

Social Sharing Obligations and Investment in rural Liberia

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Abstract

In the absence of formal insurance systems, individuals often have the obligations to share with their kinship to cope with shocks. It has been argued that sharing obligations within kinship networks may impede economic development. An experiment was used to investigate whether individuals from rural areas of Liberia are subject to sharing obligations stemming from family and friends. By means of a risk game, I explored to what extent family and friendship networks affect individual investment decisions. The results suggest for the existence of sharing obligations from family networks. At the same time, the findings show that family networks affect individuals to lower investment suggesting that the family impedes economic development. For males, investment decreases in the amount of family members, suggesting for the importance of family density. In contrast, friendship networks appear to stimulate economic development. Finally, suggestions for future research are presented and policy recommendations provided.

1. Introduction

1.1 A Small Anecdote

At the time I was as a research assistant in Liberia I met a young man, presumably my age who was called Augustine. He was selling scratch-cards and exchanged small sums of money aside the road. Since he was on my route home I saw him frequently and eventually I also had a chat with him buying one of his scratch-cards. Although there was barely a day he was not working, right after Christmas his usual spot remained empty for days and I was asking the other men if they knew where Augustine was. They replied that he was upcountry for the holidays, meeting his family. After 10 days he eventually returned and I approached him with the question whether he enjoyed his trip. He said that he was not upcountry but instead went for a trip to South Korea for which he had saved 'some' money. Upon invitation of a South Korean he wanted to enter the country but once being at the visa check, his entry was denied since the authorities could not reach the person who wrote the invitation. He returned after 10 days and started selling scratch-cards again, as if nothing had happened. When he finished his story I was stunned for a moment; then I told him that I was amazed by the fact that he made so much money to pay for a flight to South Korea. He smiled and said that it took him (only) several months to save the money for the trip but that he never told anybody about the money he was making and also did not share a single word about his plans with anyone. Everybody thought that Augustine was upcountry instead of traveling the world. Considering the overall poor living conditions and low incomes of the Liberians, his story was hard to believe, but since Augustine was wearing the same red clothes for days because his luggage was lost during his trip, I started to accept.

This anecdote illustrates at least two important issues. First, Augustine was hiding his money and plans because he was afraid to share his savings with others. This was why he left anybody without a notice. He confirmed to me that it was not only his friends who did not know but especially his family. Second, Augustine was either rich in relation to other Liberians because he could afford to buy a flight ticket to South Korea or I totally underestimated his financial situation. Maybe Liberia is not such a poor country as we label it to be and official figures depict. Maybe there is the broader tendency of hiding money in Liberia. Broadly speaking, this would suggest for an underestimation of the potential economic power Liberia would hold. This issue has already been picked up by Richard Dowden (2009) in his masterpiece on "Africa, Altered States, Ordinary Miracles". Among many other issues, Dowden (2009, p.264; p.518) questions the general perception of many African states as being poor. Apart from being rich in terms of human capital, many people tend to be monetarily rich. According to Dowden (2009, p.264), "[w]hen mobile phones went on sale in Africa, people suddenly found the money. Millions of Africans suddenly turned out to be richer than economist and developmentalists said they were. A lot richer."

This thesis will not deal with the question, whether we underestimate Africa's ability to pay; rather it will deal with the phenomenon of hiding and of 'finding' money. Literally hardly anybody finds money. What Dowden (2009) may point at is the phenomenon of sharing obligations. Within such a system individuals are able to oblige others to give out money, knowing at the same time to also have an obligation to share. This obligation may let people on the one hand 'find' money (by making use of others' obligation to share) but also inclines people to hide money to evade their own sharing obligation. For the latter, Augustine's story could be an example par excellence. This would be a major issue, since the system of sharing obligations is a crucial mechanism, many communities in rural areas apply in order to insure themselves in the absence of formal insurance institutions against shocks, like droughts, floods, etc. (Cox and Fafchamps, 2007). It can be argued that a general inclination to evade sharing obligations would leave this system dysfunctional (Hoff and Sen, 2005) putting those affected at high risk.

Hitherto, only little is known about the actual deflection of sharing obligations. Moreover, the literature lacks direction of where the sharing obligations stem from. The (extended) family has been identified as one main source in this respect (di Falco and Bulte, 2009; Jakiela and Ozier, 2010), though other origins, such as friendship or neighbours, have been neglected. Within a different body of literature, Vollan (2011) analyzed differences between kinship and friendship regarding trust and punishment. In order to shed more light on the origins of sharing obligations, I decided to make the same distinction.

Another point of interest this research deals with is the relation between social ties, like family or friendship, and investment. For instance, Alesina and Guiliano (2007) found in a cross-country analysis that strong family ties is associated with the economic reliance on the family instead of markets or the government. In a similar way, Platteau (2009) argued that social customs and norms, which aim at enforcing social sharing obligations, may hinder economic development.

The following chapter will address the above mechanism in more detail. The literature review will result in the formulation of the objectives and research questions of this thesis (see section 1.4 and 1.5). In chapter 2 the research design, including sampling, experimental design and procedures, will be described. Chapter 3 will present the descriptive results. Further, chapter 4 comprises the experimental analysis, and chapter 5 the econometric analysis. This thesis will end with chapter 6, where the main findings are summarized and the conclusions are drawn. Directions for future research and policy recommendations will also be mentioned.

1.2 The Importance of Social Capital

Social capital can assume many shapes; it is a quality of groups or whole societies, expressing itself as rules of law, social integration and trust (Putnam, 1995) or can be an individual's social relationship (Burt, 1992). In developing countries, a major form of social capital is the kinship network (di Falco and Bulte, 2009). A common definition of a kinship network is the extended family whose members are related by blood lineage, marriage or ethnicity (Hoff and Sen, 2005) exhibiting a binding-system of shared rights and obligations (Wolf, 1955).

As a form of social capital, the kinship network has been found a major determinant for coping with endemic risks and shocks. In this respect it is argued that rural households group together with friends and relatives to provide economic assistance in the absence of formal insurance and credit markets (Hoff and Sen, 2005) to maintain livelihoods or even for pure survival (Cox and Fafchamps, 2007). The economic perspective of kinship networks gained attention through empirical evidence of risk sharing mechanisms through the exchange of gifts and transfers (Rosenzweig, 1988; Fafchamps and Lund, 2003) mainly taking place between close relatives (Lucas and Stark, 1985; Lund, 1996).¹

Many other risk-sharing mechanisms exist among kin that underline the importance of kinship networks. A common form is labour-pooling which provides protection against the implications of health risks of household members who would be hindered to work on their field causing a loss of yield (Krishnan and Sciubba, 2004). The example of child fostering reveals the relevant role kinship networks can play as a response to shocks such as the death of a household member (Evans, 2004) or as a support to prevent households from experiencing shocks, like a loss of yield (Isiugo-Abanihe, 1985). Munshi (2003) provides an example where kinship networks function as a means of shelter for migrants and Montgomery (1991) shows how kinship networks can be used to obtain employment information. The benefits of kinship networks and their reciprocal dimension are reflected in the African entrepreneurial literature, where kinship ties are used in initial stages for business growth. However, as business reaches maturity the reverse effects of having kinship ties become apparent: entrepreneurs are approached to share surpluses (Handwerker, 1973). Nevertheless, African entrepreneurs are also able to counterbalance the kinship obligations by the application of various coping strategies (Khavul et. al., 2009).²

Hitherto the literature overview suggests a mutually beneficial natural insurance system, which can only function because it is based on reciprocity. In different words, in African societies exchange takes place within kinship networks based on systems of mutually beneficial reciprocities (Otite, 1978). The key differentiating factor between reciprocity and exchange is a moral domain attached to the former

¹ For an overview of examples where individuals are more altruistic towards close relatives than distant relatives, see Madsen et. al. (2007).

² Inconclusive results regarding kinship networks on better job opportunities have been reported by Assaad (1997) in the Egyptian construction industry.

(Narotzky and Moreno, 2002); a domain based on mutual obligation to return the transfer in whatever form accepted by the initial giver. The enforcement of such informal systems has extensively been examined making use of ‘game theory’ (Kimball, 1988; Fafchamps, 1992; Coate and Ravallion, 1993). Other informal contract-enforcing mechanisms can be found in human emotions. Guilt and shame, being shaped by for instance communal and family identity might account for the informal contract enforcement (Cox and Fafchamps, 2007).

The downside of such a reciprocal system is, that the recipient might not return the obligation and is therefore “free-riding” on the groups’ reciprocal system. In such a case the natural insurance system of a group or community is left dysfunctional (Hoff and Sen, 2005).

According to Cox and Fafchamps (2007) the communal group cohesiveness can be maintained when (1) cheaters can be screened out, (2) individual preferences can be changed or (3) incentives and monitoring systems are institutionalized making cheating less likely. Platteau (2006) has argued that reaching a certain platform of prosperity is associated with the ability of defecting one’s social obligations by not having the need to rely on one’s kin anymore. Therefore, in order to enforce the informal contracts, frequent and personal contact among kin is used, which, at the same time, enables the perfect observability of one’s income and defection. To mitigate defection through the second strategy, the group may try to change individual preferences by constant harassment of economically successful individuals; by the immediate squashing of any emerging hope to evade the kinship network of a few most productive individuals (Platteau, 2009), also the tendency to approach disproportionately more often those taking economic initiatives, can be better understood (Luke and Munshi, 2006). The disproportion is reflected in the entrepreneurial literature: 78% of a sample of entrepreneurs in Liberia, who were performing well, were frequently asked for a loan or gift. Of these entrepreneurs 56% got less in return and 15% even got nothing (Handwerker, 1973). Finally, research conducted by Platteau (2009) reveals institutionalized mechanisms, like social ostracism, harassment and accusation of witchcraft that might prevent the individual from defecting the system.

Interestingly, despite the strategies applied to prevent the individual from leaving the insurance system, a growing strand of literature provides empirical evidence from Sub-Saharan Africa of strategies and mechanisms individuals apply in order to evade their sharing obligation. In this respect, Baland et. al. (2007) found in Cameroon that in order to evade sharing obligations, members of credit cooperatives borrow small loans; having the intention to signal a liquidity constraint although they are in a wealthy position holding major savings. Similarly, di Falco and Bulte (2009) provided evidence from South Africa, including that households evade their sharing obligations by accumulating non-sharable durables at the expense of sharable non-durables, by increasing non-durables consumption and reducing liquid assets investment. Moreover, Jakiela and Ozier (2010) showed in a controlled laboratory environment conducted in Kenya that women are more inclined to apply a sharing evading

strategy than men. When a potential positive income shock was observable by relatives, who attended the game, women reduced their investment by 22%. This reduction also included a reduction in potential earnings. Further, the authors directly inquired about the participants' willingness to pay for hiding investment information (again including potential earnings) to close relatives present at the experiment. They find that participants' willingness to pay for secrecy constituted for 16% of their gross earnings in the experiment.

This discussion has pointed to various strategies people from rural Sub-Saharan areas apply, in order to evade their sharing obligations. This pressure to share appears to exclusively have its origins in kinship networks, let it be either within the village community (Platteau, 2006 and 2009) or more specifically close relatives (Jakiela and Ozier, 2010), or stem from outside the village (di Falco and Bulte, 2009). Furthermore, the literature follows two different approaches to analyse the importance of sharing obligation evasion. First, for Jakiela and Ozier (2010) it is sufficient to point out that the trigger stems from relatives attending the experiment. The second approach is followed by di Falco and Bulte (2009), who stressed not only that kinship networks are important but also the *amount* of kin a given household is related to.

In a nutshell, it can be argued that the empirical literature stressed, treats the origins of sharing pressure like a homogenous mass. Cox and Fafchamps (2007) stressed the importance to take a more nuanced look when conducting economic research. They argued that the emphasis should be placed, for instance, on the nuclear family. In an experimental research, Vollaar (2011) analyses whether friends are akin to family in terms of trust, trustworthiness and third party punishment and finds significant differences regarding the last. In a different strand of literature, D'Exelle and Riedl (2008) conducted a network analysis to explain altruistic behaviour. In more detail, they distinguished between family, friendship, support, economic and social public activities networks. They found, for example, that the size of family networks negatively influences altruistic behaviour; the size of public activities network reveals a positive influence. This suggests that network content (family, friend, etc.) matters for eliciting individual social preferences.

Adding network content as explanatory variables to the research is one important element of network analysis. D'Exelle and Riedl (2008) for instance made use of network analysis, since in experimental studies on explaining altruistic behaviour, giving variances ascribed to demographic and socio-economic variables reveal unsatisfying explanatory power. Research conducted by Jakiela and Ozier (2010) shows similar poor performance of the control variables used and may be improved by the inclusion of network analysis. However, the reluctance of economists to include network analysis in empirical research is no matter of neglect or even ignorance, but can be ascribed to data limitation constraints and especially endogeneity issues (Zhang and Li, 2003).

The following section will discuss the use of network analysis in recent economic literature in more detail.

1.3 Social Networks

The discussion of the (dis)advantages of natural insurance systems may be interpreted as nothing else but a story of social networks (Jackson, 2008, p.3). The embeddedness of individuals in social networks of different content, such as family, friendship, neighbour, etc. intuitively allows for differences in individual social behaviour since they serve different purposes and may hold different structures. Empirical research can confirm this. Apart from Vollan (2011) on friendship and family and D'Exelle and Riedl (2008) on altruism, the recent economic literature provides various examples.

One of the first network researches dealing with two different network contents was Handwerker (1973). As stressed earlier, he applied the benefits and obligations accompanied by family and friendship networks to various small business stages. In a similar way, Khavul et al. (2009) emphasized the impact of different networks on entrepreneurial businesses. Another research stresses the importance of kinship for job entry in the construction labour market in Egypt. Findings tend to be inconclusive, though the relevance of family ties in finding a job seems to be important (Assaad, 1997). Finally, in rural regions of China social networks, called *quanxi* in Chinese, have an important stake in determining non-farm employment (Zhang and Li, 2003).

So far, the network literature acknowledges network content as a key force influencing behaviour and affecting decisions. Despite that these researches provide direction, where the impact on behaviour is emerging from, the full potential of network analysis applied to explaining empirical findings has not been considered. In this sense we refer, as the network literature also suggests, to more subtle and fine-tuned measures, which allow for analyzing to what extent network density and positioning affect individual social behaviour; rather than simply giving direction by emphasizing from which network content the effects are stemming (Granovetter, 1973).

Network density is one important measure indicating the amount of relations an individual possess in a network. This measure is similar to the variable *di* Falco and Bulte (2009) applied in examining the potential influence the *amount* rather than the existence of network members has. Additionally, it is also their research that suggests its relevance: an increase in the amount of external kinship links elicits differences in expenditure. Other research also found that the amount of network members matter. In this respect, D'Exelle and Riedl's (2008) research shows a positive correlation between network size (density) and coins given in a dictator game for social public activities networks (i.e. activities related to religion, political parties, sports); however, the impact is significantly negative for family and support networks. Network density also plays a key role in the probability of finding a job in the Egyptian labour market. Wahba and Zenou (2005) found that the probability of finding a job is a function that increases concavely with dense family and friendship networks. The authors argued, that

the denser a network is, the more potential nodes³ the individual is connected to and, therefore, the more job information is available within a network.⁴ However, the concavity mentioned is due to the fact that friends also have friends the job information is transmitted to, which also creates competition.

Rather than stressing how many links a node possesses in a given network, network analysis also offers the opportunity to investigate network positioning. For instance, closeness centrality measures how easily a node can reach other nodes (Jackson, 2008, p.39). In more detail, it measures the shortest paths between two nodes in relation to all existing paths. This may result in finding nodes that only have a few (direct) links but are crucially positioned. Especially in larger networks this may give interesting insights because it takes not only direct links but also second-, third-, fourth-stage etc. links into account. In small networks the network amplitude does often not exceed the second-stage links. As a result, the closeness centrality would provide no added value to the analysis, since most of the information is captured in the network density.⁵

Another network variable – the betweenness centrality – stresses how important a given node is within a network. The importance is defined as how often a node is connecting two other nodes with one another in a given network (Jackson, 2008, p.39). Since the node, lying on the connection line between two others, may control their flow of information, it may suggest that this ascribes a certain form of power to it. On the other hand, Brañas-Garza et al. (2006) interpret the betweenness centrality as social integration in a network: the more a node is connecting two other nodes, the higher is it socially integrated. They also show that the higher an individual is socially integrated, the more coins are given.⁶

1.4 Objectives

In this section, I will summarize the shortcomings in the literature and state the contribution of this research.

³ A node is a concept within network analysis and refers to a member or a person in a network. For a thorough introduction to network analysis please refer to Jackson (2008).

⁴ This line of argumentation has its origins in Granovetter's (1973) work who was first to highlight the strength of weak ties within networks.

⁵ This research consists of 52 small networks, which includes a maximum of 30 nodes in a general network. Specifying networks by different content (family, friend, etc.) would reduce the networks even further. Therefore, I decided to *not* include the closeness centrality measure to the analysis. However, I am well aware of its potential. For instance, Werger (2010) used the closeness centrality as a proxy for altruism in a general network. The rationale is that the closer a node is to another node, the more likely it is that the node is within the (extended) family or friendship network. She found that higher degrees of altruism (closeness) lead to both a lower effort level (i.e. less productivity) and a lower degree of wealth of the recipient. D'Exelle and Riedl (2008)'s research also reveals that the degree of closeness matters. They find that the further away nodes are from a given node, the less generous the dictator is. This holds in particular for friendship and family networks.

⁶ Again, I am well aware of the potential gains that may evolve from the inclusion of the betweenness centrality to the list of explanatory variables. However, the descriptive analysis shows that the variances for the respective networks tend to be rather small. For example, I elicited mean betweenness centrality measures that to not exceed 0.08 on a scale of 0-1. For family networks it is even 0.01. As a result, I decided to dismiss this variable in this research.

Shortcomings

1. The literature review suggests for the existence of sharing obligation evasion strategies (i.e. hiding income, consumption behaviour, conveying a signal of poverty), which may hinder the well-functioning of the natural insurance system. Not enough empirical evidence from different settings has been performed.
2. Kinship is treated as a homogenous mass, not allowing for analysing behavioural differences between kinship members. For instance, Jakiela and Ozier (2010) define kinship as blood relations, which include the extended family. On the other hand, Hoff and Sen's (2005) definition also allows for the inclusion of friends, neighbours and others to the kin system. Di Falco and Bulte's (2009) definition of kinship also allows for the inclusion of social relations other than the extended family.
3. Further, the discussion leads to the application of two approaches in identifying sources of social obligations. First, mere different network membership/game attendance is used as trigger for eliciting evasion strategies (Jakiela and Ozier, 2010). Second, network density, reflecting the amount of network relations, has been found relevant (i.e. di Falco and Bulte (2009); D'Exelle and Riedl, 2008 on altruism): an increase or decrease in the density of a given network affects individual behaviour differently.⁷
4. The literature provides empirical evidence that social capital may lead to individual economic inefficiencies (i.e. Platteau, 2006; Hoff and Sen, 2005). In this regard not enough empirical evidences stemming from different contexts has been conducted.

Contribution of this Research

1. This research will contribute to the growing empirical strand of literature on the "Dark Side of Social Capital",⁸ by focussing on the evasion strategy of hiding income using an experimental approach. By adding another context, rural areas in post-conflict Liberia, the existing evidences can be complemented and verified.
2. This research will split-up kinship into the (extended) family and friends. In so doing, I hope to shed a nuanced light on the origins of social sharing obligations.
3. By making use of network analysis, I do not only stress network content (family and friends) but also add network density to the analysis. This allows for the in-depth investigation of how the amount of network members affects individual behaviour.

⁷ Basically, the difference between network membership and network density is that, in the former case, simply membership and not the amount of network members are relevant in order to elicit individual preferences. In contrast, network density is a ratio of related links to all possible links in a network (see section 3.3 for a formal definition of network density). Whereas, this is the definition D'Exelle and Riedl (2008) apply, di Falco and Bulte's (2009) measure of network density varies insofar that they do not normalize the respective given links for a given network. Instead they use the absolute values of the number of external links. However, they also not claim to use network density.

⁸ This is the title of di Falco and Bulte's (2009) paper that I mentioned earlier.

4. This research attempts to empirically test to what extent social capital, i.e. kinship networks and network density impedes economic development. Conducting this research in rural areas of post-conflict Liberia, this research firstly adds another context to the existing strand of literature and, secondly, allows to verify existing findings.

1.5 Research Questions

The research questions are as follows:

1. What are the individual preferences of villagers in rural Liberia regarding hiding investment information and investment; and to what extent affect family and friendship network membership, network density, and individual characteristics these outcomes?

This main research question can be divided into the following two sub-research questions:

1. Are villagers living in rural Liberia inclined to hide investment information as a result of sharing obligations stemming from kinship?

2. What are the individual investment preferences of villagers living in rural Liberia?

The focus for addressing both sub-questions will be the same.

- a. To what extent do family and friendship network membership explain hiding preferences/ investment preferences?*
- b. To what extent do family and friendship network density explain hiding preferences/ investment preferences?*
- c. Are there other individual characteristics that play a role in hiding preferences/ investment preferences?*

Ad 1a: In line with the literature highlighted, I expect a positive correlation between family network membership and hiding preferences. In particular, this would reflect the findings of Jakiela and Ozier (2010). They argue that hiding preferences are related to evading sharing obligations, which is prevalent in family networks. Other research reveals differences between family and friends, for instance, in terms of third party punishment in trust games (Vollan, 2011), or altruism (D'Exelle and Riedl, 2008).

Ad 1b: Within this research question the network content is not so important; rather, I focus on the density of networks. This is of relevance since it has been found that the amount of social ties in a network affects social preferences (di Falco and Bulte, 2009; D'Exelle and Riedl, 2008). I assume that the amount of ties an individual holds reflect the degree of sharing obligation. Therefore, an increase

in the density of a network will influence hiding preference positively. Whether this takes place irrespective of network content will be explored.

Ad 1c: The analysis will include certain control variables that may have a differential effect on the outcome of interest. For instance, gender is found to play a role in hiding preferences: Jakiela and Ozier (2010) found that females reduce their income in order to hide it. They also include other variables, such as age, education, marital status, household size and assets, to their analysis. Overall, the influence of these variables appears to be weak. In addition, they introduced a variable, which captures the transfers in gift and loans a household made to other households. They argue that if and the more individuals make transfers to others, the more subject they are to sharing obligations and the more they try to hide income. Despite the fact that the authors found no significant results, I include this variable for verification.

Further, I also include shocks to the list of explanatory variables. This variable captures the number of shocks (such as droughts, floods, death of household member, etc.)⁹ a household encountered in the past 12 months prior to being surveyed. I expect that *shocks* has a positive impact on hiding income, because having encountered a shock causes the household to deal with (substantial) economic losses, which reduces overall wealth levels. This could incline individuals to hide more potential incomes.

Finally, individuals living in Liberia were often exposed to violence due to the civil war that lasted for more than a decade (see section 2.1 for more background information on Liberia and the potential impact of Liberia's civil war). Due to the various influences violence exposure has on preferences and the lack of comparison with findings of other studies, I will follow an explorative approach in this respect.

Ad 2a: In the light of economic inefficiencies that may emerge due to the social sharing obligation (i.e. Platteau, 2006), I expect to find a negative correlation between investment and network membership (family and friendship), in which the correlation is stronger for family networks.

Ad 2b: As in 2a, I expect that network density has a general negative effect on investment. Differences between family and friendship network density will be explored.

Ad 2c: In order to control for influences from various individual characteristics, I include the same explanatory variables as described in 1c. I hypothesize that:

Female respondents invest less than their male counterparts. Empirical literature has found evidence that females tend to be more risk-averse than males (Eckel et al., 2008).

⁹ An extensive list of variables used and their operationalization can be found in Table 1.

Wealth can also influence investment behaviour: the wealthier an individual is the higher the investment, since a potential loss affects his/her living condition not much.

We also expect an education effect: the better educated the individual is, the higher the investment. This is since (higher) educated individuals learned to calculate (future earnings) and may also better assess risks.

Further, we expect that transfer made to other households will decrease investment. This can be seen in the same light as earlier; when a certain degree of social sharing obligation is attached to the transfers it would mean that the more an individual gives, the higher the social sharing obligation. I expect that this will induce risk-averse behaviour.

2. Research Design

In this chapter I will start with presenting background information on Liberia before I provide a detailed description of the research design.

2.1 Background Information on Liberia

As already mentioned, the context of this research is Liberia. It is located in Western Africa and surrounded by Sierra Leone in the west, Guinea in the northeast and Ivory Coast in the east. Destroyed and exploited by a civil war that lasted more than a decade and came to an end in 2003, Liberia is still facing slow development, being among the 10 countries scoring lowest on the human development index established by the UN.¹⁰ Formally this entails for example that Liberia has a GDP per capita of \$400, a mean years of education for adults of merely 3.9 years, leaving the Liberians highly illiterate (literacy rate for adults is 58.9%) and finally, a high fraction of 83.65% live under the poverty line of \$1.25 per day.¹¹

The majority of the population is living in rural and often remote areas making a living by subsisting farming, mainly cropping rice and other vegetables. The lack of infrastructure often results in a weak integration into local markets and farmers have to cope with natural risks, such as floods, droughts, epidemics etc.¹² In addition, the war devastated the country leaving many Liberians with poor or no access to food and a livelihood.¹³

Apart from the socio-economic background, there are a few particularities about Liberia, which may affect our research. The main particularity about Liberia is its history of war. The civil war cost the

¹⁰ <http://hdr.undp.org/en/statistics/>

¹¹ <http://hdrstats.undp.org/en/countries/profiles/LBR.html>

¹² <http://hdrstats.undp.org/en/countries/profiles/LBR.html>

¹³ <http://actionaidusa.org/what/priorities/liberia/>

lives of about 200,000 people (Rinco, 2010) creating at the same time 75.000 refugees as well as 500,000 internally displaced people (IDP), whose process of return was supposed to be completed already in mid-2007.¹⁴ War not only physically affects people and is accompanied by dramatic economic consequences (Hoeffler and Reynal-Querol, 2003), but may also destroy existing institutions. In this respect tenure rights can be mentioned: when IDPs and refugees return back home they often found their land occupied by others. The rearrangement of tenure rights is one the major concerns in contemporary Liberia.¹⁵

Social capital may also be affected by conflict. For instance, Sideris (2003) found in Mozambique that displacement of individuals induces loss of social belonging and identity, and detach them from kinship arrangements, social rules and obligations. This would allow to argue that violence exposure is negatively correlated with hiding, since the individuals are less subject to kinship arrangements. Different research stresses the impact of violence exposure on social preferences. Here for instance Voors et al. (2010) concluded that individuals act more altruistically and are more risk-taking when exposed to higher levels of violence. In terms of political engagement Blattman (2009) showed that those affected by violence depict more political participation. Bellows and Miguel (2009) also confirmed: violence exposure increases political and community group attendance.

Apart from the civil war, Liberia also has other particularities. For instance is kinship, as a form of social capital of importance in Liberia; not only as an insurance system to cope with risks, but also in initial stages of entrepreneurial businesses (Handwerker, 1973). Another important element in Liberia is witchcraft¹⁶ and, closely related, the Secret Society. It has been argued that the tradition of Secret Society conveys the discipline of secrecy (Richard et al, 2005). Lori (2009) even asserts that the fostering of secrecy and hiding information is anchored within the very Liberian culture. These findings suggests for a general preference of hiding in Liberia.

2.2 Sampling

In April and December 2010 demographic-, network- and experimental data was collected in 52 randomly chosen villages within Margibi and Monteserrado counties in Liberia. From each village a sample of 20-28 villagers was randomly selected¹⁷ resulting in a total sample of 1276 villagers. Participants were household heads or spouses and equal or older than eighteen years. Only one member per household participated. Randomization at community level took place by firstly mapping out all the villages in Margibi and Monteserrado counties and secondly drawing the sample. On household level randomization was performed by firstly identifying and numbering all households in the respective village. Next, a child was chosen to undertake the draw of the participants.

¹⁴ <http://www.internal-displacement.org/countries/liberia>

¹⁵ <http://www.irinnews.org/report.aspx?ReportId=8914>

¹⁶ Ellis (2001) provides interesting insights on the application of witchcraft in the civil war.

¹⁷ The variation of the sample can be explained by the fact that in December not all former participants from April could be identified.

Our research design consisted of three distinctive components. First, I performed the experiment; second, newly selected subjects participated in a survey on basic socio-economic and background information to complement our existing data set from April 2010 with additional subjects (see Annex I for the general survey) Third, all participants were by means of a network survey inquired about relations with other participants (see Annex II for the network survey).

2.3 Experimental Design

The main method of this research is an experiment, which follows the idea of Jakiela and Ozier (2010). I decided to apply this to analyze individual's inclination to evade sharing obligations and to examine to what extent kinship impedes economic development. Although, the outset of both experimental designs is similar, as we will see, there are some parts that considerably differ.

The foundation of the experiment is a risk game, in which each participant received an initial endowment of LD70, equaling about €0.7 or, equivalently, \$1.¹⁸ Participants could allocate the endowment between a non-risky and non-profitable savings cup and a risky investment cup. They had the possibility, with the probability .5, to either gain a four times higher income than the initial allocation to the investment cup or to lose their total investment made. All participants kept the money allocated earlier to the savings cup.

In order to elicit hiding preferences I randomly varied the observability of individual investment information to all other participants attending the game session. The investment information included details about the amount invested and kept and whether the investment was successful. This resulted in the introduction of two treatments: *private* and *public*. As the names suggest, within the private treatment no investment information was disclosed. In contrast, participants who received public treatment were subject to investment information disclosure.

In a third treatment – public price – I randomly introduced the option to evade investment information disclosure, before the risk game was played.¹⁹ By means of this treatment I introduced the possibility of hiding investment information to all other participants. By paying a 'hiding-fee' *before* the actual investment decision, participants could choose deliberately and it could theoretically be any amount of the initial endowment. The amount being paid had to pass a certain secrecy threshold, the reservation price, to make the fee effective. I structurally used a reservation price of LD15, which is almost 1/5 of the initial endowment. Whether I would announce their investment information was revealed to the participants *after* they divulged their willingness to pay for secrecy (*W2P*). By means of the hiding-fee

¹⁸ <http://au.finance.yahoo.com/currencies/converter/>; visited on 15.04.2011

¹⁹ Jakiela and Ozier (2010) distinguished six treatments since they also broke down the endowment into small and large endowment, allowing for income hiding by giving participants within the larger endowment the opportunity to invest not more than the smaller endowment. In this case no distinction between having got the smaller or larger endowment could be made by all other participants. Therefore, their experiment introduces a third means sharing obligations could be evaded by. Due to a budget constraint I was unable to include this in my research.

I elicited the *W2P* for secrecy of individual investment information, which included both information on a potential positive *and* negative income shock.²⁰

Generally, due to the privacy guaranteed in the private treatment group, I expected to elicit higher investments in this treatment group compared to the public treatment group. On the other hand, participants in the public group were expected to be more reserved regarding investments due to the assumption of being exposed to social sharing obligations once the investment information would have been publicly announced. Moreover, again under the assumed pressure of social sharing obligations, I expected the participants to structurally be willing to pay for hiding investment information.

2.4 Experimental Procedures

After having selected the sample in a given village, the for this purposed trained enumerators started explaining the risk game. They used a script they either learned by heart or read out loud to all the participants (see Annex III for the script). Meanwhile, enumerators started the distribution of the endowment and also let the participants draw a small note with either, *A*, *B* or *C* on it representing the treatment they would get. The notes had been prepared beforehand to guarantee equal distribution of treatments and were put into a small linen bag. Participants were called one by one, to a private setting, to start the game. For all treatments was equal that enumerators reassured the common understanding of the game and then proceeded explaining the treatment the participants would receive.

Private Treatment

Participants who drew an *A* got the private treatment and enumerators told them that every decision they were about to make would remain among them. Then participants were invited to allocate their endowment to either the *savings* or the *investment cup*. The respondent drew a note from a linen bag, with either an empty paper or a paper with a cross on it. The draw of an empty paper meant losing the money invested; in turn, a cross meant winning and thus getting four times the amount invested.²¹ In the end of the survey the participants would get their individual payout.

Public Treatment

The participants who drew a *B* received the public treatment and were told that every decision they were about to make would be publicly announced to all other participants at the end of the experiment. Participants were invited to make their allocation, drew a paper from the linen bag and were told that they would get their payout in the end of the survey.

²⁰ In this respect this experiment differs considerably from Jakiela and Ozier (2010) since they randomly assigned different ‘exit prices’ to the participants, who could either accept or reject the offer. In case the offer was rejected announcement was inevitable; when the offer was accepted, announcement was kept secret.

²¹ We attempted to avoid participants from knowing the paper to be drawn by rigorously shaking the linen bag and closing the bag, while making the draw. However, the statistics reveal a small skewness towards winners: 62% of the participants playing the game drew the paper with a cross.

Public-Price Treatment

Finally, participants who drew a *C* were in the public-price treatment. The enumerators explained that *before* the participants could allocate their endowment to the savings- or investment cup that they have the option to hide their investment information. However, secrecy came at a cost. If the participants wanted to keep their investment information secret, they had to pay a certain hiding-fee (Recall that this was the reservation price and amounted LD15). The enumerators explained that the participants could deliberately choose the amount of they were willing to pay for secrecy. In case a participant would be under the hiding-fee, despite the willingness to keep investment information secret, the investment information would have been publicly announced. The same applied when participants not wanted to pay at all for secrecy. In case the participants would have paid a hiding-fee equaling or being above the secrecy threshold (the reservation price), investment information would *not* have been disclosed. Again, the enumerators inquired about the general understanding of this treatment and invited them to pay a certain amount for secrecy, which was deduced from their endowment. Immediately after the payment, the enumerators revealed to the participants whether their investment information would be disclosed. The next step was the risk game. The respondents were invited to make their allocation, drew a paper from the linen bag and were told that they would get their payout in the end of the survey.

Important to mention is that in all three treatments respondents always had the possibility not to take part in the game. When this was the case, they could allocate the entire endowment to the savings cup, which exhibited no risks of loosing at all. Similarly, respondents who received the public-price treatment could always opt not to play; if this happened this would have been disclosed also to the other participants.

3. Descriptive Results

In this section I present the descriptive summary statistics of the experimental subjects, the network characteristics and the experiment itself. Regarding the experimental subjects, basic demographic and socio-economic information will be described. Furthermore, the transformation of this information into a socio-economic status index to measure wealth will be explained. Further, I will report a description of network content and density as used for this research,

3.1 Socio-Economic Background

Within the sample the gender ratio male-female is almost 0.5 reflecting an equal selection of female and male participants. Panel A of Table 2 depicts the average household size is 4.75, with a minimum of one and a maximum of fifteen household members; however, slightly more than 80% of the participants have six or less household members. The average respondent is 42 years old, though

having a large standard deviation suggesting for the inclusion of young as well as very old respondents. The min-max column confirms this finding. A mere 6% of the subjects appear to be single.

With respect to education, the average years of education in our sample, 2.4 years, is less than the countrywide years' average of 3.9 years.²² This difference could be explained by the remoteness of our villages to educational institutions compared to the villages included in the survey conducted by the UNDP. In more detail, 11% of our whole sample had some elementary schooling, 10% have enjoyed high school (partly or entirely) and finally a negligible fraction of 1% had (some) university education.

Panel B reveals sample distributions in terms of religious and tribal affiliation. A very high fraction of 95% stated to be Christian of which 91% are Protestant and 4% Catholic. Liberia has numerous tribes of which the three most frequently occurring tribes in our sample are Kpelle tribe (74%), Gola tribe (8%) and Bassa tribe (4%).

The violent past of Liberia is also reflected in the data set (see Panel C). Within the sample 74% reported being attacked during the civil war. Finally, 66% encountered shocks in the past 12 months including for instance droughts, floods, theft, house damage, illness, death etc.

Panel D of Table 2 depicts summary statistics of variables used to elicit information on household wealth. After the description, the creation of the wealth index, as used within this research will be explained (see section 3.2). In panel D the housing condition and materials are presented. The largest fraction of the sample owns their own house (71%), whereas a smaller fraction of 20% is living for free and merely 9% are renting their houses. The rent varies from LD25 to LD1000 per month; the average is LD112 per month, equalling €1.08 and \$1.56, respectively.²³ Overall better housing materials of wall, roof and floor are associated with higher wealth. Panel D further reveals that merely 3% have cement walls and wooden floors; a mere 1% has a plastic roof. The major wall and floor material used, however, is earth accounting for 87% and 74%, respectively, of the total sample. Roofs consist mostly of metal sheets (72%), compared to straw roofs (27%). In general it can be stated that the housing materials used are very basic, making mainly use of materials found in the villages' proximity, such as mud and water. However, metal sheets as the major roof material used can be perceived as the exemption.

Other wealth indicators include the various assets a household owns. These kinds of assets have frequently been used as a proxy for wealth and to measure income effects (Filmer and Pritchett, 2001; Vyas and Kumaranayake, 2006). In general, the average household owns 6.5 different assets, having a rather large standard deviation. 25 respondents stated to have no assets at all, in contrast, compared to

²² <http://hdrstats.undp.org/en/countries/profiles/LBR.html>

²³ €1 equals LD103.9 and \$1 equals LD72 on April 11th, 2011; <http://finance.yahoo.com/currency-converter/>

8 villagers who have 14 assets and 1 participant owning all 15 assets. The extensive list of assets the respondents can potentially own is depicted in Table 3.

Almost everyone in the sample owns a cooking pot (92%) and a cutlass (84%) mostly used for agricultural activities. The same holds for the hoe (54%), the axe (30%) and the shovel (10%) suggesting that the majority of the respondents were occupied in agricultural activities. Other economic activities comprise rubber tapping and fishery. About 28% stated to own tapping utensils and a very small fraction owns a canoe (0.3%). More than 70% of the sample possesses a mosquito net, used for both purposes, for malaria preventing measure or for fishing. In addition, regarding communication, 25% have a radio and thus access to news and other external information. Some 23% of the respondents have a bed to sleep in, whereas 27% possess a cell phone. In addition to the material assets, 37% own livestock: 8 respondents have on average 2.13 cattle; 35 respondents have on average 3.54 goats (though a large standard deviation). More or less the same accounts for sheep and pigs; but the most occurring livestock are poultry: 398 participants possess on average 9 poultry (having also a very large standard deviation of 10.61).

3.2 Socio-Economic Status Index

The above-mentioned assets can be used for the derivation of an asset based wealth index. Rather than simply weighing each asset equally, a more sophisticated method was used to create a socio-economic-status (SES) index based on our sample data. As the name already suggests, this index will include not only material assets but also livestock as well as living conditions and housing materials (Schellenberg et al., 2003; Sahn and Stifel., 2003; Onwujekwe et al., 2006).

Basically, the idea is to reduce the various socio-economic variables to a few categories by using principle component analysis (PCA). Applying PCA means creating from a set of n correlated variables, uncorrelated components, each being a linear weighted combination of the initial variables. The respective weights of each principle component stems from the eigenvectors of the correlation matrix. The eigenvectors of the first principle component estimated will be further used since it holds the highest possible amount of variation with respect to the original data (Vyas and Kumaranayake, 2006). For each household a dependent variable will be created which will equal the various socio-economic assets and will be used as a proxy for wealth. It is calculated as:

$$SES_{ij} = a_{house}house_{ij} + a_{roof}roof_{ij} + a_{floor}floor_{ij} + a_{wall}wall_{ij} + a_{asset}asset_{ij} + a_{live}live_{ij} \quad (1)$$

where the coefficients denoted as a are the eigenvectors of the correlation matrix; *house* refers to whether individuals i in village j has (1) own house, (2) lives for free or (3) rents a house; *roof* refers to whether individual i in village j has a house with a roof made of (1) straw, (2) metal sheets or (3) plastic; *floor* refers to whether individual i in village j has house with a floor made of (1) earth, (2) wood or (3); *wall* refers to whether individual i in village j has house with a wall made of (1) earth, (2)

mud blocks or (3) cement; *asset* denotes whether individual *i* in village *j* possesses the assets listed in Table 3; finally, *live* refers to the amount of livestock as listed in Table 3 individual *i* in village *j* possesses.

Table 4 depict the wealth index. Higher values are associated with a higher socio-economic status and lower or negative values with lower socio-economic status. Here, the lowest value is -0.86 suggesting a rather low socio-economic status, having for instance a few assets and livestock and living in poor circumstances. The contrary would hold for a household scoring 14.8. In a next step I normalized the SES index into *SES_adj*, a variable ranging from 0 to 1 in order to make interpretation easier; values closer to zero are thus associated with being poor and values closer to one can be perceived as being rich.

3.3 Social Network Analysis

By means of a network survey, the enumerators collected data on family and friendship networks the participants could potentially be part of.²⁴ To construct the social networks, they asked in the network survey about the relation type of each household to every other participating household in the survey. The collected data was symmetrized into an adjacency matrix, where I assumed a relation to exist if a node mentioned another.

Network Content

Within this research I defined network membership as follows: a respondent mentions a relation to another node in a village as being either family or a friend. In addition, family networks included parents, siblings, aunts, uncles and grandparents as well as the in-laws. Panel A of Table 5 depicts the results for network membership. It reveals that 89% of the entire sample holds membership of the family network and about 80% of the respondents hold friendship membership. Despite the fact that it is possible to be a member of various networks, these percentages stress that about 11% of the respondents have no family members and 20% appear to have no friends among the participants. This can be a result of measurement error, however, deeper analysis reveals that those 11% without family almost all stated to be displaced. The displacement may have cut off all family ties and also made them return to a different village. Again, this is also reflected within our data: only a small fraction of the 11% was born in the village, where they were living at the time of the survey. An alternative explanation could also be that the family members all died during the war.

²⁴ In the network survey the inquiry was not limited to family and friendship networks. Here I followed the network analysis, as conducted by D'Exelle and Riedl (2008), who also asked about support, social public activities (i.e. sport, religion, political parties) and economic networks. Data can be made available upon request. It is important to mention that I asked about different networks avoiding the analysis to become a question of either family or friends. I also included neighbour networks, which can be perceived as the most neutral of all networks. It can be argued that only if none of the other networks were applicable, the relation with a given node was characterized as a neighbour. I opted for the inclusion of only the family and friendship networks firstly, as we have seen in the literature review, these are the two networks, which are most often subject of analysis. Secondly, within this research they represent the two largest networks.

Reasons for why 20% are no member of friendship networks are less straightforward. Our analysis shows that overall there is nothing peculiar about this fraction, except that they tend to be the richest of the whole sample, having a mean *ses_adj* score of around 0.82 compared to the overall mean of 0.14. This is an interesting insight and in contrast to the idea that those who possess resources are also able to maintain more relations. Although it is not clear whether those 20% have no friends because they are rich or they are rich because they have no friends; if the latter is true, it would allow to argue that having no friends also implies having no sharing obligations, which could make the individuals richer than those, who are obliged to share.

Network Density

The network density measures how connected a node is (Jackson, 2008, p.37-38); in different words it is the ratio of actual links of an individual in a network to all possible links. Formally, the network density is defined as (Jackson, 2008, p.39):

$$CE_i^D = d_i(g)/(n - 1) \quad (2)$$

where $d_i(g)$ is denoted as the direct links individual i holds and n is the total amount of nodes in a network. The network density is established in such a way that the outcomes can be interpreted as percentages of links an individual is related to with respect to a given network.

Panel B of Table 5 shows the network density for family and friendship networks. It reveals that the family network is denser than the friendship network. On average, participants are related to 39% of members of family networks and 26% of members of friendship networks. The standard deviations of both networks are 0.27 and 0.22, respectively, which allows to argue that I have a substantial gap between low density and high density networks.

D'Exelle and Riedl (2008) found in their network analysis a family network density of mere 3.3% and 18.6% for the friendship network density. It appears that in the village in Nicaragua, where their research was conducted, respondents hold way more friendship relations than family relations. Generally speaking, it is neither necessary nor compelling to find similar density results, because different settings affect network formations in various ways. Whereas one whole village was subject to D'Exelle and Riedl's (2008) network analysis, this research drew network samples from 52 villages. It could simply be the case that within the single village, not much family existed, leading to small density values. In sum, making comparisons between densities from different research should be done with caution, since the given densities are highly case-specific. However, it can be noted that the family network density difference between D'Exelle and Riedl's (2008) and this research is considerable.

Transfers

The variables transfers given and transfers received were also part of the network survey. I only included the transfers given (short *transfer*) in this research. The idea for the inclusion originates from Jakiela and Ozier's (2010) research reporting significant positive effects of transfers given on the willingness to hide investment information. This might be accurate since giving out small loans and gifts can be interpreted as a proxy for sharing obligations.

Interestingly, about 1/3 of the sample had been either given or asked for loans and gifts. This allows for the acceptance that sharing (obligations) is a common feature within rural Liberian villages. Taking a closer look at the amounts reveals averaged transfers given and asked ranging from LD712 to LD797 respectively (see Table 6). The amounts of the transfers asked are on average higher, also holding a much higher standard deviation. This could imply that the subjects are more open about what they had asked for than what they had given. Theoretically, this skewness is impossible. In a closed network the transfer amounts given must equal the transfer amounts received. Not having found an equal balance between those two transfers could, apart from a certain unwillingness to disclose the information, suggest for measurement errors. Deeper analysis shows, however, that transfers given or asked are almost equal, when these were below LD100. Under the assumption that the higher the transfer, the less willing individuals are to disclose these, I can reject (not entirely) measurement errors. Moreover, the transfer of substantial sums of money (means of LD712 and LD797 for transfers given and asked, respectively; with a high standard deviation) allows considering that these transfers were used for improving living conditions or coping with shocks, which about 66% of the sample had to cope with.

4. Experimental Analysis

The basic part of the experiment was a risk game. Table 7 depicts that respondents invested on average LD26.3, which represents about 35% of their initial endowment. Specifying the amount invested by treatment shows that individuals invested on average most in the public treatment (LD27.7), followed by the private treatment (LD26.6) and finally public-price treatment (LD24.4). In all treatments the minimum investment amounted LD0 and the maximum was the whole endowment (LD70).

The participants were almost equally allocated to the three treatments and only a small fraction of respondents opted for not taking part in the games (see Table 8). Regarding gender, males invested around LD30.5 in the private treatment and LD32.2 when the treatment was public. Females invested on average around LD6 less in the private treatment and LD8.5 less in the public treatment. Jakiela and Ozier (2010) found similar outcomes for gender and treatment, though the difference between male-female is less. In terms of gender differences, the outcome is in line with research conducted by Eckel et al. (2008), who found that females are more risk-averse than their counterparts.

I predicted that investment would be higher in the private treatment than in the public treatment, due to the possibility to hide investment information. However, general investment is on average LD1.1 higher in the public treatment. As already mentioned, specifying for gender reveals no significant differences between investment in private and public treatment. The outcomes cannot confirm the outcomes of Jakiela and Ozier (2010), who found that females reduce their income by 22% if investment is observable.

Table 8 distinguishes the findings between exogenous and endogenous. Exogeneity refers to the randomly assignment of private and public treatment. Endogeneity, on the other hand, means that the treatment, private or public, is assigned to the participants themselves. Recall that 1/3 of the sample had the opportunity to pay for hiding investment information. In doing so, the respondents assigned themselves either to the private treatment (the willingness to pay for secrecy was higher or equal to LD15) or the public treatment (the willingness to pay for secrecy was lower than LD15). In the endogenous case, investment within the private treatment is significantly higher than in the public treatment, which confirms our expectation. In addition, the investments made in the endogenously defined group appear to be relatively high: on average LD24.7, compared to LD27.1 for the exogenously defined group, considering the deduction of their initial endowment by an average of LD15.2 before the investment. An explanation for the differences between the exogenous and endogenous group could be the following. Inquiring about the willingness to pay for secrecy may induce deeper involvement (i.e. consciously weighing the investment options and consequences). A higher perceived endowment ownership, stemming from potentially reducing part of the endowment before the investment, might have elicited more rational decisions. In contrast, participants without the option to pay for hiding investment information could have been more subject to inclination. If this is true, it could be argued that the endogenous group exhibit behaviour, which better reflect real-life situations. With caution might also be stated that this is an explanation for the relatively high investments made in the endogenously defined group.

Turning the attention to the direct option of hiding shows that the participants were on average willing to pay LD15.2 for non-disclosure of investment information. This represents about 1/5 of the initial endowment. In total, a 69% of the participants opted for paying a hiding fee, ranging between LD5 and LD45. Jakiela and Ozier's (2010) findings can confirm hiding preferences; however, they found an average W2P for secrecy price of 35 (Kenyan) shillings, combined for the small (80 shillings) and large endowment (180 shillings) group.²⁵

In sum, the experimental analysis reveals that the investment behaviour within the private and public treatment is not confirming my expectation. Specifying the sample by endogenously and exogenously defined treatment reveals, however, investment behaviour that allows for the acceptance of hiding

²⁵ Jakiela and Ozier (2010) did not specify the mean W2P for secrecy price for the small and large endowment groups. This makes a comparison of the results difficult.

preferences. Considering the minor difference between the amounts invested in public and private treatment, in turn, casts doubt on the value of the differences found regarding investment made. In contrast, directly inquiring about the willingness to pay for secrecy of investment information reveals a mean hiding price of LD15.2, which is again expected.

5. Econometric Analysis

The econometric analysis will be used to test the expectations, as identified in section 1.5. In particular, I hypothesized that (1) a higher willingness to pay for hiding investment information ($W2P$) is positively correlated with family network membership and (2) a higher $W2P$ is positively correlated with higher network densities.

The following Ordinary Least Squares (OLS) model was established:

$$W2P_{ij} = const + \alpha_1 Net_{ij} + \alpha_2 Den_{ij} + \alpha_3 Indv_{ij} + \alpha_4 Com_j + \varepsilon_{ij} \quad (3)$$

where the $W2P_{ij}$ is a continuous variable containing the amounts (in LD) participants were willing to pay for keeping investment information secret. The willingness to pay for secrecy by person i in village j is dependent on Net_{ij} , which is a dummy variable representing either family network membership or friendship network membership; Den_{ij} , the density of a given network as a proxy for network strength; $Indv_{ij}$, representing different control variables for household i in village j such as sex, marital status, educational level and income; Com_j , is a vector for village fixed effects; finally ε_{ij} is the error term.

Moreover, I estimated a Probit model to elicit whether network membership and network density increase the probability of being willing to pay for secrecy. Thus I converted the $W2P$ into a binary variable, where

$$W2P_{ij} = \begin{cases} 1 & \text{if } W2P_{ij} > 0 \\ 0 & \text{if otherwise} \end{cases} \quad (4)$$

The model makes use of equation (3) with the difference that the constant ($const$) will be dropped.

With respect to investment behaviour, I hypothesized that (1) the amount invested ($Aminv$) is negatively correlated with family and friendship membership and (2) that $Aminv$ is negatively correlated with the network density. The regression analysis will also specify $Aminv$ by private and public treatment, to further examine the findings of the experimental design, following the expectation that ‘private investment’ is higher than ‘public investment’ due to the possibility to hide investment information including potential earnings. The following OLS model was established:

$$Aminv_{ij} = const + \beta_1 Net_{ij} + \beta_2 Den_{ij} + \beta_3 Indv_{ij} + \beta_4 Com_j + \varepsilon_{ij} . \quad (5)$$

Here the amount invested is a continuous variable being explained by the same variables used in equation (3). Thus this regression intends to explain an increase in size of *Aminv* of household *i* in village *j* by the set of explanatory variables.

In order to attenuate threats evolving from reverse causality and omitted variables, I also estimated an Instrumental Variables regression model.²⁶

5.1 Regression Analysis

Willingness to Pay for Secrecy

In the following section I will present the results of the Probit model, which was estimated to shed more light on the probability that individuals are willing to hide investment information. Recall that I found a mean willingness to pay for secrecy of about LD15. The following will also report the findings of the OLS model, which intended to explain this amount. In all regressions village fixed effects (FE) were included, to make all findings robust to community characteristics.

We predicted that family network membership would have a positive correlation with *W2P*. I cannot find any evidence that family network membership increases the probability of hiding investment information (see Table 9). The results from Table 10, however, reveal a negative correlation on the amount of *W2P*: having family decreases *W2P* by around LD10. My expectation was mainly based on findings of Jakiela and Ozier (2010), who suggested for the positive influence of kin attendance at the game²⁷ (though not significant) on *W2P*. In addition, di Falco and Bulte (2009) also pointed to the importance of kinship; external links played a crucial role in expenditure patterns. In the light of our results, it may be argued that family network membership is of less importance regarding avoiding investment information disclosure. This, in turn, would allow to argue that the pressure to fulfill sharing obligations stemming from the family are weak or even non existing.

An explanation for this outcome could be provided when sharing obligations are used as a coping strategy. Indeed, results from the Probit model reveal that the probability of hiding investment information is increased by around 35% when the participants encountered any type of shock within 12 months prior to this survey (see Table 9). Regarding the explanation of the above outcome, Goldstein (1999) found that transfers made as a response to shocks mainly stem from non-relatives. Further, he even abandons the family as a crucial safety net for shock response and points to non-relatives, mainly friends, as important in this regard. Perhaps, friendship networks are more important

²⁶ The basic idea is to find valid instruments that are (1) correlated with the endogenous variable but (2) uncorrelated with the error term. I identified several potential instruments, including variables on ethnic and religious affiliation, and community level variables, such as access to road, etc. However, apart from the overall good performance of the instruments, the results not reveal many differences with the OLS model. I therefore opted to not discuss the Instrumental Variable model within the realm of this research. The findings can be made available upon request.

²⁷ It can be assumed that kin attendance at the game is equal to having family since the family network dummy is established on basis of game participants.

and more subject to sharing obligations than family networks. However, our results cannot confirm this.

I predicted that the network density would have a positive correlation with *W2P*. The findings from the OLS and Probit model, however, do not reveal any significant estimators for neither the family nor the friendship network densities. This is in contrast to di Falco and Bulte's (2009) outcomes, who found that the amount of external links²⁸ affects consumption behaviour in that way, that less assets have to be shared. In a different vein, network density was also found important for altruism; D'Exelle and Riedl (2008) found that an increase in family network density decreases coins given. Therefore, the insignificance of network density is puzzling and should be further addressed in future research. Due to the weak significance (significant at 90% level), the findings should also be treated with caution.

The findings further reveal that being attacked positively influences the *W2P* by around LD2.5. Interacting *Attack* with the respective network reveals no significant influence. The estimators from the Probit model in Table 9 strongly confirms the OLS outcomes: being attacked highly increases the probability (of around 500%!) of the willingness to pay for secrecy. This finding also points to the general impact of violence exposure on individual behaviour. Next to higher political (Blattman, 2009) and communal engagement (Bellows and Miguel, 2009), and more altruistic and risk-seeking behaviour (Voors et al., 2010), we find evidence that being attacked also inclines individuals to hide investment information including a potential positive income shock. In contrast, friendship membership and being attacked *decreases* the probability by more than 100% to be willing to pay for secrecy. Therefore it can be stated that network content matters for individual hiding behaviour.

Results from the Probit model also allows to argue in favor of an income effect: we find that higher degrees of wealth negatively influences the probability to being willing to pay for secrecy. This is also plausible since wealthier individuals also have more income to spend and in case of being approached by individuals to share income and assets, sharing does not affect their living conditions as much as it would affect poorer individuals. This may allow to argue that wealthier individuals are less sensitive when it comes to hiding investment information including a potential positive income shock. Moreover, it can be stated, since wealthier people are more often approached by others to share, due to their publicly exposed resources, they are less sensitive regarding hiding investment information. Poorer individuals, on the other hand, who make more often use of the sharing system, have a large incentive to hide their investment information, because it is likely that any publicly announced positive income shock is (re)claimed by others. In this regard, Jakiela and Ozier (2010) not find any significant results.

²⁸ Recall that network density is the amount of links of an individual but then normalized for the respective network. This allows for comparing my results to di Falco and Bulte's (2009) outcomes.

Amount Invested

Table 11 depicts results from the OLS model with *Aminv* as the dependent variable. Further, it distinguishes between family network and friendship network and between private and public treatment. All findings are robust to community characteristics.

With respect to the network density, Table 11 reveals that only the family network density has a significant influence on the *Aminv* given a public treatment. An increase in the family network density by 100% will reduce the amount invested by LD5.74.²⁹ Specifying for gender, the impact of family network density on male respondents is negative given public announcement (see Table 12). A family density increase of 100% affects the amount invested of males by LD16.79. Jakiela and Ozier's (2010) results differ insofar that they cannot find any support for the hypothesis that the *amount* of family members affect investment behaviour of neither male nor female, when the investment information is made public. Their results reveal an impact of family *attendance* at the game on females, which we can confirm: instead of family game attendance, however, we find evidence that family network membership is negatively influencing investments, given a public treatment. The variables exhibit whether the individual has family either in general or attending the game. In this respect, Table 12 shows that when females have family they invest about LD11 less when investment information is made public. On the other hand, when the investment information is kept secret, females tend to invest around LD7.5 more. This is in line with our expectations and suggests for the inclination of evading sharing obligations stemming from the family.

Regarding the friendship network density the outcomes are all insignificant. According to our findings not the amount of friends (density) matters but simply having friends. In this regard, only holding friendship network membership increases investments by around LD4.5 when, interestingly, the investment information is disclosed. The positive sign is in contrast to our expectation since we assumed that investment information disclosure would have a negative influence on *Aminv*. That friendship and family exhibit different influences, here on investment, can also be confirmed by Vollan (2011) on third party punishment (TPP) and D'Exelle and Riedl (2008) on altruism. The former author found by means of a trust game that TPP is most profound among friends than among family. The latter authors found that family instead of friendship network density is more important when it comes to altruism.

The reason for the difference between family and friendship networks remains speculative. It may be argued that friendship network membership inclines individuals to invest more for increasing their reputation. It can be accepted that a reputation effect is higher among friends than family members. Whereas family ties are naturally defined and losing blood relations is technically impossible, friendship ties have to be maintained and acquired. In this respect, reputation can play a role.

²⁹ Correspondingly, an increase in the density by 10% will reduce the amount invested by LD0.574. This better illustrates the impact of the family network density on the amount invested.

Moreover, Semmann et al. (2004) argued that reputation-increasing investments are initiated when these can be transmitted to social situations. In different words, it only makes sense to invest in reputation when there is a possibility to, for instance, acquire new friends. Given the village context, in which individuals (i.e. friends) frequently interact with each other, disclosure of investment information can be perceived as a reputation-increasing strategy.

Turning the attention to the control variables, Table 11 depicts that household *Size* has an overall positive effect on the amount invested, irrespective of the treatment: an increase in *Size* increases the amount invested by around LD 0.876. Interestingly, specifying this result for gender shows that *Size* enters only positively when the respondent is female and the investment information is disclosed. Maybe, due to the intra-household pressure, which is likely to increase in household size, females invest more when the investment information is disclosed, because they speculate to lose their investment to evade intra-household sharing obligations. Such a strategy would be in line with Baland et al. (2007), who stressed that members of credit cooperatives borrow loans, though they are not in need, to signal that they are poor and thus evade sharing obligations. However, the authors also state that the strategy is not gender dependent. On the other hand, also likely, due to larger households females tend to be more risk-taking because they need the money to fulfill all of their needs.

Age has an overall negative effect on *Aminv*; the influence is stronger within the private treatment and specified for gender, *Age* only appears to be relevant for investments by females, which remain private. The findings reveal that with every additional year female private investment is reduced by around LD0.22. In general, this would allow to argue that older respondents are more risk-averse; however, that the negative impact of *Age* on investment holds only for females given a private treatment, would cautiously allow to assume that the older participants are, the less subject they are to sharing obligations.

The data further suggests that, irrespective of private or public announcement, females' investment is overall lower of the investment information compared to their male counterparts. *Females* invest around LD7.3 less than males. That the private/public treatments could not elicit any differences in investment behaviour suggests for a general risk aversion of female respondents. This is in line with recent empirical studies, showing that females are overall more risk-averse (i.e. Eckel et al., 2008). This implies that females prefer the security of saving money instead gambling with it. As Khavul et al. (2009) found in East-Africa, a reason for female risk-aversion is that they are mainly responsible for the basic survival of their children. Other empirical studies confirm this. Small sums of money (like the endowment of the experiment) in the hands of females have been found to substantially increase children's health condition and food share (Thomas, 1990; Hoddinott and Haddad, 1995).

We also find an education effect: with every additional year of education the amount invested increases by around LD0.3 (see Table 11). The explanation could be that higher-educated individuals

tend to understand the game better. In addition, they are more able to calculate with probabilities and to mentally calculate and imagine possible earnings, due to exposure to specific economical related content and exercises.

Generally speaking, being attacked has a negative impact on A_{minv} . Intuitively, exposure to violence allows to argue that trust levels are reduced and individuals act more individualistically. Specifying these findings by gender reveals a reverse effect: females invest around LD28 more than males when they were attacked. This is in sharp contrast to our intuition about the impacts of violence exposure. The latter outcomes allow to argue that violence exposure positively affects risk preferences of females. The general risk-taking effect due to violence exposure can be confirmed by research conducted by Voors et al. (2010).

In sum, the regression analysis supports the idea that network membership and network density play an impeding role regarding individual investment. The results show that having family induces an increase of 'private investment' (see Table 11). In more detail, Table 12 depicts that the influence is restricted to female respondents. On the other hand, an increase in family network density affects male investment negatively when investment information is disclosed. This suggests that for females it is sufficient to have family in order to invest more in private and less in public; whereas for males the amount of family members is the crucial factor leading to less 'public investment'.

Since investments and their outcomes are within small villages mostly observable making investment per definition public, the results allow to argue that both family network and density may impede individual economic development. This could be a result of family sharing pressure: individuals lower 'public investment' to avoid receiving more than other participants and thus being obliged to share with their family networks.

Equally interesting, having friends induces an increase in 'public investment', which allows stating that the friendship network membership stimulates individual 'public investment'. As argued earlier, the reasons for the different impact on investment can be ascribed to either, regarding family networks, social sharing pressure, or regarding friendship networks, a reputation-increasing strategy. Overall this suggests that friends are not hindering economic development, as expected, but stimulate 'public investment'.

6. Discussion and Conclusion

In the absence of formal institutions, the economic literature has stressed the importance of informal insurance systems. These are systems based on reciprocity, the circle of giving and receiving support from its members. Safety nets are most profound in rural areas of developing countries and often stretch beyond rural communities. Its members are often kin, but also other non-relatives may be included. The economic literature has also pointed to the detrimental economic effects of such informal safety nets; they may impede individual economic development, and induce sharing obligation evasion strategies. This research contributes to the growing literature on the ‘dark sides’ of social capital by analyzing its potential detrimental effects on private investment.

The main part of this research comprised an experimental design including a risk game, in which participants could allocate an endowment to a risky but profitable investment cup and a savings cup. By randomly varying the observability of investment information including potential earnings to the other participants, I attempted explain investment levels as a function of observability of these decisions.

The results from the experimental analysis show that mean investment patterns are not different between the two groups (private vs. public; or no vs. complete observability). Using regression analysis, however, reveals that when controlling for family network membership and family network density, investment patterns suggest for the existence of hiding preferences. Specifically family membership lowers ‘public investment’ of females, whereas family network density lowers ‘public investment’ for males. In contrast, I found that friendship network membership stimulates investment. As discussed, rather than being subject to strong sharing obligations, investment behaviour of friends may be better explained by an attempt to increase their reputation. I conclude that individuals are subject to sharing obligation pressure stemming from the family and attempt to evade these by less ‘public investment’, whereas friendships affect individuals to increase their reputation, resulting in more ‘public investment’.

Furthermore, I randomly introduced the possibility of a ‘hiding fee’ participants could pay to hide their investment information. This entailed the possibility to hide potential income (and losses) and could be used to evade sharing obligations. I found an average willingness to pay for investment information secrecy of LD15, accounting for about 1/5 of the initial endowment. This result confirms the above-mentioned suggestion of hiding preferences. Unfortunately, due the general insignificant variables and the unexpected weak explanatory power of the network variables, the *origins* of (income) hiding preferences remain a puzzle.

Therefore, more empirical research is needed for verification but also for stressing different aspects this research did not consider. For instance, as David (1997) points out, the origins of sharing

obligations may be found within the household itself, rather than between households. She states that in Liberia, Kpelle women are underreporting and hiding income from their husbands in order to evade sharing obligations. Future research could control for this issue by specifying the recipients (i.e. spouse) of investment information disclosure.

Furthermore, this research finds some evidence, that a distinction between family and friendship networks is relevant. Future research can also extend the scope of analysis by the inclusion of other networks, which are perceived as relevant in a given setting. For instance, D'Exelle and Riedl (2008) make use of various networks, including neighbours, economic relations and social public activities (such as sport, religion, political parties).

Moreover, within this research network links among family and friends all received the same weight. In different words, no attention was paid to the actual relation values or tie strength between the participants. This led to a rather static representation of network relations. However, it may be argued that not only the density of networks is important for inducing social obligations, but giving and receiving is also dependent on the relation value between individuals. Future research could include relation values in, for instance, the network density, and ascribe higher weights to higher relation values. In so doing, a second dimension would be added to the amount of network relations, which may elicit more accurate hiding preferences. In this respect, Opsahl et al.'s (2010) methodological framework can be used to combine tie strength with network, closeness and betweenness centrality.

Another issue of explaining origins of sharing pressure is that the correlation between hiding (investment information) and sharing pressure is not necessarily a causal relation. As I already discussed in section 2.1, a particular aspect of Liberian culture is the general tendency of secrecy or hiding, which is strongly related to the Secret Societies. To control for this explanation of hiding preferences, a dummy variable for secret society membership could be included in future research.

Turning to the question to what extent social networks and densities impede economic development, I found that family network membership induces females to lower investments; larger family network densities, in turn, induce males to lower investments. If the lowered investments also reflect real life investment patterns, I can conclude that having family and the amount of family relations may be an impediment to individual economic development.

Finally, this research confirms recent economic research and the existence of the 'dark side' of social capital. In particular, this research points to the family as the origin for sharing obligations and is, at the same time, an impeding factor for investment. If, again, the investment patterns found reflect real-life individual decisions, it may be argued that individuals in rural areas are less inclined to, for instance, invest in human capital by sending their children to school, start-up small businesses or invest in the improvement of existing assets (i.e. land, materials, tools). This, in turn, would suggest

that safety nets, next to being often needed for survival, reflect to a certain extent a vicious circle. In overcoming this, the attention should be placed on formalizing institutions to take away the sharing obligations from the family. In so doing, especially friendship networks should be emphasized. In this respect, if the introduction of structural implementing formal insurance systems is too expensive, smaller institutions on village level should be introduced. These could comprise small businesses established in particular by friends; a third party could administer the cash flows and provide start-up money. The independence of the third party could guarantee that money is only used to a certain degree for personal matters (i.e. fulfilling sharing obligations). This could be an important step to counterbalance existing sharing obligations and further stimulate economic development.

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Table 1: Description of Variables

<i>Variable</i>	<i>Description</i>	<i>More Information</i>
W2P	Measures the participants' willingness to pay a fee for keeping investment information secret. This is a continuous variables in LD.	Jakiela and Ozier (2011)
Aminv	Measures the amount invested in LD by the participants.	Jakiela and Ozier (2011)
Density	Measures the density of a network for each individual in a given network. In more detail, it is the amount of direct ties divided by the ties of total network. Calculated by Stata11.	Jackson (2008); Miura (forthcoming)
Network Membership	Dichotomic variable indicating network membership. This variable derived from the Density measure for either the family or the friendship network.	
Size	Number of household members	
Age	Age (in years) of the respondent	
Female	Dichotomic variable indicating whether the respondent is female (1) or not (0).	
Single	Dichotomic variable indicating whether the respondent is single (1) or not (0).	
Years of Education	Years of education of the respondent	
SES-Index	Measures the socio-economic status of the respondents by using Principle Component Analysis. Variables included were years of education, house ownership, living for free, rent house, earth wall, mudblock wall, cement wall, straw roof, metal roof, metalsheet roof, plastic roof, earth floor, wooden floor, cement floor, cookpot, bed, table, chairs, mattress, coalpot, generator, radio, cellphone, sewing machine, bicycle, canoe, fishing utensils, cutlass, hoe, ax, shovel, spade, mosquitonet, goats, sheep, pigs, poultry. Calculated by Stata11	Schellenberg et al. (2003)
Shocks	Dichotomic variable indicating whether the respective household has encountered a shock in the last 3 months prior to being surveyed. Shocks included among others drought, flood, death, theft, damage, etc.	
Attack	Dichotomic variable indicating if he respective household was in any form attacked during the civil war.	
Transfer	Dichotomic variable indicating whether the respondent has given away any loans or gifts in last 3 months prior to being surveyed.	Jakiela and Ozier (2011)

Table 2: Summary Statistics

Variable	Observations	Mean	Standard Deviation	Min	Max
<i>Panel A: Demographics</i>					
Female	1276	0.51	0.50	0	1
Household Size	1243	4.75	2.26	1	15
Age	1240	42.39	15.02	13	94
Single	1242	0.06	0.24	0	1
Years of Education	1273	2.38	4.01	0	16
Some Elementary	1240	0.11	0.32	0	1
Some High School	1240	0.10	0.30	0	1
Some University	1240	0.01	0.09	0	1
<i>Panel B: Religious and Tribal Affiliation</i>					
Catholic	1235	0.04	0.19	0	1
Protestant	1235	0.91	0.28	0	1
Bassa	1240	0.04	0.19	0	1
Gola	1240	0.08	0.27	0	1
Kpelle	1240	0.74	0.44	0	1
<i>Panel C: Violence Exposure and Shocks</i>					
Attacked	1274	0.74	0.42	0	1
Shocks	1262	0.66	0.47	0	1
<i>Panel D: Housing Condition and Materials</i>					
Own House	1274	0.71	0.45	0	1
Live for Free	1274	0.20	0.39	0	1
Rent House	1274	0.09	0.28	0	1
Rent (in LD)	112	199.22	137.31	25	1000
Wall: Earth/Mud	1274	0.87	0.33	0	1
Wall: Mudbricks	1274	0.10	0.30	0	1
Wall: Cement	1274	0.03	0.16	0	1
Roof: Straw	1274	0.27	0.43	0	1
Roof: Metal Sheets	1274	0.72	0.44	0	1
Roof: Plastic	1274	0.01	0.11	0	1
Floor: Earth/Mud	1274	0.74	0.43	0	1
Floor: Wood	1274	0.03	0.16	0	1
Floor: Cement	1274	0.19	0.38	0	1

Table 3: Summary Statistics: Assets

Variable (in %)	Observations	Mean	Standard Deviation	Min	Max
Assets (#)	1262	6.53	2.97	0	15
Cookpot	1274	0.92	0.26	0	1
Bed	1274	0.23	0.42	0	1
Table	1274	0.41	0.49	0	1
Chairs	1274	0.45	0.50	0	1
Mattress	1274	0.39	0.49	0	1
Coalpot	1274	0.10	0.30	0	1
Generator	1274	0.01	0.12	0	1
Radio	1274	0.25	0.43	0	1
Cellphone	1274	0.27	0.44	0	1
Sewing	1274	0.01	0.08	0	1
Bicycle	1274	0.01	0.11	0	1
Canoe	1274	0.003	0.06	0	1
Fishing	1274	0.14	0.35	0	1
Tapping	1274	0.28	0.45	0	1
Cutlass	1274	0.84	0.37	0	1
Hoe	1274	0.54	0.50	0	1
Ax	1274	0.30	0.46	0	1
Shovel	1274	0.10	0.30	0	1
Spade	1274	0.02	0.15	0	1
Mosquitonet	1274	0.71	0.45	0	1
Animal	1273	0.37	0.48	0	1
Cattle (#)	8	2.13	1.55	1	5
Goats (#)	1274	0.10	0.75	0	18
Sheep (#)	1274	0.08	0.62	0	11
Pigs (#)	1274	0.10	0.76	0	14
Poultry (#)	1274	2.81	7.25	0	125

Table 4: Socio-Economic Status Index

Variable	Observations	Mean	Standard Deviation	Min	Max
SES	1274	0.925	1.173	-0.86	14.8
SES_adj	1274	0.125	0.079	0.00	1.06

Table 5: Network Variables

Variable	Observations	Mean	Standard Deviation	Min	Max
<i>Panel A: Network Membership</i>					
Family Total	1276	0.89	0.30	0	1
Friendship	1276	0.80	0.39	0	1
<i>Panel B: Network Density</i>					
Family Total	1276	0.35	0.28	0	1
Friendship	1275	0.22	0.22	0	1

Table 6: Transfers

Variable	Observations	Mean	Standard Deviation	Min	Max
Transfer given	1179	0.024	0.07	0	1
Transfer given (in LD)	281	712.13	927.88	10	7000
Transfer asked	1179	0.023	0.06	0	1
Transfer asked (in LD)	295	796.50	1416.56	10	15000

Table 7: Experimental Summary Statistics I

Variable	Observations	Mean	Standard Deviation	Min	Max
Amount Invested	1263	26.27	18.43	0	70
Amount Invested (Private)	432	26.6	18.85	0	70
Amount Invested (Public)	427	27.7	19.41	0	70
Amount Invested (Public-Price)	404	24.41	16.7	0	70
W2P	277	15.19	6.45	5	45

Table 8: Experimental Summary Statistics II

Treatment	Exogenous			Endogenous	
	Private	Public	Public-Price	Private	Public
Amount Invested	26.59 (-0.91)	27.69 (-0.94)	24.42 (-0.83)	26.28 (-1.1)	23.17 (-1.16)
Proportion of Endowment	0.38	0.39	0.35	0.39	0.32
W2P	.	.	15.19 (-0.38)	.	.
Proportion of Endowment	.	.	0.22	.	.
Opting for W2P	.	.	0.69	.	.
Draw: won	0.62 (-0.02)	0.64 (-0.02)	0.62 (-0.03)	0.65 (-0.04)	0.59 (-0.03)
Not played (#)	26	15	31	0	31
Not played (%)	6	3.5	7.6	0	12.7
Observations	432	427	404	160	244
Female	23.43 (-1.17)	23.63 (-1.29)	21.36 (-1.15)	23.61 (-1.62)	20 (-1.55)
Male	30.54 (-1.36)	32.15 (-1.33)	27.62 (-1.17)	28.79 (-1.46)	26.79 (-1.71)

Robust Standard Errors in parentheses.

Table 9: Probit Model Regression Results (MFX) of W2P

Dependent Variable is W2P	Family Network			Friendship Network		
	(1)	(2)	(3)	(4)	(5)	(6)
Density		0.343 (0.313)	0.399 (0.326)		-0.614+ (0.385)	-0.264 (0.462)
Network Membership			-0.708 (0.651)			0.332 (0.441)
Size	0.0656+ (0.0430)	0.0623 (0.0443)	0.0634 (0.0451)	0.0656+ (0.0430)	0.0589 (0.0445)	0.0620 (0.0448)
Age	-0.00321 (0.00653)	-0.00369 (0.00655)	-0.00382 (0.00657)	-0.00321 (0.00653)	-0.00393 (0.00652)	-0.00486 (0.00672)
Female	0.130 (0.172)	0.117 (0.168)	0.128 (0.171)	0.130 (0.172)	0.0886 (0.170)	0.118 (0.177)
Single	-0.660+ (0.416)	-0.657+ (0.416)	-0.644+ (0.421)	-0.660+ (0.416)	-0.607+ (0.406)	-0.633+ (0.423)
Years of Education	0.0353 (0.0316)	0.0359 (0.0315)	0.0347 (0.0317)	0.0353 (0.0316)	0.0322 (0.0311)	0.0336 (0.0320)
SES-Index	-2.746** (1.347)	-2.784** (1.349)	-2.728** (1.354)	-2.746** (1.347)	-2.618* (1.371)	-2.919** (1.351)
Shocks	0.354* (0.186)	0.319* (0.182)	0.323* (0.183)	0.354* (0.186)	0.370** (0.181)	0.354** (0.180)
Attack	5.239*** (0.161)	5.237*** (0.165)	4.474 (0.161)	5.239*** (0.161)	5.048*** (0.191)	6.229*** (0.515)
Attack x Network			0.817 (0.798)			-1.087** (0.538)
Transfer	0.265 (0.185)	0.261 (0.183)	0.256 (0.180)	0.265 (0.185)	0.287+ (0.180)	0.305* (0.180)
Village Fixed Effects	YES	YES	YES	YES	YES	YES
N	360	360	360	360	360	360

Table 10: OLS Regression Results of W2P

Dependent Variable is W2P	Family Network			Friendship Network		
	(1)	(2)	(3)	(4)	(5)	(6)
Density		0.148 (1.958)	1.073 (1.946)		-3.082 (2.403)	-1.513 (2.729)
Network Membership			-7.645** (3.343)			0.216 (2.424)
Size	0.302 (0.256)	0.300 (0.260)	0.295 (0.264)	0.302 (0.256)	0.270 (0.261)	0.286 (0.262)
Female	0.943 (1.035)	0.939 (1.025)	1.097 (1.013)	0.943 (1.035)	0.758 (1.026)	0.784 (1.051)
Single	-3.688* (2.124)	-3.686* (2.126)	-3.444+ (2.157)	-3.688* (2.124)	-3.387+ (2.107)	-3.315+ (2.195)
Years of Education	0.0550 (0.198)	0.0550 (0.199)	0.0365 (0.197)	0.0550 (0.198)	0.0368 (0.202)	0.0403 (0.205)
SES-Index	-2.142 (9.181)	-2.137 (9.202)	-1.450 (9.314)	-2.142 (9.181)	-1.350 (9.264)	-2.048 (9.356)
Shocks	0.900 (0.991)	0.888 (1.026)	0.955 (1.017)	0.900 (0.991)	0.941 (0.979)	0.929 (0.976)
Attack	2.550* (1.452)	2.547* (1.449)	-4.719 (3.929)	2.550* (1.452)	1.665 (1.482)	4.704+ (3.122)
Attack x Network			7.038* (4.166)			-2.727 (2.730)
Transfer	0.0443 (0.868)	0.0434 (0.871)	0.0302 (0.855)	0.0443 (0.868)	0.128 (0.828)	0.204 (0.836)
Constant	8.106** (3.120)	8.102** (3.130)	15.63*** (4.865)	8.106** (3.120)	10.07*** (3.331)	9.178** (4.002)
Village Fixed Effects	YES	YES	YES	YES	YES	YES
N	397	397	397	397	397	397
r2	0.254	0.254	0.265	0.254	0.259	0.265

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: OLS Regression Results of Amount Invested by Private and Public Treatment

Dependent Variable is Amount Invested	Family Network			Friendship Network		
	(1) Total	(2) Private	(3) Public	(4) Total	(5) Private	(6) Public
Density	-2.206 (1.797)	-1.987 (3.805)	-5.743* (3.152)	-0.832 (2.808)	-1.647 (5.330)	0.563 (5.710)
Network Membership	0.210 (1.831)	5.381* (2.796)	-2.531 (3.793)	1.627 (1.441)	-0.529 (2.321)	4.577* (2.705)
Size	0.731*** (0.240)	0.875* (0.451)	0.956** (0.450)	0.715*** (0.247)	0.881* (0.451)	0.921** (0.436)
Age	-0.112*** (0.0327)	-0.221*** (0.0610)	-0.0802 (0.0841)	-0.111*** (0.0325)	-0.219*** (0.0624)	-0.0693 (0.0832)
Female	-6.377*** (1.495)	-7.087*** (2.268)	-7.385*** (2.696)	-6.360*** (1.509)	-7.349*** (2.330)	-7.329*** (2.657)
Single	3.781+ (2.316)	0.989 (3.976)	5.348 (4.175)	3.811+ (2.302)	1.248 (4.067)	5.606 (3.976)
Years of Education	0.299** (0.142)	0.306 (0.290)	0.181 (0.261)	0.302** (0.142)	0.307 (0.281)	0.216 (0.282)
SES-Index	6.437 (5.969)	-4.026 (11.07)	5.207 (9.637)	6.736 (5.963)	-3.394 (11.42)	6.773 (9.796)
Shocks	0.638 (1.043)	-0.694 (1.906)	1.021 (1.737)	0.477 (1.016)	-0.810 (1.897)	0.605 (1.789)
Attack	0.821 (1.302)	-1.809* (1.030)	-13.31*** (2.237)	0.539 (1.674)	-3.094** (1.346)	-8.910*** (2.610)
Transfer	-0.279 (1.040)	-1.066 (1.705)	1.163 (2.213)	-0.358 (1.036)	-1.271 (1.775)	0.876 (2.288)
Density	-2.206 (1.797)	-1.987 (3.805)	-5.743* (3.152)	-0.832 (2.808)	-1.647 (5.330)	0.563 (5.710)
Network	0.210 (1.831)	5.381* (2.796)	-2.531 (3.793)	1.627 (1.441)	-0.529 (2.321)	4.577* (2.705)
Constant	32.78*** (3.575)	35.32*** (4.816)	53.77*** (5.946)	31.99*** (3.239)	40.70*** (4.436)	43.16*** (4.456)
Village Fixed Effects	YES	YES	YES	YES	YES	YES
N	1233	421	414	1233	421	414
r2	0.267	0.354	0.369	0.267	0.349	0.369

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 12: OLS Regression Results of Amount Invested by Private and Public Treatment and Gender

Dependent Variable is Amount Invested	Family Networks				Friendship Networks			
	(1) Female Private	(2) Male Private	(3) Female Public	(4) Male Public	(5) Female Private	(6) Male Private	(7) Female Public	(8) Male Public
Density	-3.890 (5.174)	-1.246 (8.963)	1.969 (5.067)	-16.79*** (4.848)	2.432 (6.346)	-5.019 (8.288)	-2.034 (9.179)	3.515 (8.673)
Network Membership	7.550* (3.958)	-2.032 (5.480)	-11.19* (5.845)	5.401 (5.719)	-1.512 (3.285)	1.474 (5.014)	8.095+ (4.839)	4.351 (3.772)
Size	0.613 (0.633)	1.175 (0.998)	1.720** (0.677)	0.737 (0.570)	0.702 (0.661)	1.198 (0.966)	1.534** (0.683)	0.625 (0.592)
Age	-0.224*** (0.0751)	-0.171+ (0.116)	-0.0464 (0.125)	-0.166+ (0.104)	-0.213*** (0.0784)	-0.171+ (0.110)	-0.0382 (0.119)	-0.164 (0.114)
Single	-1.238 (5.233)	3.296 (6.730)	-0.528 (3.972)	7.056 (8.730)	-1.018 (5.414)	3.555 (6.621)	-1.063 (3.539)	7.595 (9.235)
Years of Education	-0.390 (0.489)	0.577 (0.527)	0.573 (0.440)	-0.211 (0.454)	-0.345 (0.538)	0.656 (0.500)	0.554 (0.483)	-0.130 (0.488)
SES-Index	-1.980 (14.22)	-15.07 (27.77)	3.972 (15.03)	19.31 (25.86)	-4.794 (13.98)	-16.20 (27.48)	1.175 (13.96)	17.35 (26.02)
Shocks	0.361 (2.498)	-1.551 (3.886)	-3.861 (3.221)	2.859 (3.518)	-0.0198 (2.446)	-1.487 (3.914)	-4.515 (3.250)	2.270 (3.482)
Attack	28.36*** (3.573)	3.218 (3.749)	1.900 (5.935)	-8.621 (6.775)	24.88*** (4.210)	0.305 (2.817)	30.69*** (7.068)	-8.377 (7.279)
Transfer	0.937 (2.474)	-3.746 (4.352)	2.281 (3.334)	0.793 (3.389)	1.206 (2.575)	-3.754 (4.487)	0.536 (3.334)	1.821 (3.649)
Constant	6.294 (5.769)	31.79*** (9.347)	42.83*** (9.632)	35.67*** (9.069)	13.08** (5.202)	31.57*** (8.876)	4.987 (4.433)	31.56*** (7.658)
Village Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
N	232	189	202	212	232	189	202	212
r2	0.485	0.430	0.526	0.534	0.475	0.431	0.521	0.512

Standard errors in parentheses

+ $p < 0.15$, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Annex I

0.1. To be completed by Interviewer

Please complete before the Interview

0.11	_____	____
	<i>Interviewer name</i>	<i>Interviewer ID</i>
0.12	Date: ____ / ____ / 2010 (dd/mm)	
0.13	County Montserrat Margibi	<i>Code</i> ____
0.14	<i>a. District:</i> _____	<i>Code</i> ____
	<i>b. Clan:</i> _____	<i>Code</i> ____
	<i>c. Village:</i> _____	<i>Code</i> ____
0.15	Household code: _____	
0.16	Who is the respondent?	1 Household head
		2 Spouse
0.17	Is the interviewee willing to participate?	1 Yes
		2 No: _____
0.18	Interview language	
0.19	Starting time	__ : __ (hh:mm)

0.2. To be completed by Controller:

<p>Remarks:</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>I confirm that the questionnaire is fully and correctly completed.</p> <p>Signature interviewer:</p> <p>_____</p> <p>Date: ____ / ____ / 2010 (dd/mm)</p>
--

0.3. To be completed by Data Entry

<p>I confirm that the data is correctly entered and checked.</p> <p>Date of entry: ____ / ____ / 2010 □ (dd/mm)</p> <p>_____</p> <p><i>Name of data entry operator</i></p> <p>_____</p> <p><i>Name of controller</i></p> <p>Signature of data entry operator:</p> <p>_____</p> <p>Signature of controller:</p> <p>_____</p>	<p>____</p> <p><i>Data entry ID</i></p> <p>____</p> <p><i>Controller ID</i></p>
---	---

Space for remarks:

SECTION 1 – HOUSEHOLD COMPOSITION

1.1	1.2	1.3		1.4		1.5	1.6*	1.7	1.8*	1.9	1.10*	1.11*	1.12*
HH Member Code	First name	Sex	Literate?		Age	Relation to Head → SEE CODES	Marital status → SEE CODES	Highest attended education → SEE CODES	Years of education	Religion → SEE CODES	Tribe → SEE CODES	Status → SEE CODES	
							<i>For persons >12 years</i>						
01		M	F	Y	N								
02		M	F	Y	N								
03		M	F	Y	N								
04		M	F	Y	N								
05		M	F	Y	N								
06		M	F	Y	N								
07		M	F	Y	N								
08		M	F	Y	N								
09		M	F	Y	N								
10		M	F	Y	N								
11		M	F	Y	N								
12		M	F	Y	N								
13		M	F	Y	N								
14		M	F	Y	N								

CODES

*1.6	*1.7	*1.8	*1.10	*1.11	*1.12
1=Head 2=Spouse 3=Child 4=Parent 5=Sibling 6=Grand-child 7=Grand-parent 8=Orphan taken care of 9=Other relative 10=Foster child (no orphan) 11=No relation	1=Single 2=Married 3=Living together with partner 4=Divorced 5=Separated 6=Widow or widower 99=Not applicable (<12 years old)	1=No Schooling 2=Some elementary 3=Completed elementary 4=Some high school 5=Completed high school 6=Vocational 7=Some University 8=Completed University	1=Catholic 2=Protestant 3=Muslim 4=Animism 5=Other	1=Bassa 2=Gbandi 3=Gio / Dan 4=Gola 5=Grebo 6=Kissi 7=Kpelle 8=Krahn 9=Kru 10=Loma 11=Mandingo 12=Mano 13=Vai 14=Other_____	1=Village chief 2=Elder 3=Youth leader 4=Women's leader 5=Religious leader 6=Tribal leader

SECTION 2 – ECONOMIC SITUATION

2.1*	What are the most important activities your household is involved in? (<i>Mention up to 3, in order of importance</i>) → SEE CODES	(1) <input type="text"/> (2) <input type="text"/> (3) <input type="text"/>
2.2	Do you or your household own or rent your house?	1 Own → Skip to 2.4 2 Don't own but live for free → Skip to 2.4 3 Rent
2.3	How much do you pay per month for rent?	LD <input type="text"/>
2.4	What is the major construction material of the outside walls?	1 Earth / mud 2 Mud bricks / blocks 3 Cement / Concrete 4 Other, specify _____
2.5	What is the major material of the roof?	1 Straw / thatch 2 Zinc / metal sheet 3 Plastic sheet (tarpaulin) 4 Other, specify _____
2.6	What is the major material of the floor?	1 Earth/stones 2 Wood 3 Cement 4 Other, specify _____

2.7	Do you and your household members own any of the following assets? CIRCLE ALL THAT APPLY.	A	Cooking pots	H	Radio/Tape	O	Cutlass
		B	Bed	I	Cell phone	P	Hoe
		C	Table	J	Sewing machine	Q	Ax
		D	Chairs	K	Bicycle	R	Shovel
		E	Mattress	L	Canoe	S	Spade
		F	Coal pot	M	Fishing utensils	T	Mosquito net
		G	Generator	N	Tapping knife		
2.8	Are there any farm animals owned within the household?	1 Yes	2 No → SKIP TO SECTION 3				
2.9	If yes , how many of each of the following animals? CIRCLE ALL THAT APPLY AND NOTE NUMBER OF EACH ANIMAL	1	Cattle <input type="text"/>	3	Sheep <input type="text"/>	5	Poultry <input type="text"/>
		2	Goats <input type="text"/>	4	Pigs <input type="text"/>	6	Other <input type="text"/>

* Codes 2.1

- | | |
|--|---|
| 1. Food crop production
2. Cash crop production (e.g. tree crops)
3. Livestock rearing
4. Fishing | 5. Trade / commerce
6. Farm contract labor (e.g. farm brushing)
7. Non-farm contract labor (e.g. rubber tapping)
8. Other, specify _____ |
|--|---|

SECTION 3 – HOW MANY MEALS DID YOUR HOUSEHOLD EAT YESTERDAY?

3.1	Number of rice meals (<i>per adult</i>)	<input type="text"/>
3.2	Number of meals without rice (<i>per adult</i>)	<input type="text"/>
3.3	Number of rice meals (<i>per child</i>)	<input type="text"/>
3.4	Number of meals without rice (<i>per child</i>)	<input type="text"/>

SECTION 4 – SHOCKS, RISKS AND COPING

4.1	By order of importance, what were the 4 main SHOCKS you faced in the last 12 months ? <i>Do not read options, circle up to four letters in front of the identified cause.</i>				
A	Late rain/drought	G	Unusually high level of human disease	M	Death of other household member
B	Early or heavy rains/floods	H	Unavailability of food	N	Theft of animals or farm products
C	Loss of harvest due to bird/grass cutter (groundhog) attacks	I	Bushfire/Fire	O	Conflict/violence
D	Lost of harvest due to high level of plant disease/insects	J	Loss of employment of a household member	P	Other, specify _____
E	Theft of money, household utensils or personal effects	K	Serious illness or accident of household member		
F	House damaged/destroyed (e.g. termites, heavy rains)	L	Death of a working household member		

For the four main shocks above, please complete the following table using the codes provided. Please be consistent in the ranking. Complete one line at the time.

4.2	4.3	4.4*	4.5
Rank & Cause Rank the problems mentioned above in order of importance <i>Use letters provided above</i>	Did [cause] create a decrease or loss for your household of: 1=Consumption 2=Income & in kind receipts (e.g. harvest) 3=Assets (e.g. livestock, household belongings) 4=Both income and assets 5=No change	What did the household do to compensate or resolve these decreases or losses of income and/or assets caused by shocks <i>Use codes below, record all used</i>	Has the household recovered from the decrease in income or assets or both from the shocks? 1=Not recovered at all 2=Partially recovered 3=Completely recovered
(1) <input type="text"/>	(1) <input type="text"/>	(1a) <input type="text"/> (1b) <input type="text"/>	(1) <input type="text"/>
(2) <input type="text"/>	(2) <input type="text"/>	(2a) <input type="text"/> (2b) <input type="text"/>	(2) <input type="text"/>
(3) <input type="text"/>	(3) <input type="text"/>	(3a) <input type="text"/> (3b) <input type="text"/>	(3) <input type="text"/>
(4) <input type="text"/>	(4) <input type="text"/>	(4a) <input type="text"/> (4b) <input type="text"/>	(4) <input type="text"/>

4.61	Does your household apply any strategies to avoid negative impact in case the problem reoccurs?	1	YES	2	NO → SKIP TO SECTION 5
4.62*	If yes , which strategies (mention up to four using codes below):	(1) <input type="text"/>	(2) <input type="text"/>	(3) <input type="text"/>	(4) <input type="text"/>

* CODES 4.4	* CODES 4.62
01 = Rely on cheaper food 02 = Borrowed food 03 = Purchased food on credit 04 = Reduced number of meals per day 05 = Looked for work outside community 06 = Reduced expenditures on health / education 07 = Spent savings 08 = Sold household assets 09 = Helped by relatives/friends 10 = Borrowed money 11 = Rented out land 12 = Sold land 13 = Sent children to work 14 = Send children to other relatives 15 = Other, _____	01 = Diversified food crops 02 = Making larger farms 03 = Raise livestock to sell in times of need 04 = Use of natural fertilizer/pesticide 05 = Use of chemical fertilizer/pesticide 06 = Sand blocks to prevent erosion 07 = More contract work 08 = Petty trade 09 = Send children to work or sell goods 10 = Looked for temporary work outside community 11 = Save money (e.g. susu-club) 12 = Other, _____

SECTION 5 – HOUSEHOLD STATUS

5.1 -	When did your household settle in this village? (year)	1	_____	2	I was born here	
		1	Never displaced → Skip to section 6			
5.2 -	Have you ever been displaced because of the war? Or did you migrate because of another reason?	2	Displaced from place of origin			
		2a	If yes , since which year?	_____		
		2b*	If yes , where have you found shelter? → SEE CODES	_____		
		2c	If yes , when did you return? (year)	_____		
		3	Refugee from a neighboring country			
		4	Migrated (no refugee)			

Codes

5.2 – 2b*

1=Camp (for internally displaced people)
2=Refugee camp
3=Family
4=Other, specify _____

SECTION 6 – HISTORY OF WAR

6.1	Has your household been attacked during the war?	1	YES	2	NO	
6.2*	If yes , could you please mention some details about each attack?					
		Date (mm/yy)	Type of attack, mention all that apply (codes)			
	1	_____	_____			
	2	_____	_____			
	3	_____	_____			
	4	_____	_____			
5	_____	_____				
6.4	Was your household attacked by people you know?	1	Yes	2	No	
6.41*	If yes, do you want to specify who? (codes)	1	2	3	4	5

CODES

*6.2	*6.41
1=House destroyed 2=HH member(s) got killed 3=HH member(s) severely injured 4=HH member(s) raped	1=Other villager I had a bad relation with 2=Other villager I had no relation with 3=Extended Family member 4=Household member 5=Other, specify _____
5=HH member(s) abducted 6=HH assets looted 7=other, _____	

Annex II: Network Survey

SECTION 7 – NETWORK RELATIONS

	7.1	7.2*	7.3*	7.4*		7.5	7.6
HH	Do you know the HH? 1=yes 2=no	Relation Type → SEE CODES	Relation Value → SEE CODES	Relation Frequency → SEE CODES		Mention all people in the group who asked you for a loan/gift in the last 3 months. Write '1' if applicable. Specify how much you gave.	Mention all people in the group whom you asked for a loan/gift in the last 3 months. Write '1' if applicable. Specify how much you received.
1						LD	LD
2						LD	LD
3						LD	LD
4						LD	LD
5						LD	LD
6						LD	LD
7						LD	LD
8						LD	LD
9						LD	LD
10						LD	LD
11						LD	LD
12						LD	LD
13						LD	LD
14						LD	LD
15						LD	LD
16						LD	LD
17						LD	LD
18						LD	LD
19						LD	LD
20						LD	LD
21						LD	LD
22						LD	LD
23						LD	LD
24						LD	LD
25						LD	LD
26						LD	LD
27						LD	LD
28						LD	LD
29						LD	LD
30						LD	LD

External Contacts and Transfers

7.6	How many times have you been asked for loans/gifts by HHs outside village in last 3 months?	___ times
7.7	Total amount of loans/gifts given to other HHs outside village in last 3 months	LD
7.8	How many times have you asked for loans/gifts to HHs outside village in last 3 months?	___ times
7.9	Total amount of loans/gifts received from other HHs outside village in last 3 months	LD

CODES

*7.2	*7.3	*7.4
1=Family (own) 2=Family (in-law) 3=Neighbors 4=Friendship 5=Land rental 6=Labor transaction 7=Political group 8=Religious group 9=Commercial relationship 10=Other, specify: _____	1=very weak 2=weak 3=not weak but also not strong 4=strong 5=very strong	1=more than once a day 2=daily basis 3=weekly basis 4=monthly basis 5=annual basis

Annex III

Script for the risk game

We will give you 70 LD. I will put 2 piece of paper in this linen bag; 1 is blank whereas the other has a black cross on it. You will draw without looking one paper. If the paper with black cross comes up you will gain 4 times the amount invested. If you draw the blank paper you will not gain anything. We now like to ask you to choose how much you would like to invest. You can choose any amount between 0 and 70 LD. Put the amount you want to invest in the blue cup. Place the amount you want to keep in the green cup. Draw one piece of paper.

Private treatment

Your choice will be anonymous and remains unknown to other persons.

Public mandatory treatment

We again would like to ask you to choose how much you want to invest, but this time we will announce your choice and if you won to all other participants at the experiment.

Public-price treatment

We again would like to ask you to choose how much you want to invest, but this time you may pay a price of XX LD to keep your choice and the draw secret to all other participants at the experiment. The price you are willing to pay has to be equal or higher than the price in this envelop in order to keep the investment information secret. If you are lower than the price will still announce your choice and the result of the draw. You may also opt to not pay anything at all. In this case we are also announce this. Record the amount paid for secrecy on you **risk game record sheet** and continue with the investment game.