thus the sum of children (aged less than sixteen years), young adults having no revenues or any other depending relatives. For example a member of the extended family moving in the household and relying on its members for a living is counted as such.

Job length: Indicates that one individual has had his/her present principal income generating activity for at least twenty four months.

Primary degree: Indicates that one individual has completed primary school.

Individual share in couple income: Each individual's income divided by the sum of both spouses'income.

Expenditures: Monthly extrapolations from the sum of all expenditures made on non durable goods during one week. It includes 1) all expenditures on food (including expenses on heating and cooking such as coal or gas) and 2) luxury expenditures such as cigarettes, alcohol, eating and drinking in hotels and restaurants.

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Insurance for the Poor: the Case of Informal Insurance Groups in Benin[1]

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June 2007

Abstract

This paper studies indigenous insurance groups using evidence from urban areas in Benin. Many of these informal institutions co-exist within neighbourhood-distance. They are based on well-defined rules and regulations, offering premium-based insurance for funeral expenses, as well as other forms of insurance and credit to cope with hardships. We provide first a description of these groups. Then we investigate, with the help of an original dataset, which individual characteristics are significant in explaining both the probability to join such groups and the choice of insurance coverage.

Keywords: Groups, Insurance, Benin

JEL Classifications: O17, O18, C21

[1] I thank the CRED and the National Bank of Belgium for their financial support. I am grateful to Olivier Dagnelie, Christian Tritten and Vincenzo Verardi for helpful comments and seminar participants at the University of Oxford and Maastricht Graduate School of Governance. I wish to thank our team of enumerators: Shadia Gbaguidi, Maurille Gandemey, Calixte Houedey, Euphrem Lankoutin, Félicité Chadare, Pierre Meliho, Raoul Tchiakpe and specially Charlemagne Tomavo. The tedious but fructuous encoding process was done with the help of Amélie Bodson and Gaëtan Dagnelie. All remaining errors are mine.
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1. Introduction

Groups exist in Benin that offer insurance to their members by providing indemnities for a wide range of shocks, such as funeral expenses. These groups are called in local dialect "nujè mèji gbê", a direct translation of which would be "happiness-unhappiness funds". This paper discusses their functioning and the extent of insurance offered based on a survey in Cotonou, Benin. Along this line we firstly intend to highlight what are the individual characteristics which influence the decision to join these groups and secondly to explain the choice of coverage made by individuals. These indigenous groups were created in response to a risky environment typical of developing countries. In particular, poor households are highly vulnerable to risk. These households for whom formal insurance contracts costs are prohibitive can only resort on punctual transfers from neighbours, friends or relatives since no other informal institution that we know of offers them insurance.[3]

The organisation of these groups can be basically described as follows: usually, a group of people gather on a regular basis. During a meeting members who suffer from an adverse shock can put in a claim to the group for an indemnity according to the nature of the shock. Groups' rules always specify a list of shocks eligible for indemnity as well as the corresponding amount of indemnity offered. Once it has been agreed that a member can receive an indemnity, each member has to provide on the spot an equal amount of cash. A recipient's indemnity is thus the sum of all other members' individual contributions. This process continues until all members have received a fixed number of indemnities, thereby completing a whole cycle. The group may then decide to discontinue or to begin another cycle. Groups vary between one another in terms of number of members, frequency of meetings, variety of shocks for which indemnity is offered, terms of payment and in terms of their operating modes.[4]

The extent of experienced risk and how well households did in coping with it has been lengthily analysed in the literature (see Townsend (1994) and Murdoch (1995) for a review). Indeed, there exists a variety of mechanisms for coping with risk among which risk-sharing arrangements. A number of theoretical papers, such as Kimball (1988), Coate and Ravallion (1993), Ligon et al. (1999), Genicot and Ray (2003), Bloch et al. (2004) have focused on these self-enforcing risk-sharing arrangements. Such insurance networks, which provide mutual assistance between households, are informal in the sense that they take place outside of the market place and are made without any legal arrangement that could in any way be binding. They are not closed multilateral grouping based on well-defined formal associations that have written rules or regulations governing their operation. Hardship and risk are often difficult to face individually. Thus people voluntarily participate into such arrangements which are sustained over time as they offer higher expected payoff than the one in autarky.

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[3] Exception made of rotating savings and credit associations (roscas) that are found in those districts but as Dagnelie and LeMay (2007) shows: even if they accommodate some minor insurance aspects in their functioning they are still an imperfect substitute for insurance.

[4] Rotating savings and credit associations' (roscas) functioning differs from the one of informal insurance groups. At each rosca's meeting all members contribute a fixed amount of money to a common pot allocated to one of them. The latter is excluded from the reception of the pot in subsequent meetings but is still obliged to contribute to the pot for the rest of the cycle. This process repeats itself until each member has received the pot, a cycle is then being completed. For roscas, timing of the reception pot is not based on insurance needs whereas in insurance groups indemnities are offered only in case of a precise adverse shock. Time duration of a cycle is fixed in case of roscas but unknown for insurance groups.

Empirical research on such mechanisms have focused on arrangements between households being neighbours, living in the same village or having extended familial link but not on well-defined groups or associations formed with the specific aim of providing insurance to their members. Such studies have thus not focused on groups but instead on bilateral arrangements identifying networks of insurance partners (see among others: Fafchamps and Gubert (2007), Fafchamps and Lund (2003), Ayalew (2003), Dercon and De Weerdt (2002)). What is presented here in this paper is different. It focuses on an analysis of Beninese insurance groups having a clear and well-defined structure. Each group has a defined membership, particular procedures to accept new members and rules such as schedules of payments, specific contributions, sanctions in case of non payment, absenteeism or misbehaviour. These informal insurance groups offer insurance in order to cover entirely or some fraction of funeral costs and numerous other expenses that can arise in case of hardship.

Groups and associations of all kinds are pervasive in developing countries, though our analysis only focuses on those having the specific aim of insuring their members and a well-defined structure. Some papers have also examined such initiatives. For instance Jütting (2003) and Atim (1998) have analysed development initiatives providing health insurance through community-based organisations. These papers are related to our own apart from a basic difference which makes them distinct: these community-based health insurance initiatives have been initiated by NGOs or health providers such as missionary hospitals whereas informal insurance funds studied here have no such linkage and were created purely by indigenous initiatives.

At present time systematic analyses on such informal insurance groups are scarce. Indeed to our knowledge only Dercon et al. (2004) present an empirical and analytical analysis of such informal insurance groups. Using evidence from rural areas in Tanzania and Ethiopia, they study indigenous insurance institutions developed to cope with the high costs of funerals. This work comes closest in the literature to the analysis presented here where we use a first hand dataset with urban evidence. Whereas groups in Dercon et al. (2004) are funeral associations dealing primarily with expenses related to funeral ceremonies, informal insurance groups studied here offer a wider range of coverage and are not solely designed for such events. Discussion in the literature about diversified insurance groups is rare and the same holds for funeral associations: Dercon et al. (2004) does cite some papers pertaining to the Ethiopian context and Roth (1999) offers some evidence concerning South Africa. As Rutherford (2001) documents, one can find insurance mechanisms for funerals across the developing world. Not only their presence in many areas has been attested and is far from being anecdotal, but also funeral expenditure in much of the developing countries tends to represent a large proportion of households' monthly income.

In the following section we intend to give a description of the data survey on which our analysis is based. We will also present in section 3 the characteristics of our informal insurance groups using our first hand data set. Insurance coverage provided and the basic functioning of these groups will be discussed. We will see that groups are well-organised and structured, with a clearly defined set of rules, regulations and potential sanctions in case of misconduct. Then by using household level data on members and non-members we will highlight some differences in terms of individual characteristics. We will also briefly discuss the motivations for agents to join. In

section 4 we present field evidence that describe how individuals within households take the decision to join such groups and how husband and wife interact with each other. In section 5 we formulate conjectures as to what would drive membership and the choice of insurance coverage which we then proceed to test in section 6. The following section analyses the distinction between two types of groups and section 8 concludes.

2. 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 authority 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. In 1998, 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 has also 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, not even the main avenue, is paved. The district is clearly left to itself. Yearly floods represent an important problem which has not yet been dealt with. Both of these districts are close to downtown Cotonou: a significant part of their inhabitants work and commute on a daily basis. We shall add that no formal saving or insurance institution, either private or public, is present in Vossa or Enagnon. No NGOs initiative has reached these districts either.

We surveyed 496 households: 110 in Vossa and 386 in Enagnon (of which 116 are located in Enagnon-plage). We selected each household randomly. During the first wave of 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. During the second wave, only members of informal groups were questioned about the association(s) they belonged to. In order to tackle privately with each agent tricky issues related to expenses or income, all members of each household were interviewed separately throughout the successive waves of our survey. Particular attention was thus put on confidentiality in order to obtain maximal accuracy and our enumerators strictly abided by those rules. Additional details on our survey methodology can be found in Appendix 9.1.

Overall, the 496 surveyed households represent 2083 individuals. We were left with a sample of 1179 individuals when 894 subjects aged less than sixteen were putted aside. The remaining sample divided into 604 women and 575 men. In Table 1 we show relevant statistics according to gender and participation status. These statistics are used as variables on which is based the econometric analysis that follows. A detailed description of some of these variables can be found in Appendix 9.2.

We see that 214 individuals representing 18% of all surveyed observations kept are members of at least one insurance group. Various reasons may explain this low participation rate. In Cotonou, other formal and informal ways of getting insured are available, along with different saving vehicles which are accessible so that agents can cope individually with adverse shocks. Additionally, problems of adverse selection are important in the context of a large city where it can be difficult to put pressure on defaulting members or to trace the author of embezzlement. Even though they have established rules for selecting new members, informal insurance groups are perceived with some suspicion by many. True or fictitious anecdotes of defaulting members or group disintegrating ensuing embezzlement can be heard frequently by people for motivating their non-participation. There is rarely social pressure on individual to join a group, except for rare cases of groups based on family membership. So individuals and households living in city districts that we surveyed are by no mean ostracized if they decide not to join any group and opt for another form of insurance. Thus multiple memberships are not frequent: only 7 individuals declared being member of 3 different groups and 19 of two different groups.

From our overall sample we find that men are significantly more educated and earn a larger income than women. There is also a larger proportion of salaried males. On average women have a larger number of dependants. By comparing[5] both samples of non-members to members of at least one group, with respect or not to gender, we find that members are older, live in couple in a larger proportion and have a greater number of dependants. Members are significantly less educated but they have on average greater stability in their income earning activity as a larger proportion of members have been having their current job for at least twenty-four months. There is no significant difference in the proportion of salaried individuals between members and non members. In both cases, the vast majority of individuals are self-employed earning their income from petty retail, fishing, taxi services or various manual jobs. Most importantly, on average members have a larger income and their income distribution is skewed towards the right compared to non-members. Indeed only 2% of all individuals having income in the lowest quintile are members whereas 31% of individuals in the highest income quintile are members. Clearly memberships of informal insurance groups are not composed of the poorest of the poor. Informal insurance groups seem not to have been designed to target the most needy. Many of them impose discriminating entry requirements that we describe in the following section. Groups also impose regular payouts on members that are often difficult if impossible to meet for very poor individual or individuals with widely varying income (see Dercon and Krishnan (2004) on problems related to targeting).

3. Description of Insurance Groups

By going through the statistics given in Table 2 we can get a broad view of what structure those groups have and how they function. Overall, in the three neighbourhoods, we collected information on 209 different groups that were given through only one of their member. This limits our analysis as we have no information on the composition of groups' memberships.

Median duration of these groups is 60 months with a mean of 83. Group duration in our sample vary widely: we have from freshly new born groups having one month existence up to one

720 months old. A large majority of groups have written rules and status and an elected president. Almost all groups hold regular meetings where presence is largely compulsory and almost none have fixed a finite duration for their activity. Half of the groups have asked for recognition from the neighbourhood chief or the local chief of police (recognition often being granted in exchange of gifts). Incidentally, this enables them to get their cooperation for solving potential disputes. Membership is not a loose association of rapidly changing people. It is rather clearly composed, usually consisting first of the founding members, later joined by those who applied to become members. Entrance fees are often imposed on new comers who, in half of the groups, have to be accepted by a favourable decision of all current members (the other half is president or governing body's decision). In order to mitigate adverse selection problems, 86% of all groups also carried some investigation on those seeking to become members usually to check his past records with other groups, how he manages his household and if he has a stable source of earnings. In 85% of groups a new entrant must be sponsored by a member who is financially responsible for him for a certain initial period. Additionally, 34% of groups require that new members live in the neighbourhood of the group; this facilitates investigation on potential new members and can help the group to put pressure on defaulting members.

On average, groups are composed of 25 members, the median being 20, but their size varies largely from 5 to 200 members. Group composition is often based on neighbourhood connections. It appeared, not only from our formal questionnaire but also from our numerous interviews with members, that ethnic affiliation does not represent a strong determinant of organisation and membership (see also Fafchamps (2004), p.418). About three quarters of groups are indeed open to newcomers having a different ethnic affiliation. Unisex memberships are frequent as they represent about half of all groups.[6]

Indemnities offered by one group are often allocated cyclically. This is done in order to equilibrate the total amount of indemnities allocated between members. About three groups out of four fix a limit number of indemnities that can be received by one member, this number being the same for everyone. Once a member has attained the ceiling he has to wait until all the other members have also received this number of indemnities to be eligible again for assistance. As such, cycles have no fixed duration in time. Usual ceiling of indemnities that we encountered were 2, 3 or 4 for each "happy" and "unhappy" events or both together. These limitations can be seen as a mechanism providing some sort of *balanced reciprocity* (see Platteau (1997)) ensuring each member a certain degree of equivalence between what is paid in and what is received in indemnities. Before allocating an indemnity, two groups out of three check the veracity of a demand. Few groups have secondary activities such as rotating credit and saving associations (roscas) or investment funds. In these cases they are clearly separated from group insurance activities. Membership between different types of groups can be similar but rules and meetings are not intertwined. A very small proportion of groups organize income generating activities such as

[5] Unless stated, all tests are based on a 10% confidence level.
[6] For example many women said that it was preferable to have only females in a group as discussion was made easier. According to them men tended to monopolise conversation and women felt freer to talk about various topics in the sole presence of other women.

selling goods or services (gardening products, folkloric music, etc.) that aim to benefit the group's cashbox.

Insurance coverage, which we describe in length in Table 3, are in the vast majority of cases denominated per capita. That is to say, in a case where help is granted, each member is required to contribute a fixed amount; the indemnity offered amounting to the sum of all individual contributions. About three quarters of all groups (154 out of 209) require their members to pay a premium at each meeting[7]. In 49 groups, indemnities are paid exclusively by these premiums. In the other 160 groups, premiums are either non-existent or represent only a fraction of what members are expected to disburse in case an indemnity is requested by a member. Forty percent of all groups require their members to pay a regular "secondary" contribution (usually a small sum worth less than the premiums) which is used mainly for renting transportation means (to travel to funeral ceremonies) or buying new fabrics for celebration. This secondary cashbox has a separate accounting and is rarely used for paying indemnities.[8] These regular contributions and membership fees act as a commitment device. Slightly more than nine groups out of ten impose the payments either of insurance premium or of secondary contribution. In order not to let their unused contributions sleep in either one of their cashboxes, 58% of these groups organise what they call a "kèsi gbigba". This is a special meeting were the remains of their cashboxes (or part of it) is redistributed among members (17% of groups) or also frequently used for organising a celebration or both. Such special meeting is either organised at the end of a calendar year (59% of groups) so that money is available for members during this period of celebrations or at the end of a cycle (27%). Kèsi gbigba is also a time for rejoicing and showing non members how successful a group is.

Strict accounting is done on premiums paid by members as well as on indemnities allocated so that what goes in and out of the cashbox is carefully registered. Table 3 shows that indemnities are offered for two broad categories of events. Groups themselves refer to happy and unhappy events ("nun gnangnan" and "nun dagbé") and their rules stipulate in which case an indemnity is to be allocated and how much. A small fraction of groups offer indemnities for all cases listed. As we see "death of a member's close relative", "death of a member" and "illness of a member" represent the most cited coverage offered. The first one being for some groups their *raison d'être*: they started by offering solely indemnities for funerals and then expanded the range of coverage. During informal discussions, members reported that funeral of a close relative represents the most important expense they faced. Accordingly coverage for such events is the largest. Out of 1179 individuals aged higher than sixteen that were surveyed: 51% made expenses related to funeral and/or illness during last six months. How important can the coverage be for one household? Compared to their average monthly income of 63 845 CFA (median = 46 584 CFA), individuals spent a monthly mean of 7480 CFA on funerals and 4280 CFA on illness (averages made over the last six months). These two expenses together represent 35% of all durable expenses made by one

[7] Groups have their meetings on a weekly (76%), bi-weekly (10%) or monthly basis (11%).
[8] For all the indemnity funds surveyed, correlation between having a regular premium paid and a regular secondary contribution is of the order of -0.4.

individual.[9] All indemnities offered in case of a "happy" event aim at covering the costs of a ceremony or a celebration ranging from baptism, marriage, birth to anniversary.[10]

Groups have different ways of coping with defaulting members unable to pay premium or indemnity. Sanctions range from exclusion (32% of groups), imposing fines or excluding the member from kèsi gbigba (27%), refusing to indemnify the member until he pays his due (20%) or giving additional delay after public warnings (7%) to ultimately bring the case in front of a competent local court of justice (3%). Some groups use more than one of these sanctions in combination. Sanctions do not only have a financial impact: a defaulting member will often feel ashamed of facing public warning or reprimands. This information will spread rapidly in the neighbourhood and may prevent him from joining other groups in the district. Indeed, before accepting a new member a large majority of groups carry an investigation on the applicant's previous memberships. Sanctions such as warnings and fines made publicly can thus have long lasting "social" impacts by giving the applicant a bad reputation. In order to impose sanctions groups use different means of pressure: help of local chiefs or police (43% of groups), threats and public warnings (22%) and eventually assets seizure (9%).

4. Decision to Join

During our survey, we carried out several informal meetings with people which highlighted that spouses were secretive with one another concerning financial matters. As detailed in LeMay (2007), a large proportion of them with whom we discussed in Vossa and Enagnon 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." What stems from this is a vision of couples consisting of secretive spouses. Naturally they give as little information as possible to their partners and do not raise questions related to their incomes or activities. This way both spouses keep their income secret. The main reason for this is to retain as much latitude as possible in managing personal income. Thus by being secretive spouses avoid sharing their personal earnings or making common budgets and retain the sole control over their personal expenditures.[11]

Couples can thus be seen as an arrangement made in order to provide for children's needs and for each member's needs in public goods. Contributions to public goods are often made in

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[9] In order to get a very rough idea of what funeral expenses can represent: buying a standard coffin in Cotonou amounts to about 90 000 CFA, an almost compulsory beef for celebration 100 000 CFA and standard hearse costs 30 000 CFA. Total expenses for a funeral ceremony can easily amount 6 to 10 times one's monthly income. In Roth (1999) it is said that the poor in South Africa spend approximately 15 times their average monthly income on funerals.

[10] For groups having a limit of indemnities per member for both happy and unhappy events together, payouts for such ceremonies are sometimes used to accelerate the completion of a cycle. They are granted to a member who has not attained his ceiling of indemnities while the rest of the group has.

[11] LeMay (2007) substantiates this dichotomy between wife and husband finances inside couples using this large scale survey. He presents an empirical analysis of the determinants of spouses' pattern of consumptions and a review of the anthropological literature pertaining to that issue in West-Africa. Evidence tends to show

Benin according to social norms fixing the intra-household allocation of expenses on different items according to gender (for a detailed anthropological account of this see Falen 2003). Concerning expenses related to unhappy events, for which coverage is offered by insurance groups, a certain gender pattern can be identified. For "destruction of professional belongings / house" and "death of a member's close relative" entailing a funeral ceremony, males often bear a larger burden of expenses, but still, females are often asked for contribution. Expenses incurred by illness in one household are male's responsibility but can be shared among spouses or paid by the one having access to the required sum. This comes from the fact that traditionally the husband has the breadwinner status. However, for the majority of coverage for happy events, related to the organisation of ceremonies or parties, no specific sharing rules exist to our knowledge. Thus with respect to coverage offered and social norms in the provision of public goods we could expect that men would be slightly more likely to participate. But still this has to be nuanced. Coverage also applies to expenses not related to the household. Indeed friends or close relatives of one spouse (non member of the household or of the extended family) can be helped if necessary so that man and woman can be equally appealed to by their friends.

We also investigated motives for joining by asking all members "what were the reason(s) why they joined such a group?" Each was allowed multiple answers to this open question. Basically the 214 members of our dataset gave two answers : 97% answered "getting indemnity in cases of need", thus clearly underlining the need of insurance in case of hardship. The second given by 75% of all members was "to get moral support from other members". This underlines the importance of social dynamic and cohesion within one group. Almost all groups hold regular meetings during which indemnities are allocated and discussions on several matters that affect members are raised. It often happens that members also spend time playing music or perpetuating folkloric activities. While this paper does not investigate insurance funds as sociologists would, from our investigation and some meetings we attended to, it comes as no surprise that social links are important in driving and maintaining membership. Moreover it regularly happens that indemnities, especially for funerals, are given by the entire group or by a delegation at the ceremony to show their solidarity. Another answer provided by only 3% of all members to this question was "to discipline my saving". What is interesting to highlight here is that while about three quarters of all groups ask for regular premiums to be paid, members do not see insurance funds as a pure device for disciplining savings as is the case for roscas[12]. This happens partly because timing of reception of indemnity is not known in many cases. Also because a large proportion of these premiums are small and larger contributions are expected upon request. This entails that periodicity of important payments are not known in a majority of groups. From the preceding description, we could also suspect someone to join an insurance group in order to hide money from his/her spouse. However, according to our evidence, insurance groups are not used for such purpose. Indeed only 12% of all fund participations are unknown by spouses. This is partly due to the fact that 54% of funds allowing females require the agreement of husbands upon entry. Moreover, we know that 60% of all regular contributions to insurance groups (premiums) are known by spouses.

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that individual earnings are largely protected from spouse pressure. Husband and wife have a limited ability to bias his/her partner's expenditures both for private and public goods.

[12] See Dagnelie and LeMay (2007) for an analysis on why people join a rosca.

5. Conjectures

Important implications can be derived from the interaction among household members we depicted earlier. We can predict that the probability of joining an insurance group does not depend on whether an individual is single or in a couple and neither does it depend on each spouse's bargaining power within the couple. As we said a great deal of latitude is left to both husband and wife in terms of managing their income, net of expenses on public goods and deciding if they are going to join a group or not. This decision, thus the probability of joining an insurance group, depends on their available income, net of expenses on public goods and on other relevant individual characteristics. We proceed by making simple predictions on the effects of these variables.

Most of the households we surveyed have restricted ability to borrow or finance consumption. They would thus face difficulties in smoothing their consumption if confronted to a shock. In our discussion, risk for individuals has two aspects: fluctuation in income itself and potential obligations of disbursements in case of "happy" or unhappy" events. For a given level of fluctuation in revenues, income should positively influence the probability of joining. This, at least for low level of income, can be assumed since insurance can be thought of as a normal good for poor people highly vulnerable to potential disbursements. Indeed if income rises, one might get incited to join a group in order to make precautionary savings either through payments of a premium or through regular payouts. Membership would grant indemnities that would allow some consumption-smoothing in case of need. However we expect that very rich individuals would rather opt for formal insurance contracts or would more easily be able to cope individually with adverse shocks. Such contracts through a private firm are more secure an arrangement than any informal group can offer. So for very high levels of income we expect the probability of joining to fall, leading to an overall inverted-U shape curve with respect to income.

Age should also follow a quadratic pattern: the needs to insure would be maximised for middle aged individuals establishing and having family and would be expected to diminish as age increases. Indeed, as children become independent coverage for some happy events becomes useless. Moreover middle aged individuals are the most likely to be requested to contribute to funeral ceremonies, mainly organised for parents or parents in law, or for any other adverse shocks. It is customary to rely on them for such disbursements and they often face intense pressure (see Falen 2003). The number of dependants should have a positive effect on the probability of joining an insurance group. A larger number of children (or relatives depending on the household's head) would give higher incentives to parents to insure in order to be able to face potentially more future shocks. However for a given income, more dependants may reduce capacity to save and thus the probability of joining.

In the light of Deaton (1991), risk averse households with precautionary motive for savings and maximizing their expected utility over time would tend to save more if risk in fluctuating income increases. Given a certain risk of disbursement shock, more uncertain income would mean a greater probability of joining and also opting for a greater coverage. Alternatively, intuition would

tell us that individuals with stable source of income would not need such an insurance device and would cope with disbursements shocks by themselves. With these reasoning our two variables describing job stability, which can be taken as proxies of income stability, should be negatively linked to the probability of joining. A contrasting view would say that more stable income entries over the past means that an individual expects to be able to commit himself more easily to regular payments of premiums and indemnities. Income stability, through lower risk of default, would have a positive impact on the probability of joining. Moreover, certain insurance groups are more inclined to accept members that have a regular and secure source of income in order to reduce adverse selection problems (see Section 3). That would be an extra effect favouring a positive effect of income stability on the probability of joining. To check which of these two opposite effects dominates, we use two binary variables shown in Table 1 that are proxies for income stability: "same job for at least 24 months" and "salaried" which takes value one if an individual is salaried and zero if self-employed. Both variables are defined in details in Section 9.2.

Let's recall that coverage is the sum of all individual payouts, stipulated in the rules, given to one requesting member. So for high coverage one must join a group where individual payouts are high or a group with a large membership or both. The capacity to contribute to payouts is positively linked to income. We expect that for low level of income, richer individuals will opt for larger coverage. Again we can guess that very rich individuals would rather opt for formal insurance contracts. So it is likely that both probability of joining and coverage are concave in income as less risky opportunities become available with very high income. In the next section we confront our predictions with empirical findings obtained from our Beninese database.

6. Empirical Results

We test our predictions with our data by estimating participation and coverage with the Heckman two-step procedure. As people self-select their participation to a group, the observations taken into account in the structural equation are not a random sample. In fact, we suspect unobserved individual characteristics to influence both the probablility to join and the size of coverage chosen. We have therefore to tackle the problem of selection bias, producing inconsistent estimates, induced by the correlation between the error term and the regressors. Heckman two-step procedure addresses this problem by estimating the selection and structural equations, allowing residuals to be correlated. Moreover we introduced fixed effects removing the area-specific component from the residuals and eliminating the endogeneity caused by unmeasured area characteristics.

Table 4 gives empirical estimates with respect to participation which is the dependent variable of the first step. We regress alternatively with respect to the whole sample size and then with a subset incorporating only members of a couple.[13] We control for ethnic affiliation as these variables can be seen as very rough proxies for social identification and networking. A look at both

[13] See Appendix 9.2 for a detailed description of some of the independent variables.

regressions results show that two ethnic variables (Goun and Popo) are positive and significant.[14] Why Goun and Popo people are more willing to join groups is difficult to answer. It may have to do with the fact that both ethnic groups do not originated from Cotonou, as is the case for Fon, and that members of these communities would tend to gather between themselves. Neighbourhoods are also controlled for and account for all potential interactions and effects specific to Vossa and Enagnon (Enagnon-plage is included in the constant term). The district fixed effects are not significant suggesting that unobserved factors specific to each neighbourhood are not important. As shown in Table 1, individuals in our sample tend to have a rather long stay in their respective neighbourhoods with a mean of almost sixteen years. Movements across neighbourhoods and migration are much more of an exception rather than the rule. This may explain why the dummy variable "Same neighbourhood for at least 24 months" is not significant for both samples.

We include additional regressors such as the number of dependants. This variable's coefficient is positive but only significant for the sub sample of members of couple. In this case the marginal effect of one additional dependant in the household is rather small: an increase of 1.6% on the probability of joining a group.[15] This weakly confirms our interpretations presented before: a larger number of dependants means higher potential risk of facing adverse shocks and greater need for insurance. We check whether education has any effect: it appears not to have one as the variable "Has no education" is not significant in both samples. Income stability which we partly measure by whether one has kept his present job for at least 24 months, positively affects the probability to join an insurance group only for the entire sample. Having the same job for at least 24 months increases the probability of joining a group by 3.6%. Being salaried (not self-employed) is however not significant. Overall these two results would tend to weakly favour the second intuition we presented earlier. However we are unable to disentangle between the effects from groups' rules or one's ability to commit.

Being house owner has a significant and relatively strong impact on participation: it increases the probability of being member by 5.2%. Provision of coverage against "destruction of professional belongings / house" may attract owners. Moreover, possessing a house greatly facilitates the grant of membership since in case of dispute a house owner has less chance of fleeing. It gives additional guarantee to a group in case of default. As anticipated, group participation is quadratic in income. However the maximum is reached at a very high level of income indicating that for most of our sample the probability increases in income. Indeed only 46 individuals out of 1179 have a larger income than the maximum of this quadratic function. An increase in income of 1000 CFA increases probability to join by 0.17%. The income variable used in all our regressions is a measure of monthly individual income earned plus transfers. Our inverted-U shape prediction concerning age is also verified but only in the case where the whole sample is used: the relationship begins to decrease at 44 years of age.[16] Marginal effect of additional year is 1.6% on the probability of being member. This tends to confirm that demand for insurance

[14] Taken together the three variables representing ethnic affiliation are jointly significant. Not a majority of groups are designed along specific ethnic patterns. Out of the 49 groups restricted to only one ethnic affiliation, which represent only 23% of all groups, 19 are restricted to Popos and 16 to Gouns.
[15] Marginal effects are computed at the means of the independent variables.
[16] Note that 2003 estimates for the life expectancy at birth in Benin is 53 years. (Worldbank, 2005).

disbursements (such as funerals ceremonies) is increasing among young agents and decreases as they get older.

Coefficients displayed for the overall sample also show that neither couple nor the interaction variable between female and couple are significant. This confirms that decision to participate is not influenced by marital status. Bargaining power within couple proxied by the variable female share of household income (which is female's income divided by the sum of both spouses' income) and its square to allow for quadratic interaction are not significant. These results provide evidence in favour of the decision framework we depicted where the decision to join an insurance group is individual and independent of marital status considerations.[17] Contrary to the estimates for the overall sample where gender is non significant, estimates for the restricted sample of members of couples show that other things being equal men would be more likely to participate, the marginal effect being 7.8%. This result is in line with the breadwinner status that traditionally the husband has. In our previous discussion with respect to expenses related to happy or unhappy events and social norms, we stated that male could be more likely to join insurance groups. Results displayed in Table 4 are robust to various changes in specification notably when quadratic terms for age, income or female share of income are omitted.

Table 5 displays our second step estimates where the dependent variable is a coverage index. This variable is an average measure of what a member is expected to receive in case of a shock, it reflects the size of insurance. We show estimates based on a coverage index which is the average of indemnities for the three most widely indemnified "happy" and five "unhappy" events. We also carried estimations with two other coverage indexes: one being an average of all coverages listed above in Table 3 and one being an average for a subset of three "unhappy" events only. Results that we show hold for those three indexes. We use coverage index because we can compute such value for all groups and thus for all 224 members included in our second step. Using premiums paid by members instead would have diminished the sample size since only three quarters of all groups require such payment. Individuals can belong to several groups, which is the case for 12% of all members in our sample. In those cases coverage computed is the sum of all groups' respective payouts. By looking at Table 5 we see that personal characteristics such as gender, marital status, age, education, female share of household income, job stability, education and being salaried have no significant effect on coverage chosen by one member. From our two different sets of estimates only two variables are driving the decision with respect to the size of coverage: income and the number of dependants. These results are intuitive knowing that both decisions to join and to contribute seem independent as we show below. Once an individual has decided to join a group based on his personal characteristics, he will decide the size of insurance according to his income. Higher income would potentially lead an agent to save more and thus allow him to pay larger premiums and indemnities. We could also expect that a very wealthy agent would at some point turn to formal insurance and reduce informal coverage. However this effect does show up only slightly: income square is significant but choice of coverage remains increasing

[17] We also ran two tests of joint significance on coefficients of couple and female*couple and on female share and female share square. Results do not allow us to reject joint non-significance at a 10% level for both tests.

in income for most of our sample. The maximum of our quadratic inverted U-shape curves for both samples are reached at high level indicating that for most of our sample coverage increases in income. Intuitively having more children or dependants would tend to reduce savings for a given income and thus reduce coverage. Alternatively it would mean facing greater risk of shocks thus asking for a larger coverage. Results tend to support the first interpretation: coefficients are negative and significant only for the overall sample. District fixed effects are irrelevant in explaining the size of coverage. Dummies for house ownership and ethnic affiliation were discarded of the second step to identify the probability of joining a group in the first stage of the estimation. When added into the second step, these variables are insignificant. Empirical results are in accordance with our rationale: marital status and female share of household income are non significant indicating that the decision made on the size of coverage is individual. Estimates from Table 4 and 5 show that secrecy allow spouses to make individual decisions first on whether or not to commit themselves to an insurance group and second to what extent they will insure. As a way to check robustness, alternative estimates for this second step regression are given in Table 5a. Results from an OLS on restricted sample including only members and a Tobit estimation are roughly similar.

The inverse Mill's ratio is not a significant variable in determining the size of coverage. This suggests that the decisions to join a group and the choice of coverage are independent. This may be due to the fact that an agent has the choice among a set of insurance groups in his neighbourhood and others known through colleagues, friends or relatives and that the selection among these is made with respect to the indemnities offered. Being familiar with other members is the predominant criterion in group selection. Indeed in our sample 72% of all members said that they had selected the group they are in because they knew or had links with other members. The second most cited answer to "why did you choose this specific insurance group?" is because its president was known for well managing the group (18%) and following in importance is the fact the group was affiliated to a church (6%). Once individuals have identified groups in which they are familiar with some or all members and likely to trust them, they will join the one more suitable to their preferred level of insurance.

It can be argued that group participation can influence one's income, not directly since premiums paid bear no interest; and with strict accounting members receive in indemnity the equivalent sum disbursed in payouts, but indirectly through social connections or others beneficial side effects. About 45% of all 214 members answer that they experienced some extra economical advantages by participating in an insurance group: 22% say that fellow members prefer to buy at their shop or doing business with them and 12% say that they have met their employer (past or present) in the group. These answers tend to confirm that insurance groups provide social connectedness and that they can bring additional advantages. However measuring the importance of these side effects is practically impossible. To account for such potential benefits on income and thus endogeneity with respect to the probability of joining a group we have carried out the same Heckman two-step regressions as in Table 4 and 5 by replacing income with expenditures on non

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Introducing sampling weights to reflect the fact that we surveyed in different areas of Cotonou does not change our results.

durable goods (food and other weekly expenses such as gas for cooking, transportation, etc). This way we instrument income by a variable which can be considered as independent of such extra benefits. Results from these regressions (not shown) are similar to the ones already displayed.

7. Comparing Groups According to their Payment Mode

The previous analysis considered only two options for one individual: either joining or not an insurance group. We could also interpret the choice one individual faces differently. One important distinction between groups arises from the timing of payment of contributions to the group. Indeed 26% of groups, which we denominated as type 1, do not impose any payment of premium and members only contribute in case of emergency. That is to say only when help is granted to one individual, members are asked to pay their share, thus they are only making ex-post payments. A type 3 group, 22% of all groups, imposes to their member the payment of a regular premium which covers entirely the payouts. In this case payouts are thus paid ex-ante an emergency. Slightly more than half (52%) of all groups are of type 2 which is a hybrid of both type 1 and 3. They impose regular payment of a premium but these contributions are not sufficient to cover the payouts and thus members are also asked to pay on the spot in case of emergency. Thus members of a type 2 group are making ex-ante and ex-post payments. In what follows we aim at analysing the decision to join a group according to these different types: either one individual decides not to join, or opt for a specific type.[18]

Table 6 shows group characteristics with respect to their type. According to our t-tests numerous differences exist between types. Not surprisingly ex-ante contributions are larger for type 3 groups compared to type 2 groups (as defined type 1 does not impose ex-ante payments). Type 2 and 3 groups all have regular meetings, which is not the case for type 1. This is simply explained by the fact that in all groups of type 2 and 3 premiums are paid during meetings. Some type 1 groups only meet when an emergency is declared. Proportion of groups offering lending is also positively linked to the importance of ex-ante payments. This comes as no surprise since these type 2 and 3 groups have larger sum of money available in their cashboxes. Also, groups of type 2 and 3 also more frequently redistribute assets ("kèsi gbigba"). In all groups types a similar fraction have fixed a finite duration and democratically elects new members and their president. Type 3 groups are significantly more inclined than the others to check the veracity of a member's request before allowing a payout. What may appear as a surprise is the fact that there is no significant difference between the proportion of groups imposing entry fees (and the conditional mean of those fees) between type 1 and type 3 groups. One would have expected to find this feature more often for type 1 groups since it could serve to reduce the probability of defaulting members. Indeed members of type 2 and 3 groups have additional incentive to stay in the group since they make regular contributions to the cashbox. Moreover, there is no significant difference between types

[18] This classification does not consider if a group imposes "secondary contributions" or not. A distinction between groups imposing either insurance premiums and secondary contributions or none would have been too discriminatory (since 92% of all groups impose either one or both of these payments) and would not have taken into account the important difference in terms of magnitude between these two contributions. Thus opting for a classification differentiating groups according to ex-ante, ex-post and a combination of both contributions seemed the most appropriate.

concerning entry requirements[19], ethnic and gender polarisation, the proportion of groups having written rules and status and sanctions in case of defaults (described in Section 3). Proportion of groups having a majority of their members in the neighbourhood is similar for type 1 and 3 groups. A significantly lower proportion of type 1 groups has their rules approved by the neighbourhood's chief and imposes cycles. Despite that, type 1 groups show a similar mean duration as type 3 groups and a larger one than type 2. All this seems to suggest that there is not much difference in terms of monitoring and prevention of potential moral hazard between types, and if there would be one it would be surprisingly in disfavour of type 1 groups. With respect to differences between type 2 and type 3 groups: they appear to be largely similar.

In her theoretical work on mutual savings groups and risk-sharing arrangements, Bold (2006) analyses the effect of ex-ante transfers on group stability and the extent of insurance. From her model and simulations she formulates predictions that our data allow us to test. Her first conjecture says that insurance groups holding assets and charging ex-ante transfers should on average have larger membership. According to our data there is no significant difference in terms of membership between all three types and thus no evidence of a positive link between the importance of ex-ante transfers and size of groups. Her second prediction states that insurance groups holding assets and charging ex-ante transfers should offer larger coverage than those that do not. We also carefully checked for differences in coverage offered between our three group types. For this we looked at differences in our tree coverage indexes, we also tested conditional and unconditional mean of coverage for each specific case for which insurance is granted (see Table 3) and also tested difference in proportion of groups providing each specific coverage. The conclusion is that overall groups offer similar coverage: there is no significant positive correlation between the size of ex-ante transfers and the size of insurance provided. Such similitude between groups may appear as surprising. We provide below some explanations for such results.

We now want to see if incorporating these group distinctions brings additional insight to our initial estimations that are presented in Section 6. As a first approach we pose that the base choice for an individual is not to join any group with now two alternative choices: joining a type 1 or joining either a type 2 or type 3 group. From our previous analysis, the distinction between types 2 and 3 appears tenuous and regrouping them provides initial results.[20] Table 7 shows results of a multinomial logit regression. Results are displayed for the whole sample (first two columns) and for coupled members only (last two columns). We have incorporated in this model the same regressors as in the first step of our previous Heckman two-step procedure. Results in terms of significance are comparable: important variables driving membership are income, age, being house owner and job stability. New significant variables for type 2 and 3 option are education and female (for both samples). We compared the values of coefficients between alternative choices in order to check if there is any significant difference. For the whole sample we found only one significant difference for education. For the sample composed of members of couple only age and age square are

[19] Entry requirement is an index which represents the sum of all conditions that a new entrant most satisfies. See Appendix 9.2 for a detailed description of this variable.
[20] We carried out an Hausman test on the assumption of the independence of irrelevance alternatives (IIA) for each possible omitted category and we could not reject the null hypothesis of independence. Moreover multinomial probit regressions that we ran with the same variables show very similar results.

significantly different. Jointly both sets of coefficients are similar for both samples. What these results suggest – having in mind that they have to be interpreted with great care since uncensored samples are small- is that variables impacts are largely similar on the probability of joining either a type 1 or type 2 and 3 group. With respect to income, similarity might be due to the fact that since insurance coverage is not significantly different across groups, regular ex-post transfer requires an equivalent income compared to regular ex-ante transfers. As a second step we run multinomial regressions having now three alternatives choices corresponding to each type.[21] Results (not shown) –again to be interpreted with caution- do not bring much additional insight compared to the previous multinomial analysis as to what variables drive membership and in terms of confirming or not conjectures stated in section 5. Jointly the three sets of coefficients are similar. For the overall sample the only coefficient which significantly differs across choices is salaried though remaining not different from zero for all options.

Treating all three types differently does not bring much refinement to the analysis. Similarities in descriptive statistics of individuals according to their type affiliation[22] and results from the multinomial logit regression raise the question as to why there are so few differences in terms of membership and variables driving it across group types. The fact that there are several similarities in group characteristics across types is certainly not alien to this. Moreover one thing that makes this analysis tricky is the widespread presence of secondary contributions. This renders the distinction between groups less obvious. It is also plausible to think that individuals make only minor distinction between a premium and regular ex-post transfers. Both require a certain degree of regularity in payments from members, this being particularly true in large groups where demand for indemnities occurs frequently. This resemblance is reinforced by the fact that coverages are not significantly different for all types. Furthermore as we saw the major reason for group selection is the familiarity with other members; payment or not of a premium did not appear at all as a crucial factor. This certainly explains part of the multinomial regressions results and the fact that members across types are not significantly different.

Explaining similarity in terms of structure and characteristics of groups across types on the basis of our data would be far fetched. Our questionnaire did not included question on the reasons motivating groups design and functioning. We did not spend time with groups founding members to cover this issue. Nonetheless we observed some clusters of resembling groups. Field observations and interviews with locals gave us the impression that new born groups can act simply by mimicking the structure and rules of successful and often neighbouring associations. Still this issue has to be studied with more attention and would need additional field investigations. Thus we are limited in explaining why some groups impose ex-ante payouts and others not. Imposing premiums can be conceived as a mean to deal with adverse selection issue. We would then observe alternative means for dealing with selection for groups of type 1 and 2 which does not appear to be the case. There is no difference between entry requirements and sanctions across

[21] Again we carried out an Hausman test on the assumption of the independence of irrelevance alternatives (IIA) for each possible omitted category and we could not reject the null hypothesis of independence. Moreover multinomial probit regressions that we ran with the same setting show similar results.

[22] We checked for differences in individual characteristics between members of all three types of groups and found none to be significant at ten percent except that members of type 3 are significantly more salaried.

types and neither with respect to group duration.[23] At very first look it does not appear to be primarily intended for selection. It could aim at attracting a specific clientele, creaming the poorest unable to pay regular premiums. However, this does not come out of our empirical analysis: there is no income difference across memberships, only do we find that there is a larger proportion of salaried members in type 3 groups.

8. Conclusion

This paper has analysed a type of local institution that is largely understudied in the development literature: indigenous informal associations with a focus on insurance. These groups not only offer funeral insurance, but also provide indemnities in a substantial number of cases: illnesses (hospitalisation and medication costs), fire and house damages, loss of a job and as well as for covering the costs of festivities such as baptism, marriages, etc. About a third of them even offer short term credit to their members. Our empirical evidence tend to show that insurance group participation is not a gender issue in Cotonou and that the decision to join such group is made individually in such a way that each spouse retains the control over his/her spending. This has to be taken into account by policies that would be designed to favour any gender participation. Our investigations underline that group participation and choice of coverage in Cotonou is primarily driven by income and that group selection is made on the basis of social connectedness. We also found overall small significant differences in terms of characteristics between groups classified in three types according to the importance of ex-ante transfers. Moreover variables influencing participation for each specific groups underlined by our multinomial regressions are broadly similar to the results we obtained in the first stage of our Heckman two-step estimates.

Up to now there has been no initiative in Cotonou by government-led institution to establish new groups or even to help scaling-up existing ones. Nevertheless these institutions represent a unique way to reach relatively poor people. The strong networks roscas and insurance groups represent in those districts should be considered as a serious asset. Because they are known, well established and experienced institutions, they are likely to reach underprivileged households at a relatively low cost. Would they be offered appropriate financial support they could potentially contribute to development and finance activities in a sustainable way. Projects favouring the establishment of new or existing insurance services for poor people should be based on accessibility and thus requiring payments of low premiums or ex-post transfers. That would then make possible to reach the most needy and raise the overall relatively low level of participation that we observed in Cotonou (18%). Pooling numerous individuals of the same neighbourhood could greatly improve the extent of insurance. In the face of obvious needs, such projects in Vossa and Enagnon, and certainly in other poor areas of Cotonou, would most probably meet with success.

[23] When comparing durations, means are computed only on existing groups. We did not survey groups that have ceased their activities. A more valid analysis of groups' duration would require such data.

9. Appendix

9.1 Survey Methodology

We selected households according to a random process. We succeeded in obtaining a map of Enagnon and performed there a selection of lots according to an implemented random process. 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 household was 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 two questionnaires a day. The taking account of intra-household secrecy greatly lengthened the survey by requiring specific appointments with each adult member. Another time consuming factor was the detailed part of our questionnaire concerning groups: we often needed more than an hour for a single group. We compensated every household for their precious time by donating 1500 francs CFA. Finally, with two previous missions, in 2002 and 2003, we carried out about eighty group interviews. We attended regular meetings or met members of their governing body in order to get a better understanding of their functioning.

9.2 Definitions of Key Variables

In couple: Individual having a partner (married or not) who is member of the household. Those who were engaged in a couple for whom the spouse was not living in the household and for whom we did not have any data were not considered to live in couple.

Salaried: Individual is salaried if he/she receives a salary on a regular basis (either daily, weekly, bi-weekly, monthly, bi-monthly, etc) in the formal or informal sector. Only 12% of all individuals are salaried and there is an important gender difference: 22% of men are salaried and only 3% of women. Women are massively self-employed in our sample.

Monthly individual income: 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.

Number of dependants: Total number of people within the household depending financially on either member of the head couple. It is thus the sum of children (aged less than sixteen years), young adults having no revenues or any other depending relatives. For example a member of the extended family moving in the household and relying on its members for a living is counted as such.

Same job for at least twenty four months: Indicates that one individual has had his/her present principal income generating activity for at least twenty four months.

Monthly individual expenditure: Monthly extrapolations from the sum of all expenditures made on non durable goods during one week. It includes 1) all expenditures on food (including expenses on heating and cooking such as coal or gas) and 2) luxury expenditures such as cigarettes, alcohol, eating and drinking in hotels and restaurants.

Entry requirement: Beninese groups have a series of requirements that a new member must fulfill before being accepted. A series of six "yes or no" questions that we developed in our questionnaire highlights them. These questions are: Is there an enquiry made on individuals who want to become members? To become a member, should an individual be proposed by an actual member? To become a member, should an individual be known by the group? Should an individual live in the neighbourhood? Should this individual receive his/her spouse's agreement? Is there any other conditions? We computed the variable reflecting entry requirements by summing all positive answers to all those questions.

9.3 Tables

Table 1: Individual Characteristics with Respect to Insurance Group Participation

	Total sample				Women				Men			
	all	sd	Fund members	sd	all	sd	Fund members	sd	all	sd	Fund members	sd
Participates in group	0.18	0.39	1.00	0.00	0.16	0.37	1.00	0.00	0.20	0.40	1.00	0.00
Female	0.51	0.50	0.46	0.50	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
Age	33.13	13.53	39.36	11.35	32.97	13.07	39.08	9.60	33.29	14.00	39.59	12.71
In couple	0.50	0.50	0.70	0.46	0.50	0.50	0.66	0.48	0.50	0.50	0.73	0.45
No education	0.38	0.49	0.46	0.50	0.55	0.50	0.67	0.47	0.21	0.41	0.28	0.45
Salaried	0.13	0.34	0.15	0.36	0.04	0.20	0.01	0.10	0.23	0.42	0.27	0.45
Same job for at least 24 months	0.52	0.50	0.79	0.41	0.53	0.50	0.84	0.37	0.51	0.50	0.74	0.44
Proprio	0.70	0.46	0.82	0.38	0.71	0.45	0.83	0.38	0.69	0.46	0.82	0.39
Primary degree	0.27	0.44	0.17	0.38	0.16	0.37	0.08	0.27	0.38	0.49	0.25	0.44
Monthly individual income (1000 CFA)	50.79	100.54	66.19	46.09	42.24	34.56	61.68	31.70	59.77	139.05	70.08	55.43
Monthly individual expenditures (1000 CFA)	33.23	31.97	43.35	23.51	29.89	24.68	39.42	20.44	36.73	37.86	46.73	25.46
Number of dependants	1.77	2.18	2.93	2.49	1.96	2.14	3.21	2.30	1.57	2.20	2.69	2.62
Number of months in the neighbourhood	201.97	154.68	271.40	172.40	187.42	147.75	235.39	151.22	217.26	160.36	302.39	183.78
Native Language : Fon	0.21	0.41	0.10	0.30	0.21	0.41	0.12	0.33	0.21	0.41	0.09	0.28
Native Language : Popo	0.35	0.48	0.51	0.50	0.37	0.48	0.54	0.50	0.32	0.47	0.50	0.50
Native Language : Yoruba	0.05	0.21	0.03	0.17	0.05	0.21	0.04	0.20	0.05	0.22	0.02	0.13
Native Language : Peul	0.05	0.22	0.02	0.15	0.04	0.20	0.02	0.14	0.06	0.24	0.03	0.16
Native Language : Goun	0.31	0.46	0.33	0.47	0.31	0.46	0.27	0.45	0.32	0.47	0.37	0.49
Native Language: Ashanti	0.01	0.10	0.00	0.00	0.01	0.08	0.00	0.00	0.01	0.12	0.00	0.00
Vossa	0.25	0.43	0.26	0.44	0.25	0.43	0.31	0.47	0.25	0.44	0.21	0.41
enagnon	0.53	0.50	0.45	0.50	0.52	0.50	0.37	0.49	0.53	0.50	0.52	0.50
Number of observations	1179		214		604		99		575		115	

Source: Survey Data

Table 2: Characteristics of Informal Insurance Groups

	mean	sd
Months existed	83 (median=60)	95
Group has written rules and status	0.76	0.43
Group has a finite duration	0.01	0.10
Group has recognition from Chief of neighbourhood / local chief police	0.46	0.50
President is elected	0.92	0.27
Entire group (all members) decides upon new entry	0.47	0.50
Number of members	25 (median=20)	20.32
only female members	0.20	0.42
only male members	0.28	0.45
All members are same ethnicity	0.23	0.42
Majority of members are from the same neighbourhood	0.72	0.45
group holds regular meetings	0.97	0.18
presence is compulsory	0.84	0.37
regular contribution (premium paid)	0.74	0.44
regular secondary contribution (transport, fabrics, etc)	0.39	0.49
No flexibility in payments	0.94	0.23
Entrance fee (conditionnal mean)	0.70 (6159)	0.46 (4263)
Cycles in coverage	0.70	0.46
Check demand before coverage is allocated	0.67	0.47
Redistribution of asset holdings	0.55	0.50
Fund offers borrowing to its members	0.30	0.46
Group has generating income activities	0.07	0.26
Group has secondary activities	0.14	0.35
Number of observations	209	

Source: Survey Data

Table 3: Coverage Offered by Insurance Groups

"Unhappy" events	Proportion of groups offering coverage	Coverage conditional mean	Coverage conditional median
Death of a member	0.89 (0.32)	88404 (64764)	75000
Death of a member's close relative	0.99 (0.12)	77910 (63512)	62750
Death of a member's relative	0.53 (0.50)	64520 (53124)	51000
Illness of a member	0.88 (0.33)	52020 (47286)	40000
Illness of a close relative	0.41 (0.49)	59231 (57292)	45000
Illness of a relative	0.35 (0.48)	63145 (58126)	50500
Loss of job	0.37 (0.48)	65561 (55513)	60000
Destruction of professional belongings / house	0.68 (0.47)	56354 (53367)	47250
"Happy" events			
Birth of a member's child	0.76 (0.43)	50299 (49016)	31000
Birth of a member's relative's child	0.43 (0.50)	53680 (57084)	30000
Baptism of a member's child	0.85 (0.36)	48743 (45854)	32000
Baptism of a member's relative's child	0.39 (0.49)	55099 (57996)	31000
Marriage of a member	0.85 (0.36)	50514 (45562)	38875
Marriage of a member's relative	0.39 (0.49)	56056 (57230)	38750
Diploma	0.79 (0.41)	52651 (46828)	38875
Member's anniversary	0.55 (0.50)	50544 (51675)	32000
Member's relative anniversary	0.33 (0.47)	58791 (60544)	38750
Number of observations	209		

Source: Survey Data; Standard deviations in parentheses
Conditional mean and median are computed only for groups offering coverage

Table 4: Heckman Estimates of Participation and Coverage: *1st step Participation*

	All sample		In couple	
	coeff.	se	coeff.	se
Female	-0.644	0.393	-0.380**	0.149
Couple	0.283	0.360		
Female*Couple	0.324	0.410		
Female share of household income	-1.651	1.332	-1.081	1.339
Female share of household income square	1.856	1.291	1.332	1.306
Individual income (1000 CFA)	0.012***	0.003	0.008**	0.003
Individual income square	-0.000***	0.000	-0.000**	0.000
Age	0.111***	0.027	0.050	0.037
Age square	-0.001***	0.000	-0.001	0.000
Number of persons in charge	0.036	0.027	0.077**	0.032
House owner	0.395***	0.126	0.503***	0.156
Has no education	0.109	0.113	0.109	0.141
Salaried	-0.096	0.149	-0.190	0.183
Same neighborhood for at least 24 months	-0.062	0.177	0.014	0.239
Same job for at least 24 months	0.252**	0.124	0.242	0.160
Fon	-0.105	0.215	0.180	0.278
Goun	0.450**	0.187	0.692***	0.255
Popo	0.659***	0.184	0.832***	0.252
Vossa	0.052	0.146	0.118	0.181
Enagnon	-0.106	0.129	0.069	0.163
Constant	-4.092***	0.526	-2.942***	0.830
Number of observations	1179		587	
Number of censored observations	955		438	
Pseudo R2	0.20		0.14	
Number of uncensored observations	224		149	

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

Table 5: Heckman Estimates of Participation and Coverage: *2nd step Coverage*

	All sample		In couple	
	coeff.	se	coeff.	se
Female	-28248.66	27089.15	-13917.86	10174.55
Couple	-37903.20	24333.21		
Female*Couple	19656.47	27004.94		
Female share of household income	125309.70	90563.41	85855.27	88806.51
Female share of household income square	-113411.80	88621.45	-74690.87	87071.70
Individual income (1000 CFA)	589.2428***	210.59	594.7847***	222.33
Individual income square	-1.372545*	0.72	-1.603868**	0.71
Age	2458.83	2397.84	3813.44	2608.31
Age square	-19.78	27.15	-34.82	28.76
Number of persons in charge	-3128.936*	1770.67	-1944.49	2035.11
Has no education	3235.85	7487.63	5919.45	8901.59
Salaried	-9883.52	10435.61	-10006.93	12484.37
Same job for at least 24 months	2011.59	9847.22	3944.49	12149.34
Vossa	13582.92	9509.42	8326.91	11231.79
Enangnon	-10089.54	8413.62	-12234.52	9734.28
constant	-33351.42	60056.36	-108936.60	62880.16
mills' ratio	3311.55	13643.29	18985.05	14739.87
Number of observations	224		149	
Adj R2	0.07		0.05	

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

Table 5a: Estimates of Choice of Coverage

	restricted OLS		Tobit	
	coeff.	se	coeff.	se
Female	26565,11	27210,50	-44323,20	28846,42
Couple	-39054,34	24799,72	8404,91	26426,32
Female*Couple	18802,24	27820,91	20864,44	29847,25
Female share of household income	131835,80	89858,07	-95668,77	97663,14
Female share of household income square	-120377,20	87122,39	105316,30	94462,68
Individual income (1000 CFA)	567,13***	197,30	902,68***	207,32
Individual income square	-1,291*	0,66	-2,90***	0,75
Age	2167,47	2157,46	7999,75***	2064,54
Age square	-16,56	24,62	-85,09***	23,82
Number of persons in charge	-3203,98*	1811,52	2083,99	1942,65
Has no education	3076,02	7750,28	7730,92	8145,14
Salaried	-9365,34	10615,01	-17433,21	10866,73
Same job for at least 24 months	1070,60	9407,87	21185,64**	9162,50
Vossa	13861,40	9809,17	-7207,72	10062,49
Enagnon	-9549,00	8430,83	-18599,38**	8892,92
constant	-22410,32	41252,29	-258395,6***	38018,80
Number of observations	224		1179	
R2 / Pseudo R2	0,08		0,03	

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

Table 6: Characteristics of Informal Insurance Groups

	type 1		type 2		type 3	
	mean	sd	mean	sd	mean	sd
Months existed (median)	(60)		(48)		(60)	
Group has written rules and status	0.74	0.44	0.78	0.42	0.74	0.44
Group has a finite duration	0.02	0.14	0.01	0.10	0.00	0.00
Group has recognition from Chief of neighborhood / local chief police	0.33	0.48	0.51	0.50	0.51	0.51
President is elected	0.87	0.34	0.93	0.25	0.94	0.25
Entire group (all members) decides upon new entry	0.44	0.50	0.52	0.50	0.38	0.49
Number of members (median)	(21.5) 27.35	19.80	(19) 22.99	19.97	(20) 28.64	21.39
only female members	0.17	0.38	0.22	0.42	0.19	0.40
only male members	0.20	0.41	0.30	0.46	0.32	0.47
All members are same ethnicity	0.20	0.41	0.21	0.41	0.30	0.46
Majority of members are from the same neighborhood	0.63	0.49	0.81	0.42	0.66	0.48
group holds regular meetings	0.89	0.32	1.00	0.00	1.00	0.00
presence is compulsory	0.83	0.38	0.86	0.35	0.81	0.40
regular contribution (premium)	0	0	1	0	1	0
Premium monthly value (mean)	0	0	2033	1764	3187	3926
regular secondary contribution (transport, fabrics, etc)	0.74	0.44	0.26	0.44	0.30	0.46
No flexibility in payments	0.93	0.26	0.96	0.19	0.91	0.28
Entrance fee	0.59	0.50	0.79	0.41	0.62	0.49
(with conditionnal mean)	(4165)	(2706)	(6848)	(4630)	(6340)	(3962)
Cycles in coverage	0.56	0.50	0.78	0.44	0.72	0.45
Check demand before coverage is allocated	0.65	0.48	0.63	0.49	0.79	0.41
Redistribution of asset holdings	0.43	0.50	0.60	0.49	0.55	0.50
Fund offers borrowing to its members	0.17	0.38	0.29	0.45	0.47	0.50
Group has generating income activities	0.13	0.34	0.05	0.21	0.06	0.25
Group has secondary activities	0.13	0.34	0.14	0.35	0.15	0.36
Number of observations	54		108		47	

Source : Survey Data

Table 7: Multinomial Logit Estimates

	All sample				In couple			
	type 1		type 2 & 3		type 1		type 2 & 3	
Participation	coeff.	se	coeff.	se	coeff.	se	coeff.	se
Female	-0.078	1.081	-1.858**	0.798	-0.619	0.404	-0.683**	0.283
Female*Couple	-0.304	1.117	1.207	0.815				
Couple	1.115	0.944	0.067	0.736				
Female share of household income	-5.456	3.551	-1.623	2.665	-4.211	3.593	-0.798	2.660
Female share of household income square	5.105	3.533	2.469	2.514	4.284	3.552	1.540	2.540
Individual income (1000 CFA)	0.017**	0.008	0.021***	0.006	0.016*	0.009	0.011*	0.007
Individual income square	-0.000**	0.000	-0.000***	0.000	-0.000*	0.000	-0.000*	0.000
Age	0.157*	0.080	0.237***	0.062	-0.048	0.100	0.179**	0.083
Age square	-0.002*	0.001	-0.003***	0.001	0.000	0.001	-0.002**	0.001
Number of persons in charge	0.072	0.069	0.058	0.051	0.160*	0.082	0.118**	0.059
House owner	0.774**	0.368	0.746***	0.269	1.022**	0.472	0.864***	0.316
Salaried	0.194	0.376	-0.419	0.318	-0.207	0.485	-0.413	0.362
Has no education	-0.327	0.321	0.394*	0.229	-0.177	0.388	0.338	0.274
Same neighborhood for at least 24 months	-0.533	0.472	0.216	0.421	-0.111	0.696	0.286	0.542
Same job for at least 24 months	0.697*	0.375	0.374	0.261	0.680	0.481	0.304	0.318
Fon	-0.304	0.665	-0.075	0.508	0.828	1.132	0.195	0.606
Goun	0.615	0.589	0.990**	0.425	1.676	1.075	1.222**	0.528
Popo	0.974*	0.572	1.370***	0.422	1.955*	1.067	1.409***	0.528
Vossa	0.198	0.368	0.044	0.300	0.444	0.459	0.066	0.357
Enagnon	-0.643*	0.358	-0.026	0.261	-0.288	0.457	0.188	0.312
Constant	-6.998***	1.553	-8.816***	1.229	-3.699	2.391	-7.601***	1.849
Number of observations	1179		1179		587		587	
Number of censored observations	965		965		438		438	
Number of uncensored observations	67		147		45		104	
Pseudo R2	0.17		0.17		0.13		0.13	

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

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Beninese and Ethiopian Informal Insurance Groups: a Comparative Analysis.[1]

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May 2007

Abstract

This paper aims at highlighting the differences and similarities that exist between informal insurance groups in Benin and in Ethiopia. Drawing on original datasets from Benin and Ethiopia we provide empirical evidence that documents differences ranging from those found in memberships group structures, type of coverage offered, sanctions and entry requirements.

[1] I am grateful to Tessa Bold who provided me the data on Ethiopian insurance groups.

1. Introduction

In Benin and in Ethiopia one can find groups that offer insurance to their members by providing indemnities for a wide range of shocks, principally for funeral expenses. In Benin these groups are called in local dialect "nujè mèji gbê", a direct translation of which would be "happiness-unhappiness funds". In Ethiopia they are called iddirs. This paper discusses and compares their functioning and the extent of insurance they offer. We intend to highlight a series of similarities and differences that exist between these two unrelated endogenous institutions.[2] This exercise points out that two far separated geographically local societies have experienced the formation of endogenous groups that surprisingly bear important resemblances. These groups were created both in Benin and Ethiopia in response to a risky environment typical of sub-Saharan countries. Either in urban or rural environments, poor households are highly vulnerable to risk and few means of insurance are available. For the vast majority of the households, costs associated to formal insurance are prohibitive and so they resort on punctual transfers from neighbours, friends or relatives.

The extent of experienced risk and how well households did in coping with it has been lengthily analysed in the literature (see Townsend (1994) and Murdoch (1995) for a review). Indeed, there exists a variety of mechanisms for coping with risk, risk-sharing arrangements represent one. Such arrangements, which provide mutual assistance between households, are informal in the sense that they take place outside of the market place, are made without any legal arrangement that could in anyway be binding and are not based on well-defined formal associations that have written rules or regulations governing their operation. Hardship and risk are often difficult to face individually, so people voluntarily participate into such arrangements which are sustained over time as they offer higher expected payoff than the one in autarky. Empirical research on such mechanisms have focused on arrangements between households being neighbours, living in the same village or having extended familial link but not on well-defined groups or associations formed with the specific aim of providing insurance to their members. Such studies have thus not focused on groups but instead on bilateral arrangements identifying networks of insurance partners (see among others: Platteau (1996), Fafchamps and Lund (2003), Ayalew (2003), Dercon and De Weerdt (2002)).

What is presented in this paper is slightly different. We focus both on Beninese and Ethiopian informal insurance groups that have a clear and well-defined structure. Those groups feature a well defined membership, particular procedures to accept new members and rules such as schedules of payments, specific contributions, sanctions in case of non payment or misbehaviour. They offer insurance in order to cover entirely or some fraction of funeral costs and numerous other expenses that can arise in case of hardship.

Our paper tries to draw a comparison between Ethiopian iddirs which were initially presented in Dercon et al. (2004) and on their Beninese equivalent described by LeMay (2007).

[2] By endogenous we mean that these groups were not initiated by NGOs or foreign health providers: they were created purely by indigenous initiatives.

Though, our analysis of iddirs slightly differs from Dercon et al. (2004) since we use here a different dataset on iddirs, taken from Bold (2006), which also provides evidence from rural areas in Ethiopia. These groups are dealing primarily with expenses related to funeral ceremonies. Beninese informal insurance groups offer a wider range of coverage and are not solely designed for such events. In comparison, data related to Beninese groups were collected in Benin's largest city: Cotonou. In what follows we elaborate on the differences in the forms and structures that such groups can take and on the differences in terms of their membership.

We intend in the next section to give a description of iddir and of the data survey on which our comparison is based and then present Beninese informal insurance groups. In section 3 we compare both groups according to a number of features ranging from their structure, internal rules, coverage offered and sanctions. We will see that groups are well-organised and structured, with a clearly defined set of rules, regulations and potential sanctions in case of misconduct. In section 4, we use matching household level data on members and non-members and highlight some differences in terms of membership in both regions. We show that individual characteristics which influence the decision to join these groups and the choice of coverage made by the individuals are broadly similar in urban Benin and in rural Ethiopia. We also put particular attention to the cases of multiple memberships. Section 5 concludes.

2. Informal Insurance Groups

To present the main features of Ethiopian insurance groups we use a unique dataset on funeral insurance groups. This data originates from a number of communities, studied as part of the Ethiopian Rural Household Survey (ERHS). This survey has been collecting panel data on households and communities since 1989, focusing on 15 communities from across the country. Data on a sub-sample of funeral societies in these villages are drawn from the Funeral Insurance Survey (FIS) for which key figures and community leaders in six villages were interviewed in 2003. In total, detailed data has been collected on 78 funeral societies: about half the number of funeral societies present in these six villages. In addition, a new module in the ERHS 2004 asked households to provide details of the funeral insurance groups in which they are a member. We will restrict our analysis to the six villages for which both the FIS and the ERHS survey contain information.

Iddirs are associations that ensure payout in cash and in kind at the time of a funeral for a deceased relative of a group member[3]. They do not consist of loose and rapidly changing associations of people. Indeed iddirs have a stable and clearly defined membership and payments are made when members incur costs related to the funerals of a well-defined set of relatives. The actual payout is conditional on the relationship of the member to the deceased: for example, the payment for a spouse is typically different from the payout for a child or for uncles and aunts. Almost all groups have written statutes, bylaws and records of contributions and payouts. The rules define membership procedures, payout schedules, contributions and also a set of fines and other measures for nonpayment of contributions.

[3] For a detailed description of these groups see Dercon et al. (2004).

Iddirs are primarily designed for providing insurance in the case of funerals and payouts are mainly made in cash but are also composed of in-kind gifts and labour services. In Table 1 we display a detailed description of the iddirs based on the FIS survey. Let us emphasis a few of those characteristics: iddirs appear to be quite long lasting institutions with a mean duration of eighteen and a half years and to attract large membership with 85 members on average. Committees in charge are almost always elected, nine out of ten funds impose entrance fees and 45% of all groups ask their members to pay regular contributions: insurance premiums.

There are three clearly distinguishable types of iddirs in the FIS, which differ in the extent to which insurance contributions depend on the occurrence of a shock: members of a Type I make contributions only when a funeral occurs and payments are made directly to the member who incurs the funeral expense. Type II iddirs additionally collect a small monthly payment. Type III iddirs collect only regular monthly payments from their members, which are stored in a communal iddir fund. Insurance claims by members are then reimbursed directly out of this fund. These three contract types can be distinguished by the degree to which they make use of ex-ante versus ex-post transfers: broadly speaking Type I iddirs only use ex-ante transfers, Type II iddirs use a mixture of ex-ante and ex-post transfers and Type III iddirs use only ex-ante transfers (see Bold 2006a).

By breaking down iddirs characteristics according to the three group types we can see that they also differ along several other dimensions. It appears groups of Type II have a significant shorter duration in years than the other two types.[4] The average monthly contribution for Type III groups is 2.88 birr, which unsurprisingly exceeds regular contributions in Type I and Type II groups. As a consequence of collecting regular contributions, Type II and Type III iddirs retain substantial savings. With an average of 3266 birr, current funds in Type III groups are significantly larger than in the two other groups. There is also a significant larger entrance fee for anyone wanting to join a group of Type III, which in about three quarters of cases is calculated as a percentage of current iddir funds. About 60% of groups offer consumption loans to their members. Again, a larger percentage of Type II and III iddirs provide this service, but the difference between both types is not significant. Type III groups are the only ones, that undertake any other income generating activities (such as selling cattle). Average group size is 85 and groups of Type III tend to have more members, although this difference is not significant.

Beninese counter parts of the iddir on which our comparison is based are describe in details in LeMay (2007). Broadly speaking, their functions are similar. They also aim at ensuring payout in cash at the time of a funeral for a deceased relative of a group member and in cases of other hardships. Interestingly Beninese groups can also be categorized according to the same three Types defined for iddirs. We show in Table 2 aggregate descriptive figures of the 209 groups that were surveyed in 2004 in Cotonou. Differences between each Type are analysed in LeMay (2007).

[4] Significance tests are made at the 10% level.

3.1 Comparing Functioning

Some aspects of groups functioning are common to both iddirs and Beninese groups: a large proportion have a written constitution and written rules. Groups all have a chairman, secretary, storekeeper and treasurer. Most of them hold regular meetings, for which presence is largely compulsory. Both groups do not have a finite duration in the sense that the governing body or the members have not fixed a date or a horizon at which the group should dismantle. Parallel to payouts offered in case of a shock, groups in both countries can offer loans that are always consumption loans and cannot be used for investment purposes. There is, in both countries, a small proportion of groups that undertake generating income activities (growing cattle, commerce of coffee or grain, buying plot and renting it, etc.). Along that many iddirs undertake development projects, such as building roads, bridges or even schools which is not the case for Beninese groups.[5] Table 3 presents a synthesis of broad similarities and differences between Ethiopian and Beninese groups.

Table 3: Comparison between Ethiopian and Beninese Groups
Common Features:
Clearly defined memberships
Democratically elected governing bodies
Well defined sets of rules, procedures and payout schedules
Entrance fees
Three Types of groups according to timing of contribution
Sanctions and fines in case of late or no payment of contribution
Different Features:
Iddirs' longer duration
Iddirs' implication in community (undertaking of development projects)
Higher rate of unique and multiple memberships in Iddirs
Coverage offered by Beninese groups works according to cycles
Coverage of Beninese groups covers a wider set of shocks
Beninese groups require a secondary contribution
Beninese groups have limited assets holding compared to Iddirs

We could identify nine variables[6] describing groups that are common to both questionnaires and computed their statistical means. Two striking differences emerge: iddirs have significantly longer duration and larger membership than Beninese groups, both at the aggregate and Type levels. We give potential reasons explaining larger memberships in Section 4 below. It is difficult to assert if the difference observed in duration comes from a more recent local trend in Benin or if it is simply that groups are more volatile since to our knowledge no research on the origins of Beninese groups is available. As for iddirs, Aredo (1993) and Pankhurst and Mariam (2000) gives and account of their historical evolution: they seem to originate from the early twentieth century and gained popularity during the Italian occupation.[7] With a mean duration of 18 years Ethiopian groups appear to be very stable over time. Despite the fact that Beninese groups have a

[5] Pankhurst and Mariam (2000), Mariam (2003), Aredo (1993) and Dercon et al. (2004) give examples of iddirs implications in their communities. Usually, members are expected to provide free labour services and the iddir will pay for the materials.

[6] This includes four dummy variables and five metric variables: if group elect their president (zero if not), if group impose membership fees (zero if not), if group offer borrowing opportunities to their members (zero if not) and if group organise generating income activities parallel to their main insurance activity (zero if not); duration of group in months, size of membership, entry fees (either in francs CFA or birr), coverage offered in case of member's or spouse death and coverage offered in case of close relatives death (this last variable appears as such in the Beninese survey but for the Ethiopian dataset it represents an average of member's father or mother death, member's brother or sister death and member's children death

[7] In fact in our Ethiopian dataset the oldest groups were created in the 1940's.

significantly shorter mean duration (83 months), they nevertheless show a high level of stability. In terms of electing the president and having income generating activities both groups are similar. Democratic elections are pervasive and groups are rarely managed by one self-imposed individual. Also, groups rarely run outside activities and concentrate on offering insurance. Finally, Ethiopian groups offer loans more frequently. This could come from the fact that Ethiopian groups do not sporadically redistribute their funds to their members as the Beninese groups through the "kèsi gbigba"[8]. Iddirs can thus accumulate large sums and make a fraction of it available for loans.

3.2 Coverage

In Table 4 we show the magnitude of the insurance that iddirs offer to their members. They are primarily designed for providing insurance in case of funerals: for members' spouse, mother or father, brother or sister and children death. Some groups also offer additional insurance to cover expenditures made for a wedding ceremony, or provide cash in case of illness, bad harvest, fire, destruction of house and when a member has lost oxen or other livestock. Member's spouse and children death represent the most widely insured event. If we disentangle coverage by group types we find that except for death of a member's spouse, where Type III groups offer a significantly larger coverage, all types offer broadly a similar coverage with respect to cases related to death. As for the other cases, groups of Type II are on average more versatile and seem to offer a wider insurance. Groups can provide important protection for the insured households with payouts at 240.41 birr on average per group for the death of a member's spouse. While it is hard to estimate the full cost of a funeral, it is certain that they form a significant proportion of a month's income. Payouts are mainly made in cash but are also composed of in-kind gifts (usually coffee and injera, the basic staple food made from teff) and days of work (typically one to three days of labor per member, including farm and related work).

Beninese groups also offer similar coverage across their various Types (Table 5 shows coverage for all Beninese groups). There is no significant positive correlation between the size of ex-ante transfers and the size of insurance provided. Payouts are given only in cash and no groups propose in-kind gifts or compensation in form of work. Contrary to iddirs, coverage for wedding ceremony, illness, fire, destruction of house are frequently offered by groups. Moreover, a significant proportion, ranging from one third to almost ninety percents of all groups, offer coverage for other ceremonies that entail important expenditure (birth, baptism, etc.). Two additional important differences exist with respect to iddirs. First, slightly less than three quarters of Beninese groups offer their payouts according to cycles. This is done in order to equilibrate the total amount of indemnities allocated between members. They fix a limit number of indemnities that can be received by one member, this number being the same for everyone. Once a member has attained the ceiling he has to wait until all the other members have also received this number of indemnities to be eligible again for assistance. As such, cycles have no fixed duration in time and their implementation may suggest that these groups have more to do with reciprocity than with true insurance (Platteau (1996); Mariam (2003)). Second, forty percent of all groups require their

[8] This is a special meeting were the remains of their cashboxes (or part of it) is redistributed among members or also frequently used for organising a celebration or both, see LeMay (2006).

members to pay a regular "secondary" contribution (usually a small sum worth less than the premiums) which is used mainly for traveling to funeral ceremonies or buying new fabrics for celebration. This secondary cashbox has a separate accounting and is rarely used for insurance purpose. These regular contributions and membership fees clearly act as a commitment devise: about three quarters of all groups impose either one of them. These two differences may be explained by the fact that in the context of a large city, problems of adverse selection can be more important and groups need additional instruments to prevent default and abuses.

Both Beninese and Ethiopian groups deal with adverse selection by often imposing a period of surveillance on new members. They will be under close scrutiny for the first few months after joining; sometimes they may not be allowed to make a claim for a while. Fraudulent claims are greatly reduced in iddir's village context where payments are made for shocks that are not subject to moral hazard and are perfectly observable. However, seven out of ten Beninese groups clearly stipulate in their rule that a check has to be carried out before help is granted. It often happens that funeral ceremonies are held in distant villages from Cotonou and fraudulent claim could easily be made.

Coverage offered in comparable nominal value is larger in Benin. This may simply be due to the fact that individuals' income and/or funeral expenses, in nominal values, are larger in the Cotonou's urban context. With the available Ethiopian data it is impossible to match member households to a precise iddir and thus measure the importance of coverage one household can receive with respect to its wealth. Neither is it possible with both datasets to compare the proportion of funeral expenses covered by insurance groups and thus to access the extent of insurance provided.

3.3 Entry Requirements and Sanctions

Beninese groups have a series of requirements that a new member must fulfill before he gets accepted. A series of six "yes or no" questions that we developed in our questionnaire highlights them.[9] We compute a variable reflecting entry requirements by summing all positive answers to all those questions. Average requirement sum for all groups is 3.79 (standard error of 1.45). There is no significant difference in this sum across all three group Types. This is slightly surprising as we would have anticipated a larger requirement for Type I groups. Indeed among other tools they use to prevent from adverse selection problems, Type II and III groups ask for regular contributions to be paid but not Type I groups. Roughly seventy percents of all Beninese groups impose entry fees which usually take the form of a monetary transfer to the group or an in-kind gift (alcohol, food, etc). There is still no significant difference between Types as regard to the proportion of groups imposing entry fees and the conditional mean values of those fees. Entry requirement data for iddirs only show if there is or not an entry fee. We obtain other counter intuitive results: Type II and III are charging entry fees in a larger proportion and fees charged are also significantly larger

[9] These questions are: Is there an enquiry made on individuals who want to become members? To become a member, should an individual be proposed by an actual member? To become a member, should an individual be known by the group? Should an individual live in the neighbourhood? Should this individual receive his/her spouse's agreement? Is there any other conditions?

for groups of Type III. What this could suggest is that Type III iddirs are designed to attract richer individuals and thus individuals that can meet regular contribution payments. About sixty percents of iddirs based entrance fees on the magnitude of their funds which is never the case in Benin. Groups' funds in Benin tend not to accumulate for years since some or all of it is dispersed through the "kèsi gbigba".

A series of questions were also included in both questionnaires with respect to sanctions in case of default. To the question "What happens if a member does not pay one or several contributions?" Beninese answers rank from: nothing (13%), summoning in front of the group's governing body (7%), no participation in the "kèsi gbigba" (7%), reduction of payouts by the amount unpaid (14%), no more insurance provided (5%), fine (3%), exclusion (19%) and finally the defaulting member is brought in front of a local chief of police or an official court (32%). Between different Types, answers appear to be similarly distributed. We get a similar conclusion across Types if we also look at the means used to put pressure on a defaulting member who left the group (warnings/threats, summoning in front of local chief of police, seizure and judicial pursuit). The equivalent in the Ethiopian questionnaire is phrased as follows: "What happen if a member is not willing to make a payment?". The answers range from delay in payment (5%), fine (29%), exclusion (57%), taken to a local court (5%) and taken to governmental court (4%). Groups of Type I and II have a similar distribution of answers, with the exception of Type III groups that do not take their case to any court and only exclude defaulting members, which could be explained by the fact that past contributions can serve as compensation. However, trying to highlight any kind of difference between iddir Types is of little relevance: on the whole groups only impose fines or exclude defaulting members in similar proportions.

4. Membership

The first striking contrast between both samples in terms of membership is the very high rate of membership in Ethiopia compared to a mere fifth of individuals being members in the Beninese sample.[10] Indeed virtually all households - 91% - are members of at least one iddir.[11] This cannot be attributed to the fact that Beninese groups are relatively new compared to Ethiopian groups. In both areas where surveys were conducted insurance groups have a well established tradition and are vastly known by people. The difference may have more to do with the location of the survey: urban versus rural area. In Ethiopia, the custom indicates that anyone who lives in a village can and must be member of any of the village iddir as soon as they form their own household. Membership of a clan iddir is also socially compulsory, although there are several iddirs for each clan. The general feeling among peasants is that everyone can join and in fact is forced to join the iddir. The idea that someone would refuse to pay the membership fee without any reason was completely alien to the interviewees. Iddirs influence is strong: Pankhurst and Mariam (2000) adds that "a person who does not belong to an iddir is usually considered an outcast and a disgrace to his or her family."(p.44) Iddirs also have an important attractive advantage: if a household head

[10] A Kolmogorov-Smirnov equality-of-distribution test shows that income distribution of Beninese members is likely to contain larger values than the distribution of Iddir members but the test fails to detect a significant difference for small values.
[11] High rates of participation in iddirs were also reported in Aredo (1993) and Mariam (2003).

has no income and no relative to insure him, the whole iddir can decide to pay his contribution. In our sample about one fifth of iddirs exempt some members from paying, mainly poor and sick people. Temporary inability to pay the membership fee is dealt with by offering to delay payment for a limited period. The average delay offered is a little more than four months. This is confirm by Pankhurst and Mariam (2000) and by findings in Mariam (2003) where almost all groups "have provisions for members who face economic problems and are unable to pay contributions after being members for some time." (p.1723) Iddirs also have to be placed in a rural context where alternative sources of insurance are almost non-existent. It is obvious that without the money the iddir pays, the cost of a funeral would be devastating to a family's finances and make life in the community almost impossible. Moreover some iddirs have grown to such an extent that the insurance they provide is extremely affordable: some cover the whole village and charge very low contributions.

In Cotonou, other formal and informal ways of getting insured are available, along with different saving vehicles which are accessible so that agents can cope individually with adverse shocks. Additionally, problems of adverse selection can be more important in the context of a large city than in a village where it is easier to put pressure on defaulting members or to trace the author of embezzlement. Even though they have established rules for selecting new members, informal insurance groups are perceived with some suspicion by many. True or fictitious anecdotes of defaulting members or group disintegrating ensuing embezzlement can be heard frequently by people for motivating their non-participation. There is rarely social pressure on individual to join a group, except for rare cases of groups based on family membership. So individuals and households living in city districts that we surveyed are by no mean ostracized if they decide not to join any group and opt for another form of insurance. Two other reasons may explain the wide gap in terms of membership between both samples. First, over the years helped by public institutions and political parties, iddirs have increased their visibility. They developed relationships with state organizations that tried to involve them in crime prevention and sanitation programs and were also used for political purposes (Aredo (1993), Pankhurst and Mariam (2000), Pankhurst (2003)). Second, anthropological accounts by Falen (2004), Kaplan (1971) and Levine (1999) on both households units in Benin and Ethiopia suggest that Beninese households are more intertwined in larger extended family so that they can more easily rely on kinship for insurance purpose.

Multiple membership is another feature that distinguishes both samples. In Ethiopia, just under 30% report belonging to one iddir, 33% belong to two, and another 29% belong to three or more. Thus membership in groups is not mutually exclusive; rather there is significant overlap between groups. In several villages there are a large number of iddirs. One reason why multiple membership is so frequent is that membership in one iddir does not allow securing sufficient funds for the funeral. Multiple memberships is then a good way to meet the cost of a funeral and at the same time avoiding to take loans or sell land or cattle. Multiple memberships is also a way to diversify risk. It can happen that an iddir is weakened and its funds depleted, so that it may fail to make a payout. In fact, most iddirs frequently ask their members to make extra payments to ensure the iddir's survival. People tend not to like being members of an iddir with low funds. If it is the case, the incentive to join one with bigger funds is important. With respect to the services

iddirs offer, the multitude of overlapping services suggests that this is not the main reason for the presence of a large number of iddirs. Flexibility in paying contributions is also one potential explanation why people are member of several iddirs. Since it is possible to delay payment or lapse membership in one or two iddirs without losing protection and insurance completely, for people paying a certain amount of birr in total, it is thus possible to spread this payment over the month. Hence, it allows people to be more flexible in paying their contributions without losing their coverage. This could obviously also be achieved in one big iddir, however allowing this kind of flexibility may incur higher administrative costs and may be destabilising.

In Benin multiple memberships is an exception: only 2% of individuals declared being member of at least two groups. In Benin as in Ethiopia, rarely does a group's payout cover the entire costs of a funeral. Despite this, members in Benin rarely opt for additional membership to cover the gap but choose other sources of aid, notably family and relatives networks. This certainly has to do with adverse selection problems and with the risky perception that people can have of these groups. On the contrary it could be argued that joining several groups could serve as a way to diversify risks against potential defaults or group collapses. We know that in Benin most individuals select their group whether they are familiar or not with one or several of their members (see LeMay 2007). This certainly limits the number of groups they can envisage joining and may partially explain why multiple membership is rarely observed. Groups in Benin are not an important and recognized vector of socialisation: membership is not socially compulsory. Moreover, flexibility in making payments appears to be far less pervasive than in Ethiopia. Indeed groups have strict rules on this and 93% of all groups do not allow any flexibility in payments: contributions paid by all members are equal irrespective of their income, health and age. Only 45% of all groups allow their members to pay their contribution late without fine, usually the delay extends until the next group meeting. This can discourage individuals with uncertain and fluctuating income from joining several groups for fear of not being able to make contributions. They then risk to be expulsed and potentially get a bad reputation, making it even more difficult to henceforth join another group. The range of services offered in insurance groups is broadly the same across groups (there is some variety in the extent of coverage offered) and may also explain the low proportion of multiple memberships. Wealth is certainly a factor explaining multiple membership in both samples: individuals in Benin having multiple memberships are in the top income quintile and ordered probit estimates based on the Ethiopian sample show that wealthier households in terms of livestock value are more likely to join more iddirs overall.

Probit regression was done to examine the correlates of iddir membership. Wealthier households in terms of livestock value are more likely to join an iddir. The magnitude of these effects is important; a household in the fourth livestock value-owning quintile within a village is about 54% more likely to belong to an iddir than a household in the omitted category, households in the poorest livestock value-owning quintile. However wealth measured in terms of land has a limited impact on the likelihood to join an iddir and has none in the ordered probit regressions. Larger households and female-headed households are more likely to belong to at least one iddir. The age of the head of household appears to have no statistically significant impact either on the probability to join an iddir or on the number of groups joined. Similar estimates for the Beninese

data are presented in LeMay (2007) where individual level and not household level data is used. Results show that income measured as the sum of all income-generating activities has a positive effect on the probability of joining an insurance group. Contrary to the Ethiopian estimates, the household size does not have a significant impact in the overall sample. For the Beninese sample the relationship with respect to age is significant and follows an inverted-U shape curve: the relationship begins to decrease at 44 years of age. Still contrary to the Ethiopian estimates, gender is non significant in explaining membership.

As we mentioned earlier, people in Ethiopia are members in several iddirs and entry restrictions are light: basically anyone can be a member anywhere. Iddirs normally have geographical and ethnic boundaries, often they are then subdivided according to gender. These divisions are not strict though and iddirs often transcend those criteria (Aredo (1993), Pankhurst (1998), Pankhurst and Mariam (2000) and Mariam (2003)). Especially in male iddirs we can find a lot of women, if they are household heads. Female iddirs usually only have female members. Field evidence shows that in certain rural areas people are not grouped together according to income characteristics or any other characteristics that we could discern for that matter. Underlining statistically any type of differentiation between iddirs' memberships in terms of wealth requires data on several members of a same group, which we don't have. For the same reason, we are unable for Beninese groups to see the level of income homogeneity among members. However distinctions in term of gender are frequent and strictly followed in Benin: 20% of groups accept only female, 28% only male and 23% only accept individuals of the same ethnicity. To further mitigate problems of adverse selection, 73% of groups require their member to be from the same neighbourhood. Ethnic affiliation, gender and geographical location are the only important factors of segregation in Benin: less than five percents of the 209 groups surveyed in Benin are based either on the large family or clan unit, on church membership or on a professional activity (taxi driver, workers of a small factory,...).

5. Conclusion

With the available data, we highlighted that informal insurance groups in Benin and Ethiopia can both be categorized in three Types according to the degree to which they make use of ex-ante versus ex-post transfers. Their respective functioning shows a number of similarities; noticeable differences appear in the extent of coverage offered and the way it is allocated. Indeed, Beninese groups offer insurance for a wider range of shocks and a majority of them according to cycle. We also showed that Ethiopian groups have on average a significantly longer duration and a much more comprehensive membership: not only iddirs attract a larger proportion of individuals in their respective communities, but also multiple memberships is an important phenomenon compared to the Beninese context. Iddirs thus appear to be key economic local players, which is not the case of their Beninese counterpart.

Table 1: Iddirs Characteristics

	mean	sd	#obs.
Years existed (median=16.5)	18.54	12.57	70
Committee is elected	0.97	0.16	76
How long has current committee been in charge (in months)	51.21	41.70	47
Current funds of iddir	1921.16	3968.58	76
Sum of money paid out by iddir (last year)	1116.50	3749.51	56
Fund offers borrowing to its members	0.61	0.49	77
Number of members (median=56)	85.22	99.34	78
Iddir imposes entrance fee	0.90	0.31	78
Entrance fee in birr (with conditional mean)	42.49	40.02	70
Entrance fee is calculated based in iddir funds (other iddir entrance fee are fixed)	0.63	0.49	70
Proportion of iddir imposing regular contribution	0.45	0.50	78
Mean regular contribution to those iddir (in birr/month equivalent)	2.88	1.65	35
Proportion of iddir imposing regular contribution and at time of emergency	0.37	0.49	78
Mean regular contribution to those iddir (in birr/month equivalent)	0.79	0.99	29
Proportion of iddir having only "at emergency" contribution	0.18	0.39	78
Group has generating income activities	0.08	0.28	60
Number of observations	78		

Source : FIS

Table 2: Characteristics of Beninese Informal Insurance Groups

	mean	*se*
Months existed (median=60)	83	95
Group has written rules and status	0.76	0.43
Group has a finite duration	0.01	0.10
Group has recognition from Chief of neighbourhood / local chief police	0.46	0.50
President is elected	0.92	0.27
Entire group (all members) decides upon new entry	0.47	0.50
Number of members (median=20)	25	20.32
Only female members	0.20	0.42
Only male members	0.28	0.45
All members are same ethnicity	0.23	0.42
Majority of members are from the same neighbourhood	0.72	0.45
Group holds regular meetings	0.967	0.18
Presence is compulsory	0.842	0.37
Regular contribution (premium paid)	0.737	0.44
Regular secondary contribution (transport. fabrics. etc)	0.39	0.49
No flexibility in payments	0.94	0.23
Entrance fee (conditionnal mean)	0.70 (6159)	0.46 (4263)
Cycles in coverage	0.70	0.46
Check demand before coverage is allocated	0.67	0.47
Redistribution of asset holdings	0.55	0.50
Fund offers borrowing to its members	0.30	0.46
Group has generating income activities	0.07	0.26
Group has secondary activities	0.14	0.35
Number of observations	209	

Source : LeMay (2007)

Table 4: Coverage Offered by Iddir

	Proportion of groups offering such insurance		Coverage conditional mean and median (in birr equivalent)		
			total = cash transfers + in-kind transfers +in-work transfers		
	mean	sd	mean	sd	Median
Cases related to death:					
member's/spouse death	1,00	0,00	240,41	210,45	199,21
member's father/mother death	0,67	0,47	143,67	128,68	100
member's brother/sister death	0,54	0,50	97,61	81,39	85
member's children death	0,94	0,25	149,72	132,63	120
Other Cases:					
wedding	0,77	0,27	26,54	39,37	4,96
illness	0,18	0,39	20,74	33,29	1,99
harvest	0,04	0,19	1,88	0,19	1,99
fire	0,15	0,36	53,55	40,32	48,99
destruction of house	0,26	0,44	182,23	260,71	59,5
death of cattle	0,13	0,34	187,09	136,71	197,5
number of observations	78				

Table 5: Coverage Offered by Beninese Insurance Groups

"Unhappy" events	Proportion of groups offering coverage (se)	Coverage (CFA) conditional mean (se)	Coverage (CFA) conditional median
Death of a member	0.89 (0.32)	88404 (64764)	75000
Death of a member's close relative	0.99 (0.12)	77910 (63512)	62750
Death of a member's relative	0.53 (0.50)	64520 (53124)	51000
Illness of a member	0.88 (0.33)	52020 (47286)	40000
Illness of a close relative	0.41 (0.49)	59231 (57292)	45000
Illness of a relative	0.35 (0.48)	63145 (58126)	50500
Loss of job	0.37 (0.48)	65561 (55513)	60000
Destruction of professional belongings / house	0.68 (0.47)	56354 (53367)	47250
"Happy" events			
Birth of a member's child	0.76 (0.43)	50299 (49016)	31000
Birth of a member's relative's child	0.43 (0.50)	53680 (57084)	30000
Baptism of a member's child	0.85 (0.36)	48743 (45854)	32000
Baptism of a member's relative's child	0.39 (0.49)	55099 (57996)	31000
Marriage of a member	0.85 (0.36)	50514 (45562)	38875
Marriage of a member's relative	0.39 (0.49)	56056 (57230)	38750
Diploma	0.79 (0.41)	52651 (46828)	38875
Member's anniversary	0.55 (0.50)	50544 (51675)	32000
Member's relative anniversary	0.33 (0.47)	58791 (60544)	38750
Number of observations	209		

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Inside Beninese Households: How Spouses Manage their Personal Income[1]

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July 2007

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

[1] I thank the CRED (University of Namur) and the National Bank of Belgium for their financial support. I am most grateful to Olivier Dagnelie. Thanks are also due to Vincenzo Verardi, Stefan Dercon, Christian Tritten, Jean-Marie Baland, Douglas Falen, Joël Noret and seminar participants at the 5th EUDN Workshop in Bonn for helpful comments and to our team of enumerators: Shadia Gbaguidi, Maurille Gandemey, Calixte Houedey, Euphrem Lankoutin, Félicité Chadare, Pierre Meliho, Raoul Tchiakpe and specially Charlemagne Tomavo. The tedious but fructuous encoding process was done with the help of Amélie Bodson and Gaëtan Dagnelie. All remaining errors are mine.
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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

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[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 Progresa 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 Fon[7] 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). Vercruijsse 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:

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

Subject to: $x_w + p_w k_w = I_w$ (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):

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

$k_w = k_w(p_w, I_w, \underline{k}_h)$ (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 derivates 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:

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

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.

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

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

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 ($totex_i$).[12] Since $\underline{k}_{-i}$ 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 $\underline{k}_{-i}$. We can thus rewrite our specification as follows:

$$x_{ij}, k_{ij} = \alpha_{0j} + \alpha_{1j} totex_i + \alpha_{2j} totex_i^2 + \alpha_{3j} totex_{-i} + \sum_{r=1}^{R-1} \delta_{rj} z_r + \varepsilon_j \qquad (10)$$

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 e*ducation* 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:

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

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_i)

[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 seems not 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 incline 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]

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[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
Expenditure (monthly budget shares where applicable):						
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
Spouses characteristics:						
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
Proportion of households members:						
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
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
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
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
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
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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