Risk Sharing within Geographically Spread Extended Families: Evidence from rural Tanzania

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By

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Abstract

Theoretical models of risk sharing predict higher levels of risk sharing among close-knit groups, such as families. I analyse risk sharing agreements within geographically spread extended families in rural Tanzania. While others have established the extent to which risk is shared within this setting, this paper focuses on gifts and the motives behind gift giving. The analysis shows two clear patterns of risk sharing. Firstly, when non-migrated household experience an aggregate shock, the migrated extended family helps out by increasing the amount of gifts given. Secondly, in case migrated households experience an idiosyncratic shock, the non-migrated extended family insures them by increasing the amount of gifts. In order to understand the underlying motives behind risk sharing I look at heterogenous effects across wealth and distance. I find that non-migrated households respond in a reciprocal way to both idiosyncratic and aggregate shocks of the migrated network, while migrated households behave altruistically when the non-migrated network experiences idiosyncratic shocks.

Keywords: risk sharing, extended families, migration, altruistic models, reciprocity models

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1 Introduction

Living at the subsistence level is characterised by a high degree of risk and low levels of income. Informal arrangements are used within the local community to deal with the risk that households face. In his seminal paper, Townsend (1994) shows that while a substantial part of the risk is shared within the village, household are unable to fully insure against shocks. A myriad of mechanisms are used to deal with this risk, such as gifts, loans, asset sales (Fafchamps and Lund, 2003), labour sharing arrangements (Krishnan and Sciubba, 2009), and credit and insurance institutions (Bold and Dercon, 2009).

The literature has continued its quest for a better understanding of risk sharing in two ways. Firstly, research has been moving away from the village towards social networks more generally (De Weerdt and Dercon, 2006) and more specific groups, such as funeral societies (Bold and Dercon, 2009). Secondly, understanding the underlying motives behind risk sharing has been the topic of several lab experiments (Leider et al., 2009) and other empirical investigations (Blumenstock et al., 2014) by contrasting altruistic and reciprocal models.

This paper fits in this literature by focusing on geographically spread families as insurance units. While local communities might be able to help out each other in the case of idiosyncratic shocks, informal insurance against an aggregate shock that, by definition, affects the community as a whole is impossible. A geographically spread family is affected by different aggregate shocks, thereby creating a potential for risk sharing. As such, this paper is an empirical counterpart of Stark and Bloom (1985), who argue that geographic spread through migration is an income maximization strategy of the family as a whole, rather than that of an individual. Besides showing that families share risk, this paper contributes to the literature by investigating the underlying motives behind this type of risk sharing.

In order to do so, the data used needs to contain a reasonable degree of geographic spread. The Kagera Health and Development Survey (KHDS) fits this criteria. Started in 1991, all individuals interviewed in the 915 households were reinterviewed in 2004 and 2010 again. Significant migration occurred among these individuals, resulting in a network of households that use to be part of the same household but live in different locations: an ideal context for testing risk sharing among geographically spread extended families.

I find evidence of two clear patterns of risk sharing within the extended family. When non-migrated households experience an aggregate shock, migrated households from the same extended family send additional gifts. The opposite is true for idiosyncratic shocks: in case migrated households experience an idiosyncratic shock, non-migrated households increase their gifts. There seem to be contrasting motives at play: while migrated households seem to behave altruistically (in the case of idiosyncratic shocks among the ones that stay behind), non-migrated household respond to all types of shocks in a reciprocal manner.

The contribution of this paper is twofold. Firstly, it adds to the bulk of empirical evidence on risk sharing through gift giving. More specifically, it focuses on the particular network of the extended family, thereby supplying additional evidence on the substantial but imperfect insurance across kinship ties (Grimard, 1997). Moreover, it provides additional evidence on the role of migration as a mean to sharing risk among families. While De Weerdt and Hirvonen (2013) show the overall role of migration in risk sharing agreements within the extended family, this paper builds on their findings by focusing on the role of gifts as a specific risk sharing mechanism.

Secondly, it shows that motives might differ across households, depending on their geographic position. Whereas reciprocal motives might be very important in a poor agricultural context more generally, sharing within the extended family across space might display higher levels of altruism. This relates back to the literature on "sociobiology", which argues that the survival of several kinship members could be more important to an individual than its own survival (Wilson, 1978).

The rest of the paper is structured as follows. I first present a conceptual framework in which the main concepts are linked to the relevant literature. Subsequently, I describe the main features of the data and elaborate on the econometric strategy. This is followed by the main results. The validity of these results are discussed in the next section, after which a short conclusion follows.

2 Conceptual framework

Over the past decades economists have attempted to better understand the role of risk and uncertainty in the lives of the poor. In particular, the extent to which households are able to insure themselves against risk within a certain community or network has been a major topic. Following Townsend (1994), the full insurance hypothesis argues that all idiosyncratic shocks within a village are perfectly shared among the village members. The intuition is that under perfect risk sharing households share an aggregate budget constraint within their network. As such, only aggregate consumption matters towards the household and therefore any idiosyncratic shock to income should not affect consumption of the household. The village is an ideal setting in which information asymmetries about idiosyncratic shocks can be overcome: due to the close proximity and knowledge of each other, it is hard for a household to freeride and act as if they are experiencing an idiosyncratic shock, while they are not. Similarly, enforcement problems are theorized to be no issue in the setting of a village, because close social pressure will prevent people from opting out of the risk sharing agreement. From a theoretical point of view, one could argue that idiosyncratic shocks can be fully insured against within the village.

However, empirically Townsend (1994) rejects the full insurance hypothesis for three villages in southern India. Many others find similar evidence (e.g. Deaton, 1992; Udry, 1994). In response to this empirical evidence, models of limited commitment have been developed that emphasize the fact that self-interested individuals will only participate in risk sharing agreements when these agreements are self-enforcing: a gift today is only provided when the participation constraint is met (Coate and Ravallion, 1993; Ligon et al., 2002; Karlan et al., 2009). Furthermore, coalition proof models of mutual assistance indicate that reciprocal arrangements are also bound in size (Ambrus et al., 2010; Genicot and Ray, 2003; Bold, 2009). Whether or not information asymmetries and enforcement problems can be overcome determine the efficiency level of the risk sharing agreement.

On the one hand, models of altruism or other-regarding preferences argue that an individual's utility depends positively on the utility of the individual with whom the risk is shared (Becker, 1976). These models originate from "sociobiology", which argues that the genes that survived are the ones that value the survival of the gene (Wilson, 1978). Following Foster and Rosenzweig (2001), altruism has the potential to alleviate self-enforcement constraints. Social norms cause the participants to experience a dissatisfaction from breaking the agreement, and therefore these participants are more likely to stick to the contract. As such, the participation constraint is less likely to bind in risk sharing agreements based on altruism and as a consequence these risk sharing agreements are more sustainable. In the context of extended families one might expect altruism to be more present and therefore risk sharing agreements to be more viable.

The theoretical models of mutual assistance therefore suggest that risk sharing will be at its most efficient among small and close-knit groups, where trust is high, information asymmetries are low, punishment mechanisms effective, and members care for one another (Cox and Fafchamps, 2007). These theoretical insights have been corroborated by recent empirical studies. Fafchamps and Lund (2003) show that risk sharing within social network that consists of friends and family use a combination of gifts, loans and assets sales as risk sharing mechanisms. Looking at overlapping social networks within a village, De Weerdt and Dercon (2006) fail to reject the full insurance hypothesis for food consumption, suggesting that certain shocks can be locally insured.

Beyond the effects on the efficiency of risk sharing agreements, motives are important in order to understand the interaction between informal institutions of risk sharing and public action. Leider et al. (2009) point to the example of microfinance: in communities where social ties are predominantly based on reciprocal motives, microfinance programs might work better because resources will be redirected towards efficient use. Moreover, it is relevant for understanding the potential crowding out effects of public action: one can argue that risk sharing agreements based on charity might be less likely to disappear after the initiation of a particular public action program.

In recent years a number of lab experiments have been undertaken that shed light on whether social interactions are predominantly altruistic or reciprocal. Leider et al. (2009) perform a lab experiment among Harvard undergraduates that are asked to give a certain amount of a sum of money to their social network. This giving can be decomposed into three components: (1) *baseline altruism* towards random strangers, (2) *directed altruism*, which indicates giving that favours friends over random strangers, and (3) *reciprocal giving* which constitutes giving that comes with an expectation of reciprocity. They find that directed altruism leads to bigger gifts in comparison to reciprocal giving. Using baseline altruism as the default, directed altruism leads to an increase in gifts of 52% in comparison with an increase of 24% with reciprocal giving.

However, whether the results from an online experiment among Harvard undergraduates can be generalized to the setting of risk sharing in developing countries can be questioned. To address this issue, Ligon and Schechter (2012) undertake a field experiment in fifteen villages in Paraguay in which a clever design of a dictator game allows for the identification of different types of motives. The variation in giving behaviour in the experiment can be compared to the variation in 'real-world' giving behaviour, which leads to the conclusion that 'real-world' giving is primarily motivated by the expectation of reciprocity.

While lab experiments lead to a very clean identification of motives, one can also test the predictions of the altruistic and reciprocal model using stylized facts. One example of such an approach is Blumenstock et al. (2014), who look at the impact of natural disasters on mobile money transfers in Rwanda. They find evidence in favour of behaviour motivated by reciprocity through three stylized facts: (1) strong history-dependence of transfers: individuals are more likely to transfer money to a particular individual when they received a transfer in the past from that individual; (2) wealthier individuals receive more transfers than poorer individuals; and (3) transfers decrease with geographic distance, indicating that monitoring costs seem to matter. While many have found reciprocal motives to dominate, others show the importance of altruistic motives in certain contexts. For example, De Weerdt and Fafchamps (2011) show that giving is not regressive and unreciprocated to fellow kin members: altruistic motives dominate. Therefore, the jury is still out on which motives dominate in which context.

In this paper I look at whether risk sharing occurs within the context of geographically spread extended families in rural Tanzania. I focus specifically on the channel of gifts as risk sharing mechanism. Since extended families are an example of a close-knit group, risk sharing might be more efficient and driven by altruistic motives. This is why I also look into the motives that drive risk sharing behaviour within extended families.

In order to investigate risk sharing in this context, I look at two types of shocks: idiosyncratic and aggregate. Moreover, I also look within the extended family at two distinct groups that are geographically apart: non-migrated households that stayed behind in the baseline village and migrated households. These groups might be able to respond to differently to the two types of shocks. Villages or social networks that are in close proximity to the affected household are unable to deal with aggregate shocks. Since aggregate shocks, by definition, affect the community as a whole within a certain geographic area, local risk sharing agreements are not feasible. Instead, families that live far away from each other might be able to help each other out in times of aggregate shocks. Through social norms, enforcement problems within the family can be overcome. In addition, the information about aggregate shocks is less private and therefore information asymmetries might be less problematic. However, information asymmetries about idiosyncratic shocks continue to exist. Monitoring of idiosyncratic shocks becomes more difficult, because of the increased distance between households. Therefore, sharing of idiosyncratic shocks within extended families might be less sustainable in comparison with a local community such as a village. However, the extended family should be able to insure against aggregate shocks.

Finally, the motives behind risk sharing within an extended family might differ, depending on the geographical location of the group that is giving the gift and the type of shock. As the results show, I do indeed find that different motives drive migrated and non-migrated to give in response to different type of shocks.

3 Data

The Kagera Health and Development Survey (KHDS) has been administered in Kagera, a region in Northwestern Tanzania, which borders with Burundi, Rwanda and Uganda. Kagera is predominantly rural and more than 80% of the economically active population works in agriculture (URT, 2012). The main food crops produced are bananas, beans, maize and cassava. The KHDS was first undertaken jointly by the World Bank and the Muhimbli University College of Health Sciences. It covers a wide range of topics, including consumption, transfers and demography (World Bank, 2004, World Bank, 2010).

The KHDS has been widely used in the field of migration and development, because of its unique and highly successful tracking feature. In the first four rounds, which took place between 1991 and 1994, 915 households from 51 villages were interviewed. In 2004 and 2010 the surveyors attempted to reinterview all individuals that were part of these baseline households. Because households split up over such an extended period of time (e.g. the daughter in the family got married and started living with her husband), the sample expanded significantly. This resulted in a sample of over 2,700 in 2004 and 3,300 households in 2010. Tracing individuals from the baseline households was extremely successful, with a reinterview rate of 93% and 92% respectively in 2004 and 2010. Since significant migration took place among the reinterviewed households, this survey is particularly suitable for answering the question of risk sharing within geographically spread extended families.

In order to perform the analysis, several households are dropped. Firstly, because I want to use a panel from both 2004 and 2010, only households that are interviewed in both years are used. This leads to a final sample of 3,313 households, that together are part of 805 distinct extended family networks. Of these 3,313 households, 42% is migrated in 2004 and 51% is migrated in 2010. I define households as migrated when they do not live in the baseline village anymore. In certain cases the behaviour of migrated households within the extended family is analysed in response to the circumstances of the non-migrated households within the same extended family or vice versa. In order to do so, only extended families that have both migrated and non-migrated households are used. This further reduces the sample to 2,710 households that are part of 615 extended family networks.

Additionally, rainfall data is used in order to construct rainfall shock measures that serve as the main indicator of aggregate shocks. The data includes rainfall for each day (measured in millimetres) for the period 1980 - 2010 for ten weather stations close to the 51 baseline villages. Each village is matched with the closest weather station for the non-migrated sample. Additionally, rainfall data from 79 weather stations over the same period close to migrated households is used to construct similar measures for the migrated sample.

4 Econometric strategy

In order to structure the paper, this section as well as the results section consists of four main blocks that logically follow each other. First, I use the Townsend test to investigate the potential of risk sharing within the extended family. Secondly, I ask whether gifts are a potential risk sharing mechanism. These two sections culminate into the third section, which attempts to investigate whether gifts are used within extended families as a risk sharing mechanism. Lastly, I ask the 'why' question: do households within these extended families share risk purely out of altruistic reasons or is there some expectation of reciprocity? Besides these blocks, this section also includes a discussion of the identification strategy used.

4.1 Townsend test

As an initial test of whether extended family networks matter, I use a modified Townsend (1994) full insurance test, based on De Weerdt and Hirvonen (2013):

$$c_{ijt} = \alpha_0 + \beta s_{ijt} + \gamma \mathbf{X_{ijt}} + \alpha_{jt} + \varepsilon_{ijt} \tag{1}$$

in which c_{ijt} is consumption of household i that is part of extended family j at time t, s_{ijt} the shock experienced by household i, $\mathbf{X_{ijt}}$ a vector of household controls[1], α_{jt} network or village fixed effects, and ε_{ijt} the error term. In order to test whether extended family networks matter for risk sharing, I run this specification without any fixed effects, with village fixed effects and with extended family fixed effects. I hypothesize $\beta = 0$: shocks have no impact on consumption under full insurance. I test the full insurance hypothesis for both aggregate and idiosyncratic shocks.

4.2 Gifts as risk sharing mechanism

Having established that extended family network seem to play some role in risk sharing, I look into the specific mechanism of risk sharing: gifts. I use a specification that has been proposed by Fafchamps

[1] This vector includes the following variables: number of adults, number of children, whether the household head is female, the age of the household head, the education of the household head, the number of females, the percentage of household members that is educated, the average age of the household members, whether or not the household is migrated and the value of land, livestock and durable assets.

and Lund (2003):

$$g_{ijt} = \alpha_0 + \beta s_{ijt} + \gamma \mathbf{X_{ijt}} + \alpha_{jt} + \varepsilon_{ijt} \tag{2}$$

in which g_{ijt} is the amount of net gifts received by household i. In order to fully understand the dynamics of gifts, I also look at the amount of gifts received and given separately. Since the rest of the analysis focuses on extended family networks, α_{jt} constitutes extended family fixed effects (however, these are replaced by household fixed effects when idiosyncratic shocks are analysed, see section 4.5). Again, I look at the effect of aggregate and idiosyncratic shocks. I expect households to receive more gifts when they experience economic difficulties, i.e. $\beta > 0$.

4.3 Risk sharing through gifts within the extended family

In order to investigate whether gifts are also used within extended families as a mechanism through which risk is shared, I use the following specification, which is based on a setup of Fafchamps and Lund (2003):

$$g_{ijt} = \alpha_0 + \beta s_{ijt} + \eta s_{jt} + \gamma \mathbf{X_{ijt}} + \alpha_{jt} + \varepsilon_{ijt} \tag{3}$$

in which s_{jt} is the shock experienced by the extended family j of household i. When experiencing difficulties themselves, I expect households to receive more gifts (or, by symmetry, give less gifts), i.e. $\beta > 0$. However, the key hypothesis concerns the response of households towards network shocks: I expect households to increase the amount of gifts given (i.e. reduce net gifts received) when the extended family experiences a shock, i.e. $\eta < 0$.

4.4 Exploring heterogeneity to uncover motives

Using a similar approach as Blumenstock et al. (2014), I gain a better understanding of the motives behind sharing in extended families by looking across different heterogeneities. In particular, I look at two heterogeneities: distance and wealth. The following specification is used:

$$g_{ijt} = \alpha_0 + \beta s_{ijt} + \eta s_{jt} + \upsilon z_{ijt} + \delta_1 z_{ijt} s_{ijt} + \delta_2 z_{ijt} s_{jt} + \gamma \mathbf{X_{ijt}} + \alpha_{jt} + \varepsilon_{ijt} \tag{4}$$

in which z_{ijt} is the heterogeneity (i.e. distance or wealth). The interaction between shocks and the heterogeneity, i.e. δ_1 and δ_2, tells us something about the motives behind risk sharing.

Concerning distance, the model of Blumenstock et al. (2014) only yields predictions about the effect of an aggregate shock (i.e. earthquake) on gift giving across space. However, it does not provide any guidance concerning idiosyncratic shocks.

In this sample, however, model predictions with regards to distance ought to be augmented to take into account the different nature of the shocks. The geographically correlated nature of aggregate shocks implies that risk sharing can only occur across distance. A positive interaction effect with distance does not necessarily have to reflect altruistic or reciprocal behaviour: it simply reflects the fact that households that live further away are affected by different aggregate shocks and are therefore more able to help. It does not tell us much about the willingness to help and for that reason distance as heterogeneity is not very useful in distinguishing between models.

However, under altruism, distance should not affect the extent to which someone receives or gives gifts, i.e. $\delta_1 = 0$ and $\delta_2 = 0$. Reciprocal models suggest that households that live further away from the baseline village to receive less gifts, i.e. $\delta_1 > 0$. Concerning δ_2, I should note that distance in this regression means the average distance of the network away from the baseline village. Under reciprocity, networks that live further away are less able to monitor whether the recipient of the gift actually experiences the idiosyncratic shock an is therefore expected to receive less gifts, i.e. $\delta_2 > 0$.

Fortunately, heterogeneity across wealth can be compared to clear predictions from both models for both type of shocks and therefore provides a clean test. Altruistic models predict that wealthier household are more likely to transfer money to poorer households, because the marginal utility from this amount of money is higher for the poorer households, i.e. $\delta_1 < 0$, but give more when their network experiences a shock, i.e. $\delta_2 < 0$. Reciprocal models predict richer households to receive more in case of hardship, i.e. $\delta_1 > 0$ and give less when their extended family experiences a shock, i.e. $\delta_2 < 0$, because, following Blumenstock et al. (2014), "the continuation value of a relationship is, all else equal, higher with a wealthy person whose participation constraint is less likely to bind in the future." (p. 21).

I have used lags of several variables that proxy wealth. I use the value of durable assets, land and livestock, as well as consumption as an indicator of wealth. Since contemporaneous measures of wealth are likely to be affected themselves by the incidence of shocks, we use lagged measures instead. The lags are over a long period (i.e. 1991-1994 for the wave 2004, and 2004 for the wave 2010), which should solve any endogeneity concerns.

4.5 Identification strategy

Idiosyncratic shock measures[2] are prone to endogeneity. Reporting shocks is likely to be correlated with coping strategies: households that actually reported a shock are more likely to have not been able to deal with the shock, while household that did experience a shock but did not report it are expected to have had adequate coping mechanisms.

[2]Idiosyncratic shock is a binary variable, which is 1 if any of the following shocks is reported by the household: death of family member, serious illness, loss of assets, eviction/resettlement, off-farm employment, wage employment, livestock or loss in gifts and support by organisations.

In order to deal with this, I use household fixed effects rather than extended family fixed effects in the regressions that test the effect of idiosyncratic shocks. This controls for any potential time-invariant household unobservables that are correlated with the likelihood of experiencing or reporting a self-reported shock. Additionally, the vector of control household variables included in the main regressions controls for any observed confounding variables. This reduces the endogeneity problem to time-variant unobservables. Unfortunately, no feasible method is available to control for these time-variant unobservables. Being unable to deal completely with endogeneity of idiosyncratic/harvest shock measures is acknowledged as a limitation of the analysis.

I would like to argue that using rainfall as an aggregate shock measure in itself is a valid identification strategy, because it is exogenous. 80% of the economically active population in Kagera works in the agricultural sector URT (2012). Since a majority of the population are subsistence farmers, a negative shock to rainfall has to lead to a reduction in income, but is expected to be uncorrelated with potential measurement error in the outcome variable (i.e. consumption per capita or gifts given/received). The rainfall shock measure used in the main analysis is constructed based on De Weerdt and Hirvonen (2013). Kagera experiences two rainy season throughout the year: a long one between March and May and a shorter one between October and December. I compute average monthly z-score deviations during the two rainy seasons before the interview took place. Positive z-scores are truncated to zero, because positive rainfall shocks have less effect due to an agricultural production focus on tree crops and the relative undulating characteristic of the terrain. I will use rainfall shocks and aggregate shocks as synonymous.

Instead of using rainfall shocks, self-reported harvest shocks could also be used. However, these measures are probably endogenous. Following De Weerdt and Hirvonen (2013), rainfall shocks can be used as an instrument for these self-reported shock measures. Since there is no variation at the village level, the rainfall shock measures are correlated with the head's age, gender and education, yielding a total of three instruments. Rainfall is correlated with these variables in order to reflect that households are affected differently by rain. However, as shown in the results section, these instruments are both individually and jointly weak.

5 Results

Before getting into the econometric results, I briefly look at some of the descriptive statistics, separately for the non-migrated and migrated sample (Table 1). Possibly most important to this analysis is the observation that migrated households report less shocks, but also objectively experience smaller rainfall shocks on average. Moreover, migrated households have a much higher consumption. In terms of wealth, while non-migrated households have more land and livestock, migrated households have more than triple the value of assets on average. These stylized facts support the notion that migration leads to an improvement in living standards and a reduction in uncertainty, as pointed out by Beegle et al. (2011).

Table 1: Descriptive statistics

	Non-migrated sample		Migrated sample	
Variable	Mean	Std. Dev	Mean	Std. Dev.
Rainfall shock hh	0.349	0.299	0.224	0.257
Self-reported shock hh	0.404	0.491	0.323	0.468
Idiosyncratic shock hh	0.083	0.276	0.056	0.23
Consumption per adult	431,112	306,073	661,959	603,888
Owning a bankaccount	0.114	0.317	0.25	0.433
Value of land*	1,918,329	2,815,593	1,156,423	1,956,609
Value of livestock*	8,572	17,557	6,173	14,743
Value of assets*	78,924	125,922	239,221	433,292
# of adults	2.884	1.535	2.505	1.343
# of children	2.466	1.904	2.164	1.821
Household size	5.349	2.757	4.669	2.578
Female household head	0.276	0.447	0.178	0.38
Educated household head	0.819	0.385	0.904	0.295
Age household head	47.185	17.61	38.524	14
Attended school	0.792	0.255	0.842	0.24
# of females	0.512	0.222	0.494	0.254
Average age household	24.64	11.967	21.904	9.275
Sample size	3,326		2,898	

* Trimmed 95%

5.1 Townsend test

In order to shed some light on the importance of extended family networks in risk sharing agreements, I use the Townsend (1994) test. While these results are informative, I only use them as suggestive evidence and as a motivation to further look into the insurance role of extended families.

Table 2: Townsend test

	(1)	(2)	(3)	(4)
	OLS	OLS	OLS	OLS
Self-reported shock hh	-34957.4***	-44573.2***	2509.4	-17718.3*
	(-2.80)	(-4.58)	(0.20)	(-1.70)
Extended family dummies	Yes	No	Yes	No
Village dummies	No	Yes	No	Yes
Household controls	Yes	Yes	Yes	Yes
F-statistic	331.87	953.52	1.6e+06	5.0e+10
Observations	6104	6104	3272	3272
Adjusted R^2	0.362	0.415	0.467	0.273

t statistics in parentheses

Notes: The outcome variable is consumption per capita (TZS). Column (1) and (2) refer to the full sample, column (3) and (4) to the non-migrated sample. Standard errors in column (1) and (3) are clustered at the extended family level. Standard errors in column (2) and (4) are clustered at the village level. The constant term is not displayed.

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

Table 2 tells a clear story: extended families play an important role in risk sharing. For both the full sample and the non-migrated sample the full insurance hypothesis is rejected when the village is assumed to be the main insurance unit (column 2 and 4). While the full insurance hypothesis is also rejected for the full sample when the extended family is used as insurance unit (column 1), I fail to reject full insurance for the non-migrated sample (column 3). This suggests that the extended family is particularly important for the non-migrated households. These regressions test the effect of self-reported overall shocks on consumption per capita. When consumption per adult equivalent[3] is used instead, the results are different but not less suggestive of the importance of extended family networks: full insurance is rejected for all models and households in the full sample actually experience an increase in consumption when extended families are taken into account.

Table 3: Townsend test, separately for idiosyncratic and aggregate shocks

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	OLS	OLS
Rainfall shock hh	-37594.4***	-148163.6***	-113109.8***	27990.3**	-120841.5***	-115851.1***
	(-3.39)	(-8.68)	(-6.40)	(2.13)	(-5.20)	(-4.22)
Idiosyncratic shock hh	-7227.8	-7476.4	-4838.1	3151.7	-6557.8	1371.8
	(-0.63)	(-0.48)	(-0.39)	(0.25)	(-0.36)	(0.09)
Extended family dummies	No	Yes	No	No	Yes	No
Village dummies	No	No	Yes	No	No	Yes
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5799	5799	5799	3216	3216	3216

t statistics in parentheses

Notes: The outcome variable is consumption per capita (TZS), which is trimmed 95%. This is a consolidated table: the shock coefficients are from separate regressions. Column (1) - (3) refer to the full sample, column (4) - (6) to the non-migrated sample. Standard errors in column (1) and (4) are clustered at the household level. Standard errors in column (2) and (5) are clustered at the village level. Standard errors in column (3) and (6) are clustered at the extended family level. The constant term is not displayed.

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

Next I distinguish between aggregate and idiosyncratic shocks, as is done in Table 3. This is a consolidated table that reports the shock coefficients of idiosyncratic and aggregate shocks from separate regressions. Another important clue for the analysis is presented: idiosyncratic shocks are rather 'weak', while aggregate shocks lead to clear reduction in consumption. Full insurance against aggregate shocks is rejected for all samples, whether or not I use the village or the extended family as insurance unit. Idiosyncratic shocks appear to have no effect on consumption. This 'weak' effect persists after taking into account the insurance role of the village and the extended family. While these results point less clearly to the critical insurance role of the extended family, it is suggestive of the particular importance of aggregate shocks.

5.2 Gifts as risk sharing mechanism

Having established that extended families seem to play a role in risk sharing, the next step is to investigate a specific mechanism that could be at work, in this case gifts. Before looking into whether gifts are used within the extended family, I need to show that gifts are used more generally as a risk sharing mechanism.

While households receive more when they experience a shock, they also give away more: the net effect of receiving gifts is only sufficiently big for aggregate shocks. For rainfall shocks, the main indicator of aggregate shocks, both gifts received (column 4) and gifts given (column 7) increase, with the net

[3] Consumption per capita is transformed into consumption per adult equivalent by using the sex-age weights proposed by Townsend (1994).

effect begin positive and significant (column 1): households do actually receive more gifts on balance when they experience an aggregate shock. While idiosyncratic shocks also lead to an increase in gifts received and given (column 4 and 7 respectively), the net effect is not significantly positive (column 1): households seem to redistribute all the gifts they receive when they experience an idiosyncratic shock.

Table 4: Gifts in times of economic difficulty

	Net gifts received			Gifts received			Gifts given		
	FE	FE	IV	FE	FE	IV	FE	FE	IV
Rainfall shock hh	7873.5***			19831.6***			13067.6***		
	(2.69)			(7.69)			(8.23)		
Idiosyncratic shock hh	-245.2			6970.9***			3922.8**		
	(-0.09)			(2.64)			(2.38)		
Self-reported harvest shock hh		-1623.1	415399.5**		1730.8	902280.3**		150.4	612469.8*
		(-0.51)	(2.03)		(0.51)	(2.20)		(0.07)	(1.96)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap rk Wald F statistic			2.236			2.268			1.895
Observations	5895	5895	5895	5895	5895	5895	5894	5894	5894
Adjusted R^2	0.007	0.004		0.043	0.014		0.051	0.019	

t statistics in parentheses

Notes: All outcome variables are trimmed 95%. The full sample is used. All regressions use household fixed effects and standard errors are clustered at the household level. The constant term is not displayed.

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

Since I look at idiosyncratic and rainfall shocks simultaneously, I am using household fixed effects in order to properly identify the effect of the idiosyncratic shock. I use household fixed effects for the idiosyncratic shocks, but since rainfall shocks are uncorrelated with household unobservables, extended family fixed effects will suffice for these shocks. Nevertheless, all results are robust to using household fixed effects for all types of shocks.

In addition to rainfall as an aggregate shock measure, I also look at self-reported harvest shock measures instrumented with rainfall shocks that are interacted with several demographic variables, following De Weerdt and Hirvonen (2013). As pointed out in section 4.5, these instruments are potentially valid. However, the low Kleibergen-Paap rk Wald F statistic indicates that there is a lack of instrument relevance. This is the case when I use all instruments jointly, separately, but also when I just use rainfall shocks as sole instrument.

When looking separately at migrated and non-migrated households, as is done in Table 5, I observe some additional patterns. While gift receiving and giving increases in response to aggregate shocks for both samples, only the non-migrated households keep some of the gifts on balance. The migrated households redistribute the full amount of gifts received. For idiosyncratic shocks, households that did not migrate received zero net gifts. Migrated households do not receive additional gifts when they experience an idiosyncratic shocks. A potential explanation for the absence of additional gifts received in response to idiosyncratic shocks for migrated households might be due to a lack of a responsive local community. While non-migrated households still have extended family living close to them in their village, migrated households do not have access to such close family. An additional argument could be that some of the migrated households only moved recently and have therefore not build up a strong social network around them (yet), outside of the family.

Table 5: Gifts in times of economic difficulty, separately for non-migrated and migrated sample

	(1) Net received	(2) Received	(3) Given	(4) Net received	(5) Received	(6) Given
Rainfall shock hh	12516.5***	28524.0***	17446.6***	2049.0	11085.4***	9186.5***
	(2.84)	(7.27)	(6.87)	(0.43)	(2.71)	(3.49)
Idiosyncratic shock hh	-3564.1	7131.8*	4927.5*	75.01	1699.2	1940.1
	(-0.89)	(1.83)	(1.86)	(0.02)	(0.49)	(0.78)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3154	3156	3154	2740	2743	2742
Adjusted R^2	0.023	0.073	0.076	0.012	0.026	0.030

t statistics in parentheses

Notes: All outcome variables are trimmed 95%. The non-migrated sample is used in column (1) - (3) and the migrated sample is used in column (4) - (6). All regressions use household fixed effects and standard errors are clustered at the household level. The constant term is not displayed.

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

5.3 Risk sharing through gifts within the extended family

I now explore how individual household's net gift receiving not only responds to the incidence of own shocks, but also to the incidence of shocks to their extended family networks. The results are presented in Table 6 for aggregate shocks and in Table 7 for idiosyncratic shocks.

Table 6: Net gifts received in response to aggregate network shocks

	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE
Rainfall shock hh	22258.5***	4299.1	20585.6	10391.4*	11778.4*
	(4.35)	(0.28)	(1.42)	(1.80)	(1.83)
Rainfall shock network, except i	-15599.5***	6785.7		-10582.3	
	(-3.09)	(0.46)		(-1.64)	
Rainfall shock migrated network			-6379.1		
			(-0.43)		
Rainfall shock non-migrated network					-11358.7
					(-1.64)
Household controls	Yes	Yes	Yes	Yes	Yes
Observations	5666	2991	2310	2667	2243
Adjusted R^2	0.017	0.017	0.023	0.009	0.010

t statistics in parentheses

Notes: The outcome variable is the amount of net gifts received, which is trimmed 95%. Column (1) uses the full sample, column (2) and (3) use the non-migrated sample, and column (4) and (5) uses the migrated sample. All regressions use extended family fixed effects and standard errors are clustered at the extended family level. The constant term is not displayed.

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

For the full sample significant risk sharing of aggregate shocks is occuring within the extended family (column 1), which seems mostly driven by migrated households giving to affected non-migrated households (column 5), an effect that is close to significant with a t statistic of -1.64. Migrated households also seem to increase gifts to fellow migrated households, since an aggregate shock to the overall network also leads to an increase in gifts given (again, close to significant with a t statistic of -1.64). The positive net effect is the result of a bigger increase in gifts given than gifts received. Non-migrated do not give additional gifts when their migrated households experiences a shock (column 3). Thus, risk sharing of aggregate shocks seems to be an asymmetric insurance scheme: migrated households insure non-migrated households but not vice versa.

However, the opposite asymmetry is true for idiosyncratic shocks: non-migrated households insure migrated households against idiosyncratic shocks, as shown by Table 7. In the full sample, net gift giving increases (i.e. net gift receiving decreases) in response to a network shock (column 1), which is driven by non-migrated households giving to affected migrated households (column 3).

Table 7: Net gifts received in response to idiosyncratic network shocks

	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE	(7) FE
Idiosyncratic shock hh	3412.6	-436.3	-1338.6	-2479.6	-71.07	-630.8	585.4
	(1.14)	(-0.10)	(-0.33)	(-0.55)	(-0.02)	(-0.19)	(0.17)
Idiosyncratic shocks network, except i	-2896.7**	-878.6			-1067.3		
	(-2.48)	(-0.54)			(-0.57)		
Idiosyncratic shocks migrated network			-7146.3*			1533.0	
			(-1.68)			(0.42)	
Idiosyncratic shocks non-migrated network				964.7			-1667.7
				(0.60)			(-0.78)
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5625	3064	3147	3064	2549	2549	2740
Adjusted R^2	0.007	0.014	0.019	0.014	0.017	0.017	0.012

t statistics in parentheses

Notes: The outcome variable is the amount of net gifts received, which is trimmed 95%. Column (1) uses the full sample, columns (2) - (4) use the non-migrated sample, and columns (5) - (7) use the migrated sample. All regressions use household fixed effects and standard errors are clustered at the household level. The constant term is not displayed.

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

While previous regressions (see section 5.2) show that in general migrated households receive less gifts when they experience an idiosyncratic shock, these results demonstrate that this is not due to unresponsive behavior of the extended family: the non-migrated extended family increases the amount of gifts given. However, these extended family members are not able to fully compensate for the loss of gifts that is potentially due to a weak local community network of the migrated households.

Overall, two main patterns stand out:

Pattern 1: When non-migrated households experience an aggregate shock, the migrated extended family helps out by increasing gifts.

Pattern 2: When migrated households experience an idiosyncratic shock, the non-migrated extended family helps out by increasing gifts.

5.4 Exploring heterogeneity to uncover motives

This section attempts to understand the underlying motives for risk sharing within extended families by comparing altruistic and reciprocal models across two heterogeneities: distance and wealth. Taken together, these two heterogeneities suggest that migrated household give to non-migrated household when they are affected by idiosyncratic shocks because of altruistic reasons. On the other hand, non-migrated households give to migrated households because of reciprocal reasons, when these migrated households experience an aggregate or idiosyncratic shock.

5.4.1 Distance

While distance is an important factor in risk sharing agreements, it is hard to uncover what the underlying motives behind risk sharing across space could be. Table 8 shows the regression results: the migrated sample is analysed in columns (1) and (2), and the non-migrated sample in columns (3) and (4). In order to analyse heterogeneities, I interact shocks with distance.[4] To aid the interpretation of the interaction term I use the demeaned version of the distance variable.

The heterogeneity is interacted with two types of shocks: the household shock and the network shock. An important difference exists between the two. The interaction term with the network points more clearly towards the giving behaviour of household i. The interaction term with the household can only lead us to speculate about the potential role of the network: it only indicates what the household receives, not from who.

If household i has reciprocal preferences, I expect the distance interaction term with the network shock to be positive: the further away the extended family lives away, the less will be given by the household. At the same time, if networks behave reciprocally, I expect the interaction term with distance to be negative: net gifts received by household i from its network will be reduced across distance. In case of idiosyncratic shocks and altruistic giving, distance should not have an effect on gift giving, so both interaction terms are expected to be insignificant.

When looking at the response of migrated households to aggregate shocks (column 1), I find that households that live further away and that are affected by an aggregate shock receive more gifts (close to significant with a t statistic of -1.61). This could merely reflect the fact that households that live further away from the baseline village are not affected by the same aggregate shocks as the non-migrated households that are therefore more able to help. As such, it does not provide conclusive evidence.

A more relevant and cleaner identification of motives follows from looking at the behaviour of the non-migrated sample, in particular pattern 2: how do non-migrated households respond to idiosyncratic shocks experienced by migrated household (column 4)? I find that the further away a household lives,

[4] In the case of the migrated sample, this is the distance to the baseline village, whereas in the non-migrated sample, this is the average distance of the migrated network to the baseline village.

the less gifts it receives from the baseline village. The behaviour of non-migrated households is in line with models that emphasise monitoring costs as a barrier to reciprocal relations.

Table 8: Heterogeneous net gift receiving across distance

	(1) FE	(2) FE	(3) FE	(4) FE
Distance	7.923	-44.58**	-42.29*	-7.423
	(0.76)	(-2.38)	(-1.70)	(-0.39)
Rainfall shock hh	3529.6		23492.7	
	(0.43)		(1.33)	
Idiosyncratic shock		543.0		4246.0
		(0.11)		(0.67)
Rainfall shock hh × Distance	-69.74		36.21	
	(-1.61)		(0.58)	
Idiosyncratic shock × Distance		1.190		-21.24
		(0.09)		(-0.57)
Rainfall shock non-migrated network	-8885.7			
	(-1.01)			
Idiosyncratic shocks non-migrated network		-4808.5		
		(-1.45)		
Rainfall shock migrated network			-1229.5	
			(-0.07)	
Idiosyncratic shocks migrated network				-8190.9
				(-1.60)
Rainfall shock non-migrated network × Distance	-5.290			
	(-0.21)			
Idiosyncratic shocks non-migrated network × Distance		-35.41		
		(-1.18)		
Rainfall shock migrated network × Distance			116.7	
			(1.12)	
Idiosyncratic shocks migrated network × Distance				56.96*
				(1.71)
Household controls	Yes	Yes	Yes	Yes
Observations	2168	2324	2295	2297
Adjusted R^2	0.010	0.023	0.021	0.016

t statistics in parentheses

Notes: The outcome variable is the amount of net gifts received, which is trimmed 95%. Column (1) and (2) refer to the migrated sample and column (3) and (4) refer to the non-migrated sample. In regression (1), distance is defined as the distance of the household to the baseline village, while distance is defined in regression (2) as the average distance of the migrated network to the baseline village. Regression (1) uses extended family fixed effects and standard errors are clustered at the extended family level. Regression (2) uses household fixed effects and standard errors are clustered at the household level. The constant term is not displayed.

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

5.4.2 Wealth

Since distance only provides some evidence in favour of reciprocal motives that explain pattern 2, I also look at heterogeneous effects across wealth. Similar regressions are run for wealth. For sake of clarity and parsimony, instead of reporting the full regressions, I only report the interaction terms with the network shock: Table 9 for the migrated sample and Table 10 for non-migrated sample. The interaction terms with household shocks are less direct evidence and do not provide clear evidence.

Heterogeneity across wealth is analysed by looking at four variables: the value of durable assets, land, livestock and consumption. Each of these categories are looked at in an absolute and relative sense. While the absolute variable is simply the value of the wealth category, the relative variable expresses this value relative to the extended family. Thus, negative values indicate a below-average wealth and positive values indicate an above-average wealth. As explained in section 4.5, lagged values are used in order to address endogeneity concerns.

Table 9: Heterogenous net gift receiving for migrated households across different indicators z of wealth

	(1) Assets	(2) Land	(3) Livestock	(4) Consumption
Rainfall shock				
Non-migrated network × Abs. z	0.00999	-0.00328	0.428	0.0355
	(0.19)	(-0.42)	(1.26)	(1.09)
Non-migrated network × Rel. z	-0.000000132*	6.27e-08	-0.00000365	0.0154
	(-1.78)	(1.25)	(-1.40)	(0.48)
Idiosyncratic shock				
Non-migrated network × Abs. z	0.0101	0.00581*	0.0627	-0.0154
	(0.31)	(1.66)	(0.81)	(-0.92)
Non-migrated network × Rel. z	-0.000000164***	-0.000000242***	-0.000000508	-0.00349
	(-3.85)	(-14.11)	(-0.28)	(-0.26)

t statistics in parentheses

Notes: The outcome variable is the amount of net gifts received, which is trimmed 95%. All heterogeneities are trimmed 95%. The migrated sample is used. All regressions use household fixed effects and standard errors are clustered at the household level.

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

The clearest evidence from Table 9 points at altruism: migrated households that are relatively rich give more in response to idiosyncratic shock of their non-migrated network (column 1 and 2, last row). Thus, gift giving is progressive within the extended family, suggesting that money is sent to households that have a higher marginal utility from the additional sum of money. While other heterogeneities are sometimes significant as well, the evidence is not pointing in one direction for a specific shock or heterogeneity.

The evidence on the non-migrated households point in the exact opposite direction: they behave reciprocally. Several pieces of evidence stand out, most clearly that richer non-migrated households give less to migrated extended family that experiences an idiosyncratic shock. In addition, richer households (in an absolute sense) give less gifts when the extended family is hit by a rainfall shock. Thus, the evidence for the non-migrated households points towards reciprocal behaviour across all types of shocks. This is also in line with the evidence found in the previous section on distance.

Table 10: Heterogenous net gift receiving for non-migrated households across different indicators z of wealth

	(1) Assets	(2) Land	(3) Livestock	(4) Consumption
Rainfall shock				
Migrated network × Abs. z	-0.0316	0.0117	0.992**	0.127**
	(-0.12)	(1.01)	(2.39)	(2.54)
Migrated network × Rel. z	1.93e-08	7.81e-08	2.90e-08	0.0876
	(0.04)	(0.86)	(0.89)	(1.14)
Idiosyncratic shock				
Migrated network × Abs. z	0.157**	0.0131***	0.241**	0.0682***
	(2.22)	(3.37)	(2.17)	(4.65)
Migrated network × Rel. z	0.000000104**	6.92e-08***	-0.000000191	0.0306
	(1.97)	(5.29)	(-0.16)	(1.41)

t statistics in parentheses

Notes: The outcome variable is the amount of net gifts received, which is trimmed 95%. Both absolute and relative heterogeneity are trimmed 95%. The non-migrated sample is used. All regressions use extended household fixed effects and standard errors are clustered at the household level.

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

6 Discussion

The contribution of this paper is twofold. The first contribution consists of showing that risk sharing within geographically spread extended families occurs through two distinct patterns. Firstly, when non-migrated households experience an aggregate shock, migrated household help out by increasing gifts. It is more likely that idiosyncratic shocks are insured against by fellow village members, as they have lower monitoring costs. However, these village members are not able to help out in times of aggregate shocks, since they are affected as well: this is where the extended family can play a role.

Secondly, while non-migrated household do not reciprocate this form of insurance in the case of aggregate shocks, they do send more gifts to non-migrated households when the non-migrated households experience an idiosyncratic shock. This can be better understood in a context where these households have moved away from their baseline village to a village or community in which they do not have many social contacts (yet). Normally the local community is able to provide a household with help in case of idiosyncratic shocks. The non-migrated households are in an ideal situation to help out the migrated households that have a (temporary) lack of social contacts in close proximity.

The second main contribution is providing evidence about the motives behind risk sharing in the context of geographically spread extended families. While non-migrated households behave reciprocally, migrated households behave in an altruistic manner. I can only speculate why there might be such differences between households. Non-migrated household might behave reciprocally, because their lives are characterized by more risk and lower incomes in comparison with the migrated households: staying in these type of risk sharing agreements is potentially more important to the non-migrated. Migrated households on the other hand have experienced a significant improvement of their welfare, but uncertainty is a less important factor. As a consequence, risk sharing within the family is not as crucial: the improved environment implies that the participation constraint is no longer met. However, their altruistic motives, which are possibly driven by social norms or the avoidance of social sanctions, ensure that risk sharing still occurs (Platteau, 2012). The latter finding also fits within the literature that shows how non-migrated communities impose a so-called "kin-tax" on the migrated households. For example, Baland et al. (2011) find that migrated household conceal their incomes through additional borrowing in order to avoid social pressure to increase assistance to others.

An important issue that has not been part of the analysis is the endogeneity of the decision to migrate as a household. While much of the literature has focused on establishing causal links between migration and welfare, this in itself is not the goal of this paper. Similar to De Weerdt and Hirvonen (2013), I would like to point out that the goal of this paper is not to analyse who migrates and why. Instead, it describes what happens to informal risk sharing institutions after migration has occurred. Nevertheless, understanding the underlying motives behind migration and who gets selected into migration is an interesting avenue of further research.

7 Conclusion

This paper adds to the literature that is at the cross-section of migration and development. In particular, I look at how risk sharing occurs within geographically spread extended families. Using KHDS data, I find that gifts are an important mechanism through which risk is shared in two distinct patterns: while migrated households insure family that stays behind against aggregate shocks, these non-migrated households send money to migrated family in case they experience an idiosyncratic shock. Even though most of the recent research has found that reciprocal motives dominate social interaction, one might expect risk sharing agreements within extended families to exhibit more altruism. I do indeed find that migrated households response to idiosyncratic shocks in the network seems to be mostly driven by altruistic motives, while non-migrated households seem to behave reciprocally to both idiosyncratic and aggregate shocks in the network.

One of the main directions of future research is further unraveling the motives behind risk-sharing. Even though recent lab experiments lead to a very clean identification of these motives, relating behaviour simulated in the lab to real-life risk sharing is an important next step. Moreover, developing models that lead to clear predictions about the underlying motives of behavior could move the research frontier. Finally, while there is a rich literature on risk sharing and migration, less is known about the interaction between migration policy and informal institutions of risk sharing. Experimental evidence might lead to policy-relevant recommendations.

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