Liquidity constraints and risk sharing in rural Ethiopia

Iritani, Satoko

Daito Bunka University

6 March 2025

Liquidity constraints and risk sharing in rural Ethiopia

Running title: Liquidity constraints and risk sharing

Satoko Iritani*

Department of Economics, Toyo University

*For correspondence:

Tel.: +81 3 3945 8592

E-mail: iritani@toyo.jp

Address: Faculty of Economics, Toyo University, 5-28-20 Hakusan, Bunkyo-ku, Tokyo, 112-8606, Japan

ABSTRACT

This study examines the degree of consumption smoothing achieved through lending via formal institutions and social networks in rural Ethiopia. Lending through social networks and the formal sector coexist currently in rural sub-Saharan Africa. The expansion of formal sector lending is expected to ease liquidity constraints in rural areas and may even complement or crowd out traditional network lending. Using panel data for the period from 1994 to 2009 in rural Ethiopia, I found that idiosyncratic shocks were partially alleviated through lending via both social networks and formal lending institutions. However, non-borrower households in financially less constrained villages experienced severe risks. Also, formal sector lending did not alleviate aggregate rainfall shocks during this survey period, implying that formal sector lending does not complement social network lending.

Keywords: insurance; informal credit; social networks; consumption smoothing; Ethiopia; Africa; liquidity constraints

JEL classification codes: E21, O12, O16, O17, Z13

1 INTRODUCTION

When insurance markets are missing, destocking assets, savings (inter-temporal smoothing), and risk sharing among households (inter-state smoothing) are the only options available for affected households to *ex-post* smooth consumption. Financial inclusion is still very low in Ethiopia, as the rural population does not have coverage because formal financial institutions are not widely available. Instead, unique risk-sharing mechanisms have been developed. The most common instruments of risk sharing are gift-giving, loan- and livestock-lending (*dabare* and *amesa*), which are used for the purpose of *ex-post* consumption smoothing.[1] However, since the 2000s, access to formal sector credit has improved. Particularly, the role of microcredit has increased in rural Ethiopia. Under the consumption smoothing theory, liquidity constraint is a major factor affecting consumption smoothing; therefore, availability of formal sector credit

[1] *Dabare* is a loan for cattle restocking for households that are experiencing negative shocks. *Amesa* is a short-term loan for a dairy animal for households to supplement food. *Busa gonofa* is gift giving from the rich to the needy and is observed for redistributive purposes among the rich and poor.

may ease liquidity constraints and improve households' consumption smoothing during adverse income shocks. This study investigates if institutional lending can alleviate fluctuations in consumption resulting from adverse income shocks.

During 1990s as well as 2000s, the role of formal financial institutions (e.g., micro-credit institutions, non-governmental organizations, agricultural cooperatives) expanded. These institutions are relatively resilient to agricultural shocks (although not completely independent), and the risks they can insure against may differ from the risk coverage that conventional informal risk-sharing networks offer. This study examines the impact of three primary sources of credit, namely social networks, formal sector institutions, and commercial/interlinkage lenders on consumption smoothing to estimate the presence of idiosyncratic and aggregate adverse shocks. The primary motivation for informal risk sharing is mutual insurance. Hence, households having the capacity to accumulate wealth efficiently reduce unfavorable income variances may become more resilient and will no longer require informal risk sharing, and such households could leave the risk-sharing networks. In contrast, households with accumulated wealth may play the role of an insurer and absorb the adverse shocks experienced in a village where sharing pressure would increase altruistic behavior.

The likelihood of villagers sharing their risks has been widely investigated.

Townsend (1994) found evidence that income fluctuations are alleviated by the aggregate income of villagers and only partially influence consumption. Udry (1994) found that repayment and interest payments are subject to the shock experienced by both lenders and borrowers, and even borrowers paid back more to lenders when the latter experienced adverse income shocks. Takashino et al. (2014) examined if the insurance function of formal and informal borrowing varies in the face of different types of risk. They found evidence that lower interest loan from relatives or friends was responsive to harvest failure, livestock theft, illness, injury and deaths of family members, while higher interest loan from informal money lenders was responsive to marriage payment. However, no empirical study has yet investigated the degree of consumption smoothing achieved through commercial and social network credit borrowing in Ethiopia.

The rest of the paper is structured as follows. Section 2 reviews the relevant literature and provides a brief description of past and current work. Section 3 describes the data; Section 4 presents the empirical strategy. Section 5 discusses the results and Section 6 concludes the study.

2 LITERATURE REVIEW

In many developing countries, rural financial markets are fragmented between

formal and informal lenders, that is, between those who cannot monitor private information of borrowers and those who can. Due to this fragmentation, informal lenders may benefit from better access to information and can earn the rent from credit market, and formal lenders with limited information may exit, leading to suboptimal credit allocation (Bardhan and Udry, 1999). Innovative financial instruments have recently been developed to address information asymmetry. For example, index insurance, which sets the threshold for an exogenous weather shock, lowers the transaction costs for the insurer to investigate the damage. The potential mediating effects of these new innovative instruments on exogenous shocks and their crowding-out effects on informal risk sharing have been gradually investigated.

For instance, Berg, Blake, and Morsink (2017), and Takahashi et al. (2017) found that the index-based livestock insurance does not crowd out customary risk sharing measures. Berg et al. (2017) explained that basis risk, the residue loss uninsured by index insurance, may be an incentive to remain in informal risk-sharing networks. Dercon and Krishnan (2002) also found that workfare payments complemented risk sharing, and even alleviated the adverse shocks experienced by non recipients of workfare payments.

In addition, informal risk-sharing may not be truly altruistic, as Santos and Barrett

(2011) and Carter and Castillo (2005) found, persistently poor households are often excluded from risk-sharing networks in southern Ethiopia and Honduras. Hence, better access to the credit market may enable those poor households to insure against such risks and achieve better consumption smoothing. For instance, Lacalle-Celderon et al. (2018) finds that the effect of microcredits on poverty reduction is slightly larger in countries with the highest incidence and depth of poverty, indicating microcredit benefits those in extreme poverty. Although the evaluations of microcredits on extreme poverty in different countries tends to contradict each other, Lacalle-Celderon et al. (2018)'s quantile regression analysis on panel of 57 countries give a bright view that microfinance may alleviate extreme poverty.

Conversely, some studies found formal financial instruments crowd out informal risk sharing, and the capacity of poor households to smooth their consumption deteriorates. Dizon et al. (2015) found that self-insurance through micro saving is a substitute for risk sharing among vulnerable women in Kenya, reducing the probability of informal risk sharing by 12%. In addition, the laboratory experiment by Berg et al. (2017) shows that indemnity insurance, where the payout covers the entire damage, substitutes risk sharing. Instruments that eliminate the risk of idiosyncratic shocks have the potential to crowd out informal risk-sharing networks. Micro saving is an effective

saving instrument for rural households but may impair lending through social networks because those who accumulate adequate wealth may exit from risk-sharing arrangements.

Formal institutionalized lending may alleviate aggregate shocks that are not efficiently insured by risk sharing and complement the ambiguities embedded in informal risk sharing. In this context, driven mainly by this difference, this study investigates if institutionalized and social network lending play different roles in consumption smoothing in rural Ethiopia. Both idiosyncratic and aggregate shocks were interacted with three sources of credit to examine if their impact was alleviated.

3 DATA DESCRIPTION

The study data comprised rural household panel data from the Ethiopian Rural Household Survey (ERHS), collected for the period from 1994 to 2009. During the seven survey rounds, 36–61% of sampled households had access to credit (Table 1), except in 1995, when the number of borrowers dropped sharply, credit access increased steadily. This trend suggests that credit constraints in rural Ethiopia were eased during the 1990s as well as 2000s, and rural Ethiopian households were able to smooth their consumption efficiently.

[Insert Table 1 here]

The decomposition of credit sources is shown in Figure 1. *Formal sector lenders* include banks, the Ministry of Agriculture, service cooperatives, credit associations, and NGOs and microfinance institutions. *Social networks* include friends/relatives, *iddir* (i.e., funeral associations), and *equb* (i.e., RoSCA, Rotating Savings and Credit Associations). *Informal commercial/interlinkage lenders* include money lenders, employers, and traders. While credit from social networks was dominant throughout the period, credit borrowing from formal institutions, especially from government organizations and agricultural cooperatives, increased gradually from 1997 onward, coinciding with two new arrangements occurring in rural credit supply. First, since 1996–97, extension agents replaced the Agricultural and Industrial Development Bank (AIDB) and started to provide agricultural input credit (Gebremedhin, Hoekstra and Tegegne, 2006).[2] Second, cooperative activities that were scaled down in the early

[2] Later known as the Development Bank of Ethiopia and the Commercial Bank of Ethiopia, these banks provided input credits through intermediaries (i.e., service

1990s were revitalized after the Cooperative Societies Proclamation No. 147/1998 was enacted (Kodama, 2007), and farmers' cooperatives were strengthened as another major providers of agricultural credit. Only 8% of the sample households obtained credit from formal institutions in 1994a, while the proportion gradually increased to 24% in 2009. During the 2000s, the introduction of microfinance loan service outreach institutions also contributed to the rise in formal sector credit borrowing. Since they appeared in the 1999 survey,[3] the role of microfinance institutions expanded during the 2000s (Table 2). Loans from NGOs and micro credit institutions are mainly used to buy livestock or other agricultural inputs.

[Insert Figure 1 here]

---

cooperatives, peasant associations and farmers' groups). Due to a high default rate, a new arrangement was made between regional governments and the banks in 1996–97, under which regional governments became responsible for recovering all the loans through their extension agents (Gebremedhin, Hoekstra and Tegegne, 2006).

[3] The Microfinance proclamation was passed in 1996, and microcredits started playing a crucial role in financing of agricultural input in rural areas (Gebremedhin, Hoekstra and Tegegne, 2006; Ayele, 2015).

[Insert Table 2 here]

Money lenders (*arata*) were often former landowners of large private farms who became traders or specialized moneylenders after the socialist government confiscated their lands (Aredo, 1993). Each household's relationship with moneylenders varied from no business relationship (59%), collateral ownership (14%), labor-sharing partnerships (10%), oxen-sharing partnerships (4%), crop buyers (4%), and others,[4] and credit from moneylenders, traders, and employers may be interlinked with contract farming and other transactions. Consequently, in this study, commercial/interlinkage lenders are separated from social network lending.

In the sample of 15 Ethiopian villages, approximately 84% households were members of at least one *iddir,* except for those in the Tigray region (as of 1999). *Iddir*, a funeral association provides a payout in the form of cash and in-kind transfers at the time of the funeral of an *iddir* member or a member of the family of the deceased *iddir* member. When an *iddir* member dies, the family receives a payout (Dercon *et al.*, 2006). A reduced payout is made when any member of an *iddir* member's family dies. A

[4] The relationship information is derived from 1994a data.

household can be a member of several *iddirs;* for example, average households in Sirbana Godeti have two to three *iddir* memberships. In addition to funeral insurance, many *iddirs* provide financing in the form of loans to member households to overcome adverse shocks (e.g., destruction of a house, illness, fire, death of cattle, poor harvest) or major life events such as weddings. *Iddir* members are required to contribute regularly, and their records are maintained in accounting books. If loan repayment is delayed, an *iddir* can file a case in a local court. *Iddir* membership is open to any household within the same locality, regardless of religion or socio-economic status. For instance, Dercon et al. (2006) found that *iddir* membership is not associated with socioeconomic differences (i.e., consumption level and land holdings).

There are other traditional forms of savings associations (*equb*) in rural Ethiopia, and 14–17% of the surveyed households participate in *equb*. Similar to *iddir*, *equb* also played an essential role in rural Ethiopia during the 15-year survey period referred in this study (1994–2009), and no downward trends were observed. Each *equb* member contributes a small sum periodically toward a common pool, and each member receives the entire pooled amount in rotation (Aredo, 1993). Unlike *iddir*, an *equb* payout does not always act as insurance against idiosyncratic shocks because the payout is

determined by the outcome of a lottery. However, periodical payments under peer pressure impose self-discipline on savers, and *equb* works as an effective saving institution in rural Ethiopia (Aredo, 1993).

Livestock lending (*dabare*) has also been widely observed in the pastoral regions of Ethiopia (Santos and Barret 2011). However, the survey covered only sedentary farming areas, and they were not included in the questionnaire on in-kind credit.[5] Hence, in this study, credit refers to only cash and crop lending among sedentary farmers.

Most credit loans are taken for consumption and to finance agricultural operations rather than investment. Table 2 presents the decompositions of reasons for borrowing during all the seven rounds. The top three common reasons for borrowing are: (i) to buy food or nonfood items, (ii) to buy agricultural inputs, and (iii) to pay for health expenses. Hence, the primary motivation underlying credit borrowing seems to smooth consumption in rural Ethiopia. Credit lending plays a critical role in rural Ethiopia, as precautionary saving is limited to asset accumulation and only a limited population

[5] Some livestock lending is observed, but detailed livestock types rented out are not available and cash values are not calculated.

participates in the formal financial sector and has access to a bank account.[6]

Table 3 presents the descriptive statistics decomposed by credit borrowers, non-borrowers, and by regions. In the all-region sample, borrowers have significantly smaller real per capita consumption, larger household size, and fewer livestock and land holdings. However, once the borrower and non-borrower samples are decomposed by region, the mean differences of those explanatory variables are less significant for Oromia and the Southern Nations, Nationalities, and Peoples' (SNNPR) regions. Significant differences exist in Tigray and Amhara, where not only consumption credit but credit borrowing is also less common (i.e., only 40% households borrow any form of credit). In the other two regions, 58.9–59.0% households borrow some form of credit and no significant difference exists in the mean consumption levels between borrowers and non-borrowers.

[Insert Table 3 here]

---

[6] Only 6% of surveyed households had a bank account, as of 2009. In a country that experiences high inflation, saving cash is not a good option for precautionary saving. The saved cash may lose a large proportion of its value in the future.

Access to formal financial lending (i.e., banks, cooperatives, government microfinance institutions/NGOs) and social network lending was compared across consumption quantiles (Figure 2 and Figure 3). No clear distinction is observed between these quantiles. Overall, the poorest households borrow more credit from social network lending, while a modest proportion of some of the richest households (approximately 30%) borrow consumption credit from social network lending.

[Insert Figure 2 and Figure 3 here]

4 EMPIRICAL STRATEGY

I focus on intertemporal behavior and investigate if the existence of community- and household-based lending work as consumption-smoothing mechanisms against the adverse effects of income risk. First, I test standard risk sharing (Townsend, 1994). However, the test does not consider *how* this full insurance occurred and if it can be attributed to "formalized" market mechanisms or "informal" sources (e.g., mutual support within families or villages). To address this problem, formalized *institutional* lending, informal lending with potential *interlinkage* contracts, and informal *social network* lending are interacted with idiosyncratic shocks and explicitly investigated in this study.

Following the empirical strategies adopted by Ravallion and Chaudhuri (1997) and Townsend (1994), per capita consumption was estimated using the Constant Relative Risk-Aversion (CRRA) utility function as follows:

$$lnc_{\mathrm{it}} = b + \sum_{vt} \delta_{vt} D_{vt} + \zeta lny_{it} + \gamma \boldsymbol{X}'_{it} + u_{ivt} \,. \tag{1}$$

Estimating equation (1) by first difference or fixed effect estimators removes unobserved fixed Pareto weights. Potential endogeneity is associated with consumption and income; if there are measurement errors that are positively correlated to both consumption and income, Townsend's original risk-sharing model's income coefficients face downward attenuation bias (Deaton, 1997; Ravallion and Chauduri 1997). Hence, Ireplace household income (lny_{it}) with idiosyncratic shocks (IS_{ivt}), following Dercon and Krishnan (2005), Fafchamps and Lund (2003), and Kurosaki (2015). If there are measurement errors that are positively correlated to both consumption and income, Townsend's original risk-sharing model's income coefficients are subject to downward attenuation bias (Deaton, 1997). Thus, the use of exogenous shocks rather than household income is better for assessing the excess sensitivity of consumption to idiosyncratic shocks (Dercon and Krishnan 2005). Household composition and variables denoting the household head's gender ($\boldsymbol{X_{ivt}}$) were used to control time-varying taste shifters.

Aggregate shocks are controlled by village-round fixed effects (D_{tv}) or rainfall variability at the woreda (district) level ($Rain_{vt}$) as follows:

$$lnc_{it} = b + \sum_{tv} \delta_{tv} D_{tv} + \zeta IS_{ivt} + \boldsymbol{\gamma X'}_{ivt} + u_{ivt} \text{ , or} \quad (2)$$

$$lnc_{it} = b + \delta Rain_{vt} + \zeta IS_{ivt} + \boldsymbol{\gamma X'}_{ivt} + u_{ivt} \text{ .} \quad (3)$$

All aggregate shocks at the village level were captured by D_{tv} in Equation (2). Rainfall deficit is a major risk in rural Ethiopia, and rainfall-related aggregate shocks are explicitly captured by $Rain_{vt}$ in equation (3). As negative rainfall shocks are expected to have an adverse effect on consumption, I allow δ to differ according to the sign (i.e., positive (+) or negative (−)) of the rainfall shocks: when $\delta < 0$, household i fails to smooth consumption due to aggregate shocks. Similarly, if negative idiosyncratic shocks have a negative impact on consumption, then $\zeta < 0$ shows household i is unable to smooth consumption, ostensibly due to idiosyncratic shocks.

Under the risk-sharing theory, only idiosyncratic shocks are effectively insured through a village-level risk-sharing mechanism. Hence, under perfect risk sharing, $\zeta = 0$, whereas negative and significant coefficients of rainfall shock are expected ($\delta < 0$). Equation (2) only shows if perfect risk sharing exists. To investigate the heterogeneous effects of the three types of credit (i.e., social networks (SN_{it}), commercial/interlinkage lending (IN_{it}), and formal sector lending (FN_{it})), interactions with idiosyncratic shocks

are included as follows:

$$lnc_{it} = b + \delta Rain_{vt} + \zeta_0 IS_{it} + \zeta_1 IS_{it} * SN_{it} + \zeta_2 IS_{it} * FN_{it} + \zeta_3 IS_{it} * IN_{it} + \gamma X_{ivt} + u_{it} . \quad (4)$$

When risk sharing through social network lending is present, I expect $\zeta_1 > 0$. If consumption smoothing through the formal sector (or commercial/interlinkage) lending is present, I expect $\zeta_2 > 0$ (or $\zeta_3 > 0$). ζ_1, ζ_2, and ζ_3 reflect the extent to which credit lending alleviates the excess smoothness of consumption. If consumption credit borrowing is determined by characteristics that do not change over time, then estimating equation (3) by fixed effects eliminates the source of inconsistency.

To separately investigate if both *villages* and *households* with better access to credit are more resilient to idiosyncratic shocks, I included both village-mean formal sector lending and household-level formal sector lending together, as follows:

$$lnc_{it} = b + \delta Rain_{vt} + \zeta_0 IS_{it} + \zeta_1 IS_{it} * SN_{it} + \zeta_2 IS_{it} * IN_{it} + \zeta_2 IS_{it} * VIN_{vt} + \gamma X_{ivt} + u_{it} . \quad (5)$$

This specification is inspired by Dercon and Krishnan (2005), who investigated if food aid crowds out informal insurance. Equation (5) shows if non-borrowers in the village with better financial access are more resilient to idiosyncratic shocks. Village-level formal sector lending (VIN_{vt}) is defined as average access to institutional lending, excluding household *i*. If the coefficient of the interaction term between household-level credit access and idiosyncratic shocks is positively significant, but the interactions

between the village mean accessibility to credit and idiosyncratic shocks are negatively significant, then borrowers benefit from credit access, but non-borrowers in the villages become less resilient to idiosyncratic shocks.

I included the number of ill and deceased adult members per year as idiosyncratic shocks (IS_{it}). Self-reported illness may suffer from self-reporting bias when perceptions and responses are correlated with wealth and education (e.g., rich people tend to report more health problems). Any self-reporting bias correlated with unobservable household characteristics is eliminated when controlling for fixed effects.

5 RESULTS

Table 4 presents the fixed effects estimate of equations (2)–(5), with standard errors clustered at the household level. First, I tested the perfect risk-sharing model, with all aggregate resources summarized as time-varying village-level dummies. Column 1 of Table 4 suggests that the perfect risk-sharing model is rejected, since idiosyncratic shocks (i.e., death of an economically active household member) has a negative impact on consumption levels after controlling for time-varying community fixed effects at the 10% significance level. In later specifications, idiosyncratic shocks consistently have a negative effect on consumption. Column 1 suggests that one

deceased adult member per year decreases per-capita consumption by 7%.

[Insert Table 4 here]

Column 2 presents the estimates in which rainfall shocks are controlled as aggregate shocks. The overall results suggest that the consumption levels of rural Ethiopian farmers are vulnerable to aggregate rainfall shocks. Notably, rainfall shocks have consistently negative coefficients on household consumption; for example, a 30% decrease in *Kiremt* rainfall correlates with a 4% loss in real consumption per capita. This suggests a household's inability to insulate consumption from rainfall shocks.

Although typical negative and significant idiosyncratic shocks imply the absence of perfect risk sharing, we cannot conclude that there is no partial risk sharing. To explicitly investigate the effects of credit lending, I added idiosyncratic shocks and their interaction terms with consumption credit availability. The consumption credit variable is a dummy variable that takes 1 if the household borrows for consumption purposes (i.e., to buy food/goods, pay for health expenses, pay for educational expenses, pay rent/taxes, or pay debts) and 0 if the household does not borrow for consumption purposes. Columns 3 and 4 include the interaction with access to consumption credit.

The positive coefficients of the interaction between death and consumption loans show that a household's death shock was partially alleviated through a consumption loan. Having one adult death decreases per capita consumption by 14%, but access to consumption credit alleviates the death shock more than the loss induced by death. The Wald tests for the hypothesis that the coefficients of interactions with consumption credit are simultaneously equal to zero were rejected at the 5% level in Column 3.

Next, I decompose accessibility to consumption credit into accessibility to social network lending, institutional lending, and commercial/interlinkage lending (Columns 5 and 6). Loans accessed through social networks and institutional lending have positive and significant coefficients for interactions with death shocks, but the interactions of commercial/interlinkage loans with idiosyncratic shocks are not significant, indicating that commercial/interlinkage loans are not responsive to death and illness shocks. The Wald test for the hypothesis that the coefficients of death- and illness-shock interactions with social network consumption credit are simultaneously equal to 0 was rejected at the 5% level (Column 5), confirming that social network lending plays a mediating role when rural Ethiopian households encounter idiosyncratic shocks.

I then investigated if village-level financial liquidity indirectly affects the degree of

consumption smoothing of non-borrowers. I included a household-level credit access dummy, as well as village-level credit accessibility, to differentiate between the direct effect of borrowing and the indirect effect of financial liquidity inside the village (Column 9). Direct institutional borrowing effects are positive but insignificant when interacting with idiosyncratic death and illness shocks. However, the interaction term between village-level institutional lending accessibility and illness shocks is negative and significant at the 1% significance level. This result suggests that non-borrower households in a less liquidity-constrained environment suffer much more due to lack of full insurance, as an illness shock is no longer insured in localities with institutional lending.

Next, I test the hypothesis that formal-sector loans alleviate aggregate agricultural shocks. Institutional lenders better insured aggregate shocks. Institutional lenders are not directly affected by rainfall shocks and can release credit for households that cope with rainfall shocks. Column 7 shows the interaction between rainfall shocks[7] and

[7] In Chapter 1, I investigated the correlation between variation (i.e., the long-term coefficient of variation) and level (i.e., long-term means) of rainfall during the *Kiremt*

access to consumption credit. Notably, consumption credit is responsive to *Kiremt* rainfall shocks, almost negating the negative effect of *Kiremt* rainfall shocks. Rural households periodically experience *Kiremt* rainfall deficit, and their communities may have a responsive insurance mechanism against these shocks. When I separate consumption credit into social network and institutional lending (Column 8), institutional lending interactions with rainfall shocks become negative whereas interaction of social network lending remains positive. Negative coefficients of interaction terms between negative rainfall and institutional lending may be because those credits are not only responsive to rainfall shocks, but also because households have to repay their debts even when they experience rainfall shocks. In the case of social network lending, it alleviated the impact of the *Kiremt* rainfall shock: if 16% of village households participated in social network lending, the negative effect of the *Kiremt* rainfall shock will be negated. Such residents may help each other during rainfall shocks, and the decrease in consumption level due to rainfall shocks can be

---

and *Belg* seasons and found that *Belg* rainfall (both in level and variation) did not correlate with consumption poverty. Thus, in this empirical analysis, I include only *Kiremt* rainfall shocks in the interactions.

alleviated, although this level of social network lending is prevalent only in 7 out of the 18 villages. In summary, institutional credit is not an efficient consumption-smoothing tool against aggregate rainfall shocks, indicating that institutional lending does not complement the limitations of lending through social networks.

6 CONCLUSION

This study investigates the consumption smoothing effects of three different credits on idiosyncratic and aggregate shocks. The study shows that rural Ethiopian households fail to smooth their consumption, and their current consumption levels are deeply affected by idiosyncratic shocks (e.g., illness and death) and aggregate rainfall shocks. However, I find that the adverse impact of death shocks are partially alleviated through lending via social networks and formal institutions. By contrast, conventional commercial/interlinkage lending is not responsive to death shocks and does not alleviate the adverse effects of death of an economically active member. I also investigated if households in financially less constrained village are more likely to smoothen their consumption levels during idiosyncratic shocks. Village-level accessibility to institutional lending has a negative impact on consumption smoothing when interacting with illness shocks. Households in villages that are financially less constrained may have to combat severe risks if they lack access to institutional lending. At the same time,

institutional lending does not alleviate aggregate rainfall shocks, implying that the increasing role of institutional lending in rural Ethiopia does not complement the aggregate shocks that risk-sharing lending cannot effectively address. As the impact of negative rainfall shocks has large negative effects on consumption, there is room for improvement by providing social protection for improving consumption smoothing. The limitation of this study should be noted. First, financial credit sources are confined to the questionnaires available throughout the 1994 to 2009 surveys, and thus does not cover novel financial credits available after the 2010s.

ACKNOWLEDGEMENTS

I would like to thank the anonymous reviewers Takahiro Sato, Motoki Takahashi, and Nobuaki Hamaguchi for their helpful comments. I am fully responsible for all errors and oversights. These data were made available by the Economics Department, Addis Ababa University (AAU), Center for the Study of African Economies, University of Oxford (CSAE), and the International Food Policy Research Institute (IFPRI). The Economic and Social Research Council (ESRC), Swedish International Development Agency (SIDA), and the United States Agency for International Development (USAID) provided funding for data collection; preparation of the public release version of these data was supported, in part, by the World Bank. The AAU, CSAE, IFPRI, ESRC, SIDA,

USAID, and the World Bank are not responsible for any errors in data or in their use or interpretation.

REFERENCES

Aredo, Dejene. 1993. "The Informal and Semi-formal Financial Sectors in Ethiopia : A Study of the Iqqub, Iddir and Savings and Credit Co-operatives (No. 21)." AERC research paper (Vol. 3). Nairobi: African Economic Research Consortium. Retrieved from http://idl-bnc.idrc.ca/dspace/bitstream/10625/13646/1/100306.pdf

Ayele, Gashaw Tsegaye. 2015. "Microfinance Institutions in Ethiopia, Kenya and Uganda: Loan Outreach to the Poor and the Quest for Financial Viability." *African Development Review* 27, no. 2: 117–129. https://doi.org/https://doi.org/10.1111/1467-8268.12128

Bardhan, Pranab, and Udry Christopher. 1999. Fragmented Credit Markets. In *Development Microeconomics* (pp. 76–93). Oxford University Press. https://doi.org/10.1093/0198773714.003.0007

Berg, Erlend; Blake, Michael; and Morsink, Karlijn. 2017. *Formal Insurance and Informal Risk-Sharing : Experimental Evidence from Insurance Decisions by Ethiopian Farmers*. *CSAE Working Paper Series*. Oxford. Retrieved from https://www.csae.ox.ac.uk/materials/papers/csae-wps-2017-01-2.pdf

Carter, Michael R.; Little, Peter D.; Mogues, Tewodaj; and Negatu Workneh. 2007. "Poverty Traps and Natural Disasters in Ethiopia and Honduras." *World Development 35, no.* 5: 835–856. https://doi.org/10.1016/j.worlddev.2006.09.010

Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconometric Approach to Development Policy*. Baltimore: The John Hopkins University Press. Retrieved from http://documents.worldbank.org/curated/en/1997/07/694690/analysis-household-

surveys-microeconometric-approach-development-policy

Dercon, Stefan; De Weerdt, Joachim; Bold, Tessa; and Pankhurst, Alula. 2006. Group-based Funeral Insurance in Ethiopia and Tanzania. *World Development* 34, no. 4: 685–703. https://doi.org/10.1016/j.worlddev.2005.09.009

Dercon, Stefan, and Krishnan Pramila. 2002. "Informal Insurance, Public Transfers and Consumption Smoothing (or Does Food Aid Reduce Vulnerability?)." In *Royal Economic Society Annual Conference* (pp. 1–22). Retrieved from http://www.csae.ox.ac.uk/conferences/2002-UPaGiSSA/papers/Dercon-csae2002.pdf

Dercon, Stefan, and Krishnan Pramila 2005. "Food Aid and Informal Insurance." *Insurance Against Poverty*, 305–329. https://doi.org/10.1093/0199276838.003.0015

Dizon, Felipe; Gong Erick; and Jones Kelly. 2015. *Does Financial Inclusion Exclude ? The Effect of Access to Savings on Informal Risk-Sharing in Kenya*. University of California, Davis.

Fafchamps, Marcel, and Lund Susan. 2003. "Risk-Sharing Networks in Rural Philippines." *Journal of Development Economics* 71, no. 2: 261–287. https://doi.org/10.1016/S0304-3878(03)00029-4

Gebremedhin, Berhanu; Hoekstra Dirk; and Tegegne Azage. 2006. Improving the Competitiveness of Agricultural Input Markets in Ethiopia: Experiences Since 1991. In *Proceedings of the 26th Triennial Conference of the International Association of Agricultural Economics (IAAE)*. Brisbane. Retrieved from http://hdl.handle.net/10568/613

Kodama, Yuka. 2007. "New Role of Cooperatives in Ethiopia: The Case of Ethiopian

Coffee Farmers Cooperatives." *African Study Monographs 35*, 87–108.

Kurosaki, Takashi. 2015. "Vulnerability of Household Consumption to Floods and Droughts in Developing Countries: Evidence from Pakistan." *Environment and Development Economics* 20*,* no. 02: 209–235. https://doi.org/10.1017/S1355770X14000357

Lalalle-Calderon, Maricruz; Perez-Trujillo, Manuel; and Neira, Isabel. 2018. "Does Microfinance Reduce Poverty Among The Poorest? A Macro Quantile Regression Approach" *Developing economies* 56, no. 1: 51-65. https://doi.org/ 10.1111/deve.12159

Ravallion, Martin, and Chaudhuri Shubham. 1997. "Risk and Insurance in Village India: Comment." *Econometrica* 65, no. 1: 171. https://doi.org/10.2307/2171818

Santos, Paulo, and Christopher, B. Barrett. 2011. "Persistent Poverty and Informal Credit." *Journal of Development Economics* 96, no. 2: 337–347. https://doi.org/10.1016/j.jdeveco.2010.08.017

Takahashi, Kazushi; Christopher B. Barrett; and Ikegami Munenobu. 2017. Does Index Insurance Crowd In or Crowd Out Informal Risk Sharing? Evidence from Rural Ethiopia Kazushi Takahashi, (September), 0–49. https://doi.org/10.1093/ajae/aay042

Takashino, Nina; Maharjan Keshav L; and Fukui Seiichi. 2014. "Impacts of Caste, Risk, and Time Preference on Borrowing Behaviour: A Case Study in West Bengal, India." In *Microfinance, Risk-taking Behaviour and Rural Livelihood* (1st edition, pp. 35–47). New Delhi: Springer India. https://doi.org/10.1007/978-81-322-1284-3_3

Townsend, Robert M. (1994). "Risk and Insurance in Village India." *Econometrica* 62,

no. 3: 539–591. https://doi.org/10.2307/2951659

Udry, Christopher. 1994. “Risk and Insurance in a Rural Credit Market: An Empirical Investigation in Northern Nigeria.” *The Review of Economic Studies*, 61, no.3: 495–526. doi: 10.2307/2297901.

TABLES

Table 1. Access to credit, balanced panel

	1994a		1994b		1995		1997		1999		2004		2009	
	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	Freq
No	50.22	575	47.42	543	63.06	722	47.25	541	47.07	539	46.64	534	38.08	436
Yes	49.78	570	52.58	602	36.94	423	52.75	604	52.93	606	53.36	611	61.92	709
Total	100	1,145	100	1,145	100	1,145	100	1,145	100	1,145	100	1,145	100	1,145

Source: Author's calculations based on data from the Ethiopia Rural Household Survey (ERHS)

Table 2. Reasons for credit borrowing by credit sources

1994a

Reason for loan	Commercial/ Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	Iddir	Equb	Bank	NGO	Formal institutions *		
Daily Expenses									
To buy food/goods	53	216	6	1	0	1	1	15	293
To pay for health expenses	7	45	5	0	0	0	1	1	59
To pay rent/taxes	1	8	0	0	0	0	0	0	9
To pay for education	0	3	0	0	0	0	0	0	3
Cost for farm inputs									
To buy farm or other implements	3	19	0	0	0	5	3	7	37
To buy inputs such as seeds/fertilizer	12	57	6	0	1	13	60	10	159
To buy livestock	11	20	1	0	3	7	7	3	52
To pay for hired labor	3	5	2	0	0	0	0	1	11
For transportation	2	7	1	0	0	1	0	1	12
To buy fodder/hay	0	2	0	0	0	0	0	0	2
Investment									
To start an off-farm business	4	15	1	0	0	0	0	0	20
To pay for building material	11	25	2	0	0	1	0	1	40
Ceremonial expenses									
Wedding	4	26	2	0	0	0	0	2	34
Funeral	11	28	4	1	0	0	0	0	44
Other ceremonies	2	7	2	0	0	0	0	0	11
Other									
Repay debt	4	4	0	0	0	0	0	0	8
Other	9	52	1	0	0	0	0	1	63
Total	137	539	33	2	4	28	72	42	857

*Formal institutions include service cooperatives, Ministry of Agriculture, credit associations.

**In other years, "to cover electric power installation cost" is included in "To buy food/goods" categories.

1994b

Reason for loan	Commercial/Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	*Iddir*	*Equb*	Bank	NGOs	Formal institutions*		
Daily Expenses									
To buy food/goods	57	278	17	7	0	4	6	10	379
To pay for health expenses	7	50	18	1	0	0	1	2	79
To pay rent/taxes	1	4	1	0	0	0	0	0	6
To pay for education	0	6	1	0	0	0	0	0	7
Cost for farm inputs									
To buy farm or other implements	12	48	4	2	0	4	1	2	73
To buy inputs such as seeds/fertilizer	28	99	4	1	1	5	0	4	142
To buy livestock	1	16	0	2	2	1	2	2	26
To pay for hired labor	3	15	1	0	0	0	1	0	20
For transportation	2	16	1	1	1	0	0	0	21
To buy fodder/hay	0	2	1	0	0	0	0	0	3
Investment									
To start an off-farm business	4	12	5	1	0	0	4	2	28
To pay for building material	1	17	1	1	0	0	0	0	20
Ceremonial expenses									
Wedding	5	8	2	0	0	0	0	0	15
Funeral	3	12	9	2	0	0	3	1	30
Other ceremonies	2	14	2	0	0	0	0	0	18
Other									
Repay debts	0	5	1	0	0	0	0	0	6
Other	3	15	1	0	1	0	1	0	21
Total	129	617	69	18	5	14	19	23	894

1995

Reason for loan	Commercial/Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	*Iddir*	*Equb*	Bank	NGO	Formal institutions*		
Daily Expenses									
To buy food/goods	16	169	15	1	0	3	16	5	225
To pay for health expense	6	45	12	0	0	1	7	0	71
To pay rent/taxes	2	15	2	0	0	0	1	1	21
To pay for education	0	0	0	0	0	0	0	0	0
Cost for farm inputs									
To buy farm or other implements	9	31	3	0	0	0	3	0	46
To buy inputs such as seeds/fertilizer	5	42	1	0	0	0	1	1	50
To buy livestock	1	18	2	0	0	0	0	1	22
To pay for hired labor	0	6	1	0	0	0	0	1	8
For transportation	1	12	1	0	0	0	0	0	14
To buy fodder/hay	0	2	0	0	0	0	0	0	2
Investment									
To start an off-farm business	4	12	1	0	8	0	0	1	26
To pay for building material	1	31	4	0	0	0	2	0	38
Ceremonial expenses									
Funeral	2	12	2	0	0	0	2	0	18
Other ceremonies	0	2	1	0	0	0	0	1	4
Other									
Repay debts	0	3	0	0	0	0	0	0	3
Other	2	39	4	0	0	0	0	1	46
Total	49	439	49	1	8	4	32	12	594

1997

Reason for loan	Commercial/ Interlinkage	Social network			Institutional lending				
	Money-lender	Friend/ relative	*Iddir*	*Equb*	Bank	NGO	Formal institutions*	Other	Total
Daily Expenses									
To buy food/goods	60	276	25	19	3	3	1	23	410
To pay for health expenses	8	53	23	1	0	0	1	2	88
To pay rent/taxes	1	9	6	0	0	0	0	0	16
To pay for education	0	5	1	1	0	0	0	0	7
Cost for farm inputs									
To buy farm or other implements	4	21	0	1	0	7	1	2	36
To buy inputs such as seeds/fertilizer	15	65	10	0	21	10	86	24	231
To buy livestock	4	17	0	0	3	27	0	2	53
To pay for hired labor	1	6	6	0	0	0	1	0	14
For transportation	0	11	2	0	0	0	0	0	13
Investment									
To start an off-farm business	3	12	6	1	0	4	2	4	32
To pay for building material	3	28	6	3	1	0	1	0	42
Ceremonial expenses									
Wedding	1	32	6	0	0	0	0	1	40
Funeral	3	26	7	2	0	0	0	0	38
Other ceremonies	0	7	1	0	0	0	1	0	9
Other									
Other	1	24	3	1	0	1	6	7	43
Total	104	592	102	29	28	52	100	65	1072

1999

Reason for loan	Commercial/Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	*Iddir*	*Equb*	Bank	NGO	Formal institutions*		
Daily Expenses									
To buy food/goods	93	307	44	8	8	17	0	15	492
To pay for health expenses	16	70	24	1	0	0	0	3	114
To pay rent/taxes	4	12	1	2	0	0	0	0	19
To pay for education	0	6	1	3	0	0	0	1	11
Cost for farm inputs									
To buy farm or other implements	20	26	4	2	3	5	0	5	65
To buy inputs such as seeds/fertilizer	18	56	8	5	21	8	1	9	126
To buy livestock	2	11	1	1	8	11	0	6	40
To pay for hired labor	1	5	0	0	0	0	0	0	6
For transportation	4	6	1	0	0	0	0	0	11
Investment									
To start an off-farm business	5	16	2	1	1	7	0	5	37
To pay for building material	8	42	2	1	0	2	1	0	56
Ceremonial expenses									
Wedding	4	18	2	0	0	0	0	0	24
Funeral	5	24	9	0	1	0	0	0	39
Other ceremonies	1	15	0	0	0	1	0	0	17
Other									
Repay debts	0	2	1	1	0	0	0	0	4
Other	1	21	2	0	0	1	0	0	25
Total	182	637	102	25	42	52	2	44	1086

2004

Reason for loan	Commercia/Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	*Iddir*	*Equb*	Bank	Micro finance/ NGO	Formal institutions*		
Daily Expenses									
To buy food/goods	23	123	13	2	0	6	6	4	177
To pay for health expenses	9	57	28	5	0	0	1	2	102
To pay rent/taxes	2	20	5	0	0	0	1	0	28
To pay for education	3	13	5	1	0	0	2	2	26
Cost for farm inputs									
To buy farm or other implements	3	22	5	0	0	17	10	1	58
To buy inputs such as seeds/fertilizer	5	55	14	0	1	31	168	37	311
To buy livestock	3	9	2	1	5	32	17	2	71
To pay for hired labor	2	6	8	4	1	0	0	0	21
For transportation	0	10	3	0	0	0	0	0	13
Investment									
To start an off-farm business	1	8	4	0	0	3	2	1	19
To pay for building material	5	23	6	1	0	2	0	1	38
Ceremonial expenses									
Wedding	3	16	1	0	0	0	0	1	21
Funeral	2	23	8	0	0	0	0	1	34
Other									
Repay debts	3	5	0	1	0	3	0	0	12
Other	1	25	6	0	0	3	7	1	43
Total	65	415	108	15	7	97	214	53	974

2009

Reason for loan	Commercial/ Interlinkage	Social network			Institutional lending			Other	Total
	Moneylender	Friend/ relative	*Iddir*	*Equb*	Bank	Micro finance/ NGOs	Formal institutions*		
Daily Expenses									
To buy food/goods	56	343	42	12	0	18	14	8	493
(For electric power**)	0	3	0	0	0	0	49	2	54
To pay for health expenses	9	65	35	2	0	3	3	3	120
To pay rent/taxes	0	13	2	1	0	2	4	0	22
To pay for education	1	16	7	0	0	3	0	1	28
Cost for farm inputs									
To buy farm or other implements	1	14	10	3	0	9	4	1	42
To buy inputs such as seeds fertilizer	6	60	16	2	0	44	203	3	334
To buy livestock	1	23	2	4	1	56	20	5	112
To pay for hired labor	1	15	5	1	1	2	0	0	25
For transportation	2	14	3	0	0	1	1	1	22
To buy fodder/hay	0	2	0	0	0	0	0	0	2
Investment									
To start an off-farm business	1	21	5	4	0	13	6	6	56
To pay for building material	5	31	6	2	0	5	5	4	58
Ceremonial expenses									
Wedding	2	5	1	0	0	1	1	2	12
Funeral	2	14	6	0	0	2	2	0	26
Other ceremonies	0	13	1	0	0	4	4	1	23
Other									
Repay debts	0	13	1	1	0	1	1	1	18
Other	1	21	0	1	0	3	8	1	35
Total	88	686	142	33	2	167	325	39	1482

Note: The observations are credit levels. A household can have multiple credits from different sources.

*Formal institutions include service cooperatives, Ministry of Agriculture, and credit associations.

**In other years, "to cover electric power installation" is included under "To buy food/goods" categories.

Source: Author's calculations based on data from the Ethiopia Rural Household Survey (ERHS).

Table 3. Basic statistics decomposed by consumption credit borrowers and non-borrowers (all regions)

All regions	Mean difference		Non-borrower		Borrower	
		t-value	Obs	Mean	Obs	Mean
Real p.c. consumption (monthly)	9.49	5.52	5054	74.74	1927	65.25
No. of adult deaths per year	-0.01	-1.75	5054	0.03	1927	0.03
No. of adults having illness per year	-0.04	-1.99	5054	0.28	1927	0.32
Dependency ratio	0.65	0.25	5054	123.96	1927	123.31
Household size	-0.20	-2.78	5054	6.13	1927	6.33
Female head	-0.01	-0.78	5054	0.22	1927	0.23
No. of educated household members	-0.08	-1.54	5054	1.79	1927	1.87
Livestock holding size	0.98	9.53	5054	3.43	1927	2.45
Log landholding size	0.07	5.30	5054	0.79	1927	0.72

Tigray	Mean difference		Non-borrower		Borrower	
		t-value	Obs	Mean	Obs	Mean
Real p.c. consumption (monthly)	15.54	3.37	640	60.45	159	44.91
No. of adult deaths per year	0.00	-0.19	640	0.01	159	0.01
No. of adults having illness per year	0.04	0.46	640	0.29	159	0.25
Dependency ratio	-10.94	-1.23	640	131.84	159	142.79
Household size	-0.66	-3.00	640	5.34	159	6.00
Female head	-0.02	-0.42	640	0.43	159	0.45
No. of educated household members	-0.60	-5.13	640	0.97	159	1.57
Livestock holding size	-0.39	-2.49	640	1.76	159	2.15
Log landholding size	0.00	0.02	640	0.35	159	0.35

Amhhara	Mean difference		Non-borrower		Borrower	
		t-value	Obs	Mean	Obs	Mean
Real p.c. consumption (monthly)	15.02	4.01	1741	91.90	448	76.88
No. of adult deaths per year	0.01	1.54	1741	0.02	448	0.01
No. of adults having illness per year	-0.05	-1.67	1741	0.18	448	0.23
Dependency ratio	0.07	0.01	1741	123.93	448	123.86
Household size	0.20	1.72	1741	5.50	448	5.31
Female head	-0.06	-2.64	1741	0.19	448	0.25
No. of educated household members	0.43	4.64	1741	1.70	448	1.27
Livestock holding size	2.08	7.92	1741	5.38	448	3.30
Log landholding size	0.14	5.53	1741	1.07	448	0.93

Continued

Oromia	Mean difference		Non-borrower		Borrower	
		t-value	Obs	Mean	Obs	Mean
Real p.c. consumption (monthly)	2.04	0.61	1318	81.78	608	79.74
No. of adult deaths per year	-0.03	-3.45	1318	0.03	608	0.06
No. of adults having illness per year	-0.05	-1.11	1318	0.33	608	0.38
Dependency ratio	-0.34	-0.07	1318	123.44	608	123.78
Household size	-0.06	-0.46	1318	6.55	608	6.61
Female head	-0.01	-0.58	1318	0.25	608	0.26
No. of educated household members	0.09	0.89	1318	2.05	608	1.96
Livestock holding size	0.86	5.39	1318	3.57	608	2.71
Log landholding size	0.08	3.66	1318	0.97	608	0.89

SNNP	Mean difference		Non-borrower		Borrower	
		t-value	Obs	Mean	Obs	Mean
Real p.c. consumption (monthly)	2.49	1.09	1355	52.60	712	50.11
No. of adult deaths per year	0.00	0.41	1355	0.04	712	0.03
No. of adult having illness per year	0.00	0.11	1355	0.35	712	0.35
Dependency ratio	2.58	0.59	1355	120.80	712	118.22
Household size	0.09	0.63	1355	6.89	712	6.80
Female head	-0.01	-0.62	1355	0.13	712	0.14
No. of educated household members	-0.19	-2.07	1355	2.03	712	2.23
Livestock holding size	-0.20	-1.83	1355	1.57	712	1.77
Log landholding size	-0.05	-2.94	1355	0.48	712	0.54

Source: Author's calculations based on data from the Ethiopia Rural Household Survey (ERHS).

Table 4. Testing risk sharing and consumption smoothing through credit

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Shock									
Lagged *Kiremt* rain percent deviation (negative rainfall shock)		-0.140**		-0.137**		-0.137**	-0.228***	-0.242**	
		(0.067)		-0.067		(0.067)	(0.076)	(0.114)	
Lagged *Kiremt* rain percent deviation (positive rainfall shock)		0.153***		0.154***		0.153***	0.155***	0.184***	
		(0.027)		-0.027		(0.027)	(0.027)	(0.028)	
Lagged *Belg* rainfall percent deviation (negative rainfall shock)		-0.103**		-0.102**		-0.099**	-0.105**	-0.124***	
		(0.047)		-0.047		(0.047)	(0.047)	(0.047)	
Lagged *Belg* rainfall percent deviation (positive rainfall shock)		0.097***		0.096***		0.099***	0.0982***	0.085***	
		(0.028)		-0.028		(0.028)	(0.028)	(0.028)	
No. of adult deaths per year	-0.073*	-0.045	-0.141***	-0.107**	-0.140***	-0.108**	-0.043	-0.047	-0.167***
	(0.044)	(0.049)	(0.049)	-0.052	(0.049)	(0.052)	(0.049)	(0.049)	(0.048)
No. of adults having illness per year		-0.022**		-0.026**		-0.026**	-0.021**	-0.025***	
	-0.002	0.002		0.002					0.007
	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)	(0.009)	(0.009)	(0.011)
Lending types									
Credit for consumption access (0/1)							-0.034*		
	0.009	-0.005	0.001	-0.018					
	(0.017)	(0.018)	(0.018)	(0.019)			(0.020)		
Social network lending for consumption purpose (0/1)					0.015	-0.009			0.015
					(0.019)	(0.021)			(0.019)
Institutional lending for consumption purpose (0/1)					-0.025	-0.062			-0.086
					(0.053)	(0.050)			(0.158)
Commercial/interlinkage lending for consumption purpose (0/1)					-0.018	-0.031			-0.018
					(0.044)	(0.047)			(0.044)
Village level social network lending for consumption purpose								-0.326***	
								(0.115)	
Village level institutional lending for consumption purpose								-0.048	-3.758
								(0.132)	(14.46)

Interaction terms									
Credit access #no. of adult deaths per year			0.253**	0.235**					
			(0.100)	(0.117)					
Credit access # no. of adults having illness per year			(0.001)	0.017					
			(0.018)	(0.020)					
Social network lending #no. of adult deaths per year					0.240**	0.203			0.247**
					(0.105)	(0.123)			(0.104)
Social network lending #no. of adult having illness per year					-0.001	0.011			0.002
					(0.018)	(0.020)			(0.018)
Institutional lending #no. of adult deaths per year					0.787**	0.870**			0.513
					(0.399)	(0.379)			(0.444)
Institutional lending #no. of adult having illness per year					-0.025	0.060			0.066
					(0.080)	(0.086)			(0.088)
Commercial/ interlinkage lending #no. of adult deaths per year					-0.065	0.181			-0.078
					(0.206)	(0.283)			(0.205)
Commercial/ interlinkage lending #no. of adult having illness per year					0.037	0.053			0.041
					(0.036)	(0.049)			(0.036)
Village level institutional lending #no. of adult deaths per year									3.823
									(2.847)
Village level institutional lending #no. of adult having illness per year									-0.883***
									(0.312)
Credit # lagged *Kiremt* negative rainfall							0.263**		
							(0.104)		
Village level institutional lending # lagged *Kiremt* negative rainfall								-11.44***	
								(2.144)	
Village level social network lending e# lagged *Kiremt* negative rainfall								1.572***	
								(0.397)	
Constant	4.539***	4.701***	4.500***	4.703***	4.471***	4.701***	4.709***	4.743***	4.671***
	(0.047)	(0.047)	(0.047)	(0.047)	(0.048)	(0.047)	(0.047)	(0.049)	(0.750)
All the credit variables and interactions=0			2.28	1.56			3.34		
			(0.07	(0.19			(0.03		

			8)	8)			6)		
All the social network credit variables and interactions=0					2.39 (0.067)	0.99 (0.397)			2.58 (0.052)
All the institutional credit variables and interactions=0					1.34 (0.261)	2.05 (0.105)			0.68 (0.564)
All the commercial/institutional credit variables and interactions=0					0.39 (0.758)	0.55 (0.645)			0.50 (0.685)
All the village level social network credit access variables and interactions=0								6.16 (0.000)	
All the village level institutional credit access variables and interactions=0								14.69 (0.000)	3.24 (0.021)
Village*round fixed effects	yes		yes		yes				yes
Observations	8,333	8,333	8,333	8,333	8,339	8,339	8,333	8,339	8,339
within R-squared	0.285	0.107	0.286	0.107	0.287	0.107	0.107	0.114	0.288
Number of hhid_uniq	1,494	1,494	1,494	1,494	1,494	1,494	1,494	1,494	1,494

Note:

1. Clustered standard errors in parentheses in fixed effect estimations.
2. P-values in parentheses in Wald test results.
3. Each regression also includes household size, dependency ratio, female head, number of educated household members, and log of landholding size (ha).
4. *** significant at the 10% level, ** significant at the 5% level, *** significant at the 1% level

Source: Author's calculations based on data from the Ethiopia Rural Household Survey (ERHS).

FIGURES

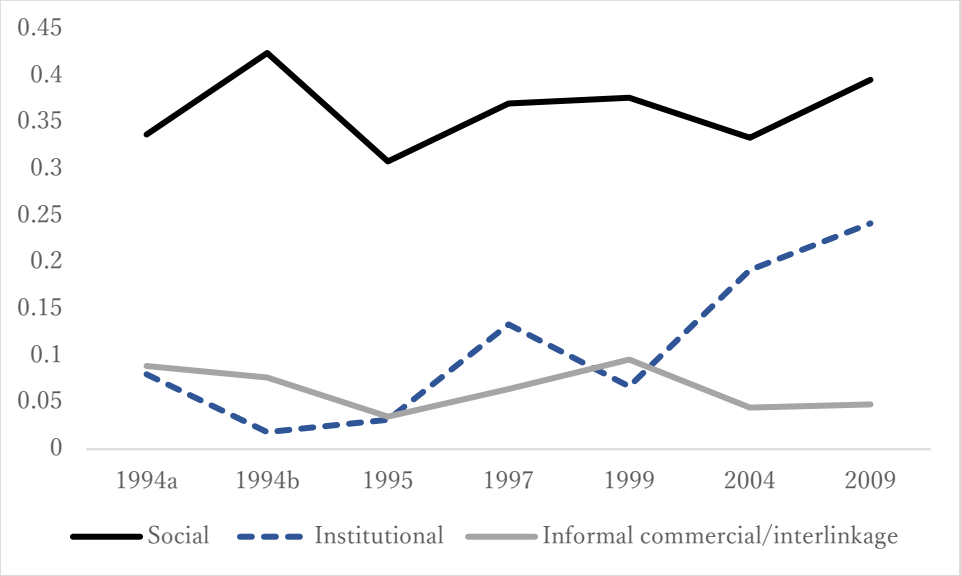

Figure 1. Proportion of credit lending from institutional lenders, social networks, and informal commercial/inter-linkage lenders

Note: Author's calculation from Table 1.

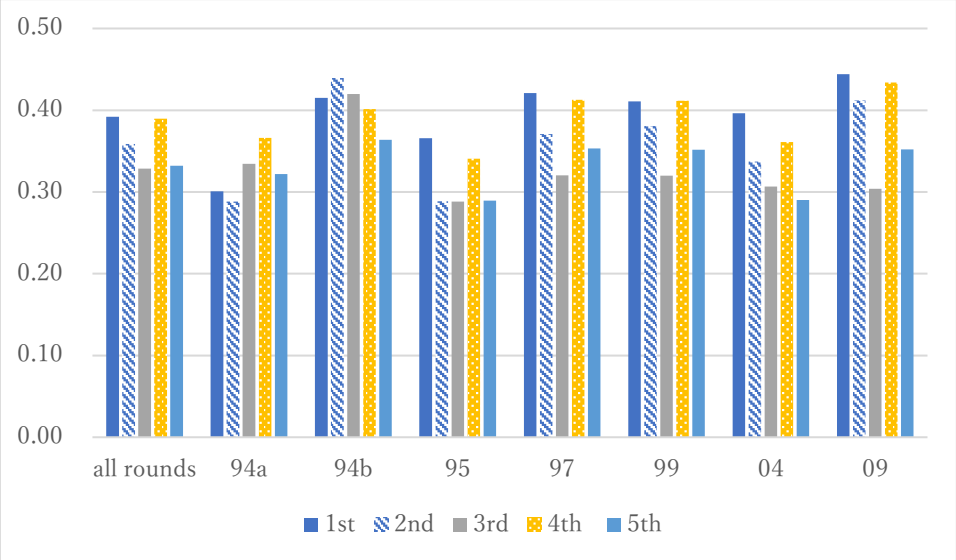

Figure 2. Access to social network lending by consumption quantiles

Source: Author's calculations from the Ethiopia Rural Household Survey (ERHS).

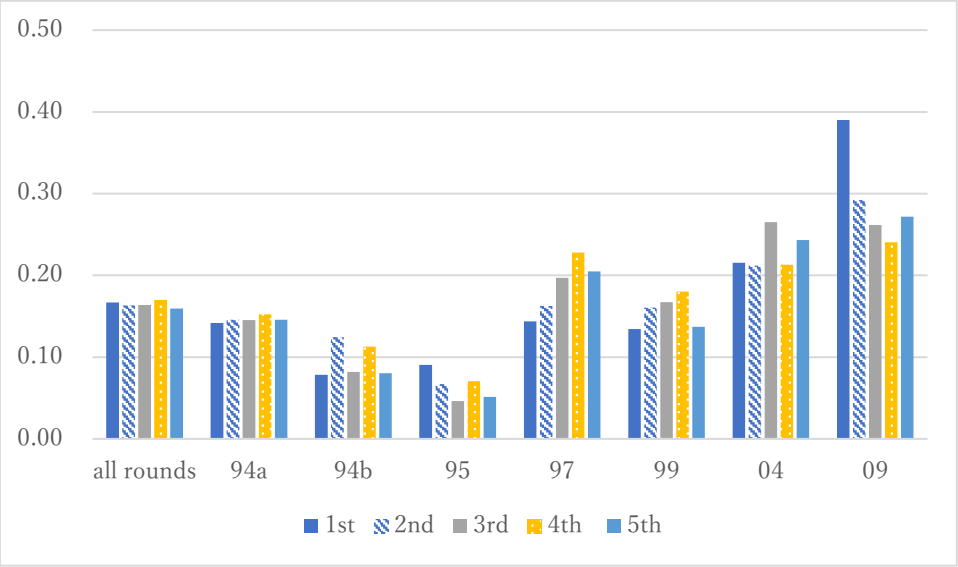

Figure 3. Access to institutional lending by consumption quantiles

Source: Author's calculations from the Ethiopia Rural Household Survey (ERHS).