

# SMALLHOLDER FOOD MARKETING BEHAVIOUR: EXPLORING THE ROLE OF INFORMAL CREDIT AND TRADERS IN STABILIZATION OF FOOD CROP PRICES

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**Abstract:** *Many farmers in Africa sell their produce at low prices immediately after harvest because they need cash. They could solve temporary liquidity constraints by use of credit and store their produce to sell when prices are high. However, due to various reasons such many poor farmers have been excluded from formal financial services. In response, the informal financial market has expanded, but the question why informal credit has not facilitated storage to enable farmers benefit from intertemporal arbitrage opportunities remains largely unanswered. To answer this question, we investigate the role of informal credit markets and traders in stabilizing seasonal food crop prices. Our analysis is based on a household survey data, and in-depth interviews with key players in the informal credit market and grain traders in rural south-western Uganda. We find that community-based self-help savings and credit associations provide credit for the majority (62%) of farmers. Informal credit still excludes the very poor and is not sufficient to enable farmers benefit from intertemporal arbitrage opportunities. Thus, poor farmers continue to 'sell low and buy high'. The study also addresses a related fundamental aspect of food marketing: why is there no competition between traders bidding up prices after harvest and eliminating seasonal price fluctuations? We analyse traders' costs and profit structure in the study area, and shed some light on imperfections in the grain market and the barriers that limit competition between traders. We find that grain trade is not highly competitive. High transaction costs and limited access to credit are the main barriers limiting competition. Supporting community-based self-help savings and credit associations to raise their portfolio can enable more farmers to borrow at the same time. Investing in infrastructure, organising and supporting small scale farmers to bulk their produce might lower transaction costs, promote competition and dampen price fluctuations.*

**Keywords:** *Narbitrage, Credit Market, Seasonal Price Variation, Trade Barriers*  
(JEL Classification: *D53, O13, O16, Q12, Q13*)

## Introduction

Agricultural production in most African countries is dominated by small-scale farmers who depend on their produce for home consumption and income generation. As smallholder households increasingly engage in market production, their opportunity to increase household income and food security largely depends on the functioning of agricultural markets and other relevant markets such as the financial market. In the absence of well-functioning markets, prices of agricultural commodities in most sub-Saharan African countries typically fluctuate across space and time (Minot, 2014). Food crop prices are usually low at harvest but rise gradually until the next harvest. This seasonal price fluctuation is largely due to variation in domestic or even local supply and demand, as markets are imperfectly integrated. Most smallholder farmers

sell their produce at low prices immediately after harvest, and buy food later during the lean period at a higher price. This has been referred to as the 'selling low and buying high puzzle' (Burke, 2014; Stephens and Barrett, 2011).

Food crop price instability is of significant interest to development economists. Price variability of the type described above adversely affects household income. It hinders intensification of input use, adoption of technologies necessary for production efficiency and negatively affects productivity growth and food security (Gabre-Madhin et al., 2002). Seasonal variation in food prices affect household dietary intake and the nutritional outcome might be detrimental to health. Addressing the food crop price instability problem would help farmers to realize the potential economic and nutrition advantage of engaging in market production (Gilbert et al., 2017).

The persistence of non-stochastic food price variability is puzzling. One would expect that predictable price movements will affect decisions on when to sell or store produce by farmers and third parties. As opposed to perishable crops, grains can be stored in case of unfavourable markets conditions and sold later when prices are high. While seasonal price variations are predictable, a majority of farm households seems not to take advantage of this to benefit from inter-temporal arbitrage opportunities. Even more puzzling is; why is there no competition between traders, bidding up prices soon after the harvest, and dissipating rents from arbitrage? In theory, both storage by farmers and traders could help to attenuate price volatility.

To date only a few studies have assessed why farmers do not store but choose to sell at low prices. The existing literature offers various explanations, including lack of strong supporting institutions and market-based risk management instruments such as warehouse receipts, forward price contracts and insurance (Byerlee et al., 2006; Coulter and Onumah, 2002). Lack of storage facilities or high storage costs and lack of liquidity might equally explain why households sell their produce at low prices immediately after harvest. Stephens and Barrett (2011) argue that poor households which are liquidity constrained may be compelled to sell their produce at a time when prices are low in order to take care of other needs. This is consistent with Fafchamps and Minten (2001) who mention that for most farmers the decision to sell or not to sell a staple (and how much to sell) is largely driven by the needs of the household rather than the price of the crop.

Temporary liquidity constraints can be solved by use of credit. Credit can improve farmers' income from production and food security through different pathways; (i) it can be used to smooth consumption and manage liquidity during seasonal income fluctuations (Matin et al., 2002; Yasuharu and LaStarrria-CorNhieL, 2015); and related to this point, (ii) it may facilitate households to temporarily store their produce and sell when prices are high (Khandker, 2005; Matin et al., 2002). While the role of credit in agricultural production has been widely discussed (Conning and Udry, 2007) only a few studies have linked credit to agricultural commodity marketing (Burke, 2014; Stephens and Barrett, 2011). In these studies, the authors show that access to credit significantly influences smallholder sales and purchase behaviour of food grain. In Kenya for instance Burke (2014) finds that access to credit increases farm net revenues as it enables farmers to store their produce and sell when prices have gone up. Not only does storage affect household income, it also affects local price dynamics when markets are not integrated. Burke (2014) finds that local price fluctuations are dampened if sufficient farmers have access to credit. Expansion of credit access in rural areas may thus help reduce price dispersion.

However, due to various reasons such as lack of collateral, high interest rates and transaction costs many farmers, especially the illiterate and the poor typically have limited access to formal financial services (Ahmad, 2003). In recent years, the informal credit market has expanded and provides alternative sources of finance for households. Are

farmers unwilling to borrow, or are they equally limited in accessing informal credit? Why don't informal financial institutions, such as private moneylenders and savings and credit cooperative associations/societies (SACCOs), help to meet temporary borrowing needs of farm households?

Alternatively, traders could bid up prices and dissipate rents from arbitrage. Why does this not happen? Several explanations have been offered. One is that there are no excessive returns in grain trade, that the gap between low and high prices is due to high transaction and storage costs incurred by the traders (Svensson and Yanagizawa, 2009). This means that traders only receive a fair compensation for their effort and the risk they run (e.g. theft or price drop). This argument is supported by the findings of Kikuchi et al. (2015) on rice marketing in Uganda and Fafchamps et al. (2005) in Benin, Madagascar and Malawi that marketing costs are nearly proportional to transaction size with very little evidence of returns to scale in agricultural trade. Sitko and Jayne (2014) equally argue that food markets are highly competitive in terms of number of traders and marketing margins and that traders improve farmers' access to markets in remote areas in Sub-Saharan Africa and should be supported in order to further develop competitive rural markets.

Yet, others claim that traders are monopolists and earn non-competitive rents (Muto and Yamano, 2009; Svensson and Yanagizawa, 2009). These studies show that crop traders use information asymmetries to gain substantial surplus beyond normal profits. Some traders form networks that restrict farmers from selling directly to wholesale traders thus limiting competition. For instance, in West Bengal, due to high transaction costs and mistrust, wholesale traders are unwilling to negotiate small trade volumes directly with farmers but rather deal with small village traders (Mitra et al., 2016). As a result, village potato traders collude on the price to offer farmers and ultimately earn large margins due to limited competition. Using a field experiment, Bergquist (2016) also finds a high degree of collusion among maize traders in Kenya and this affects competition. While a number of studies have been done in sub-Saharan Africa, there is little evidence on whether food crop markets are competitive or not (Dillon and Dambro, 2016).

This paper makes a contribution in addressing the above issues by focusing on the role of informal credit and traders in stabilizing food crop prices. We address two objectives; one, we analyse how semi-formal financial intermediaries (SACCOs) and informal credit sources which serve the majority of the rural population (Klapper and Singer, 2015) influence the marketing behaviour and affect food security of rural households. Two, we attempt to better understand the food marketing dynamics focusing on grain trade in rural Uganda and the barriers that maintain excess margins (if they exist) in equilibrium in the rural food market. To address these objectives, we conducted a set of surveys involving farmers (a household survey), managers of informal savings and credit associations, individual money lenders, and food grain traders.

This paper adds to the literature, an analysis of the

contributions and limitations of the (informal) credit market in stabilizing seasonal food crop prices and ultimately smoothing income fluctuations. Further, we provide insights in the underlying causes of imperfect competition in the food markets in rural areas which as a result, have maintained excess margins in the grain market. Our focus is on marketing of food crops, specifically grains (rice, maize, millet, beans and ground nuts) which are commonly traded in the area. We seek out strategic interventions for policy makers to leverage food crop prices for food security by improving the functioning of markets.

Our findings reveal that households which obtained credit were less likely to sell their produce immediately after harvest. However, we find that informal credit is not sufficient to enable farmers to store their produce and participate in intertemporal arbitrage. We also find that the local grain market does not have sufficient competition between grain traders. The main barriers to competition include high cost of credit, poor infrastructure and marketing systems particularly individual marketing. Addressing these factors may significantly contribute to dampening seasonal food price fluctuations.

In the following section we explain how data were collected, section three gives an overview of food crop price trends in the study area highlighting the market and price structure. In section four we analyse the factors influencing farmers' decision on when to sell their produce. Section five discusses the rural credit market in Uganda with special interest on how informal credit influences farmers' marketing behaviour. Section six presents the role of traders in stabilizing food crop prices, and we conclude in section seven.

## DATA AND METHODS

We collect all primary data from Kanungu district, western Uganda. The district borders Rukungiri district to the north and east, Kabale district to the south east, Kisoro district to the south west and the Democratic Republic of the Congo to the west. A majority of the population derives its livelihood from agriculture especially crop production. This study combines primary and secondary data on food grains trade and informal financial institutions, to analyse rural food and financial market imperfections. Primary data were collected from farmers and local traders to understand the marketing systems at the local level. Grain traders were interviewed to gain insight in local trade activities. We collect qualitative data using semi-structured interviews with individual money lenders, managers of SACCOs and representatives of other informal financial institutions (rotational savings and credit associations (ROSCAs) and accumulating savings and credit associations (ASCAs)) to better understand their lending technology.

### *Interviews with SACCO and ROSCA managers, money lenders and traders*

We approached SACCO and ROSCA managers, money lenders and traders individually. For the first three groups, we

used a semi-structured questionnaire to ask about their credit market experiences with farmers, with particular interest in borrowing and repayment, as well as transaction costs. In total 47 interviews were conducted; 15 with SACCO managers, 16 with chair persons of community-based credit and savings associations and 16 with money lenders/traders who offer credit or buy crops at a fixed forward price. We faced a challenge of identifying money lenders as most of them are operating 'illegally' (i.e., they not registered). Out of the 16 interviewed, only one is registered as a money lender. Those we interviewed were identified through their clients and colleagues. Whoever was interviewed was requested to provide names of other money lenders in the area. In order to better understand individual operations, some questions were respondent-specific. Although the sample size appears statistically small, we believe it is a good representative of money lenders as not many people are involved in the business. Five grain traders were also interviewed using a semi-structured questionnaire. We asked about the type of buyers and sellers they deal with, their transactions to better comprehend their cost structure, and the constraints and challenges they face in the grain trade.

### *Interviews with households/farmers*

Household data were extracted from a household survey on market production and household food security. The survey was conducted in 2014 (March – June) and involved 1137 rural households. The sample was drawn from seven sub counties; five sub counties were purposively selected to represent market-oriented crop production and two represent subsistence crop production. Respondents were randomly selected from the list of households in randomly selected villages. We use data on household socio-economic and demographic characteristics, credit access and use, production and marketing of major food crops (rice, maize, beans and ground nuts).

Table 1 presents a summary of descriptive statistics of sample households. A majority of households are headed by males with an average age of 42.6 years. Their average education is 6 years of schooling, implying that the majority has only primary education. It is important to note that this has implications for one's capacity to operate a bank account as well as transactions in marketing agricultural produce. The average household size in our sample is 6.2 persons, which is above the national average of 4.7 persons per household (Uganda Bureau of Statistics, 2014a). The surveyed households are typically smallholders with an average land size of 1.8 hectares. Their average annual household income –UGX 3.4 million is far above the mean national household income (UGX 2.0 million) in rural areas (Uganda Bureau of Statistics, 2014b). Crop sales contribute the bigger proportion (54.3%) of household income. This means that households mainly rely on seasonal income and therefore credit access is critical for households to manage liquidity constraints. The household survey reveals an average household annual expenditure of about UGX 2.7 million which translates into average monthly expenditures of approximately UGX 0.23 million. This is

close to UBOS estimates of UGX 0.22 million for western Uganda and slightly above the national average household consumption expenditure of UGX 204,200 per month in rural areas (Uganda Bureau of Statistics, 2014b). The bigger proportion of income is spent on food (37.4%) and school fees (29.5%), expenditures that cannot be postponed. School fees for instance are paid three times in a year – the beginning of first and second term coincide with harvest period (end of January and May, respectively) while the beginning of third term falls in the growing period (end of September). It is for such expenditures that households would need credit in order to store their produce awaiting higher prices. Analysing the factors influencing the decision on when to sell produce

**Table 1: Descriptive statistics of sample households**

Variable name	Observations	Mean	Standard deviation	minimum	Maximum
Age of household head	1137	42.6	13.4	18	85
Gender of household head; male (percentage)	1137	82.9	-	-	-
Education of household head (years)	1127	6.2	3.9	0	20
Education of household head's spouse (years)	1100	4.9	3.2	0	17
Household size	1135	6.2	2.6	1	24
Size of land owned (acres)	-	4.5	5.4	0	35
Average annual household income (million UGX)	1137	3.5	4.3	0.1	44.5
Average annual household crop income (million UGX)	1026	1.9	2.0	0.1	13.5
Average annual household expenditure (million UGX)	1132	2.7	3.1	0.1	32.3
Wealth (million UGX)	1137	19.3	20.5	0.1	72.1
Distance to the main road (km)	1137	2.56	3.68	0	48
Distance to the main market (km)	1137	6.08	4.48	0.048	72
Distance to input shop (km)	1114	4.64	3.68	0.016	27.2
Access to credit; Yes (percentage)	1125	83.7	-	-	-
Proportion that used credit (percentage)	996	67.7	-	-	-

Note: exchange rate: 1 USD ≈ 2650 UGX

To investigate the role of informal credit in stabilizing food crop prices it is important to understand the various factors that influence farmers' decision on when to sell their produce. During the household survey, the sampled farmers were asked when they normally sell their produce and we categorise the responses into two; one, immediately after harvest (within the first 4 weeks post-harvest) and two, after 4 weeks post-harvest. A common modelling framework to analyse marketing decision under this framework is a binary choice model, usually a probit or logit specification. We use the binary logistic regression model as it allows predicting the discrete outcomes of dichotomous or polytomous dependent variables from a set of categorical or continuous independent variable. This is appropriate as it fits the dichotomous choice, taking on values of 1 or 0. We use a simple logistic regression model to identify the factors influencing farmers' decision on when to sell. The simple logistic regression model estimates the probability of the household selling immediately after harvest (1= less than 4 weeks after harvest) or store and sell at least 4 weeks after harvest (=0). The binary logistic model has the advantage that it does not depend on the assumption of linearity between dependent and independent variable. The model is specified as follows;

$$\text{Prob}(Y_i = 1) = P_i = F(Z_i) = \frac{1}{1 + e^{-Z_i}} \quad (1)$$

Where  $P_i$  is the probability that a farmer sells produce immediately after harvest ( $Y_i$  takes the value 1)  $X_i$  represents explanatory variables including household characteristics, socioeconomic, farm and institutional factors which influence the decision on when to sell.  $\delta$  and  $\beta$  are parameters to be estimated and  $e$  is the exponential constant.

$$\text{Prob}(Y_i = 0) = 1 - \text{Prob}(Y_i = 1) = (1 - P_i) = \frac{e^{-Z_i}}{1 + e^{-Z_i}} \quad (2)$$

From equation 1 and 2 we get,

$$\frac{\text{Prob}(Y_i=1)}{\text{Prob}(Y_i=0)} = \frac{P_i}{1-P_i} = e^{Z_i} \quad (3)$$

Taking the natural log of equation (3), we get;

$$Z_i = \frac{P_i}{1-P_i} = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in} + u_i \quad (4)$$

## DESCRIPTION OF VARIABLES

The smallholder farmer's produce marketing behaviour is influenced by the farmers' decision on when to sell. The decision on when to sell depend on various factors including; personal and household socioeconomic characteristics (age of household head, education, number of children, off farm income), farm characteristics and other factors such as institutional and access related variables (size of land owned, distance to the market, member of farmer group). Age of household head is used as a proxy for experience in farming business. The older are expected to store awaiting better prices. Educated farmers are assumed to be better able to store as they may have other sources of income as well as better access to information. The household head's formal education is also posited to increase the understanding of

market dynamics. The number of children may influence when to sell due to their requirements especially education fees. Households with other sources of income are likely to store and sell at peak prices. Households with no storage facilities are more likely to sell their produce immediately after harvest. Distance to the market negatively influences the decision on when to sell. For farmers in remote areas, geographic isolation through distance may deny them easy access to traders and markets (Key et al., 2000). Households with membership in farmer groups are likely to delay produce sales since they have easy access to credit and market information.

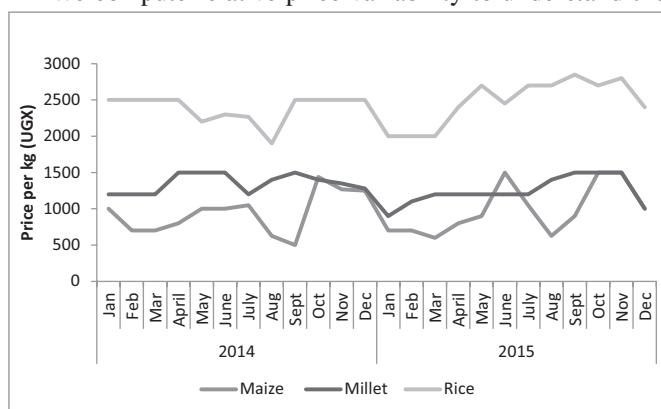
### 3. Trends in food crop prices in the study area

Since the liberalization of markets in early 1990's food crop prices in Uganda are subject to forces of supply and demand. Due to the rain-fed nature of agriculture, food crop prices are driven by seasons, the overall national harvest, and whether the crop is traded in the international and or domestic market. Apart from rice and maize, which are internationally traded, the prices of other crops are largely determined by domestic supply and demand. Food crops are mainly traded on the spot market, where farmers sell their produce to neighbours, local traders and in various local markets. Figure 1 presents retail prices of major grains in local markets in Kanungu district. We observe low prices during the post-harvest periods in January-February and July -September, and rising prices during the growing season (reaching the peak around May and October-November).

Figure 1: Average retail prices of grains in local markets in Kanungu district

Source: author's calculation

We compute relative price variability to understand the



magnitude of seasonal price dynamics. Table 2 casts some light on the extent of price variability of the key crops. Consistent with findings of Kijima et al. (2012), rice prices do not show very strong variability as they seem to be linked to international rice prices. Millet price variability is relatively low because the demand for millet is rather low compared to other grains. Seasonal price variability is much higher for maize grain. This can be explained by a relatively very high supply of maize immediately after harvest and

hence attracting very low prices. Yet, the demand for maize remains high as it is the main food for institutions such as schools and prisons. The world food programme equally demands significant quantities of maize for distribution as food aid. In addition, there is significant cross boarder export of maize to Kenya, Rwanda and Sudan. Our findings are consistent with those in other African countries (Gilbert et al., 2017).

Table 2: Relative price variability of key grains in Kanungu district

Crop	Rice	Maize	Millet
Average price in the month before harvest (UGX)	2850	1500	1500
Average price in the month after harvest (UGX)	2000	500	1000
Price variation (UGX)	850	1000	500
Relative price variability (%)	42.5	200	50.0

Note: price variability for rice, maize and millet is based on local market prices.

Exchange rate: 1 USD ≈ 2650 UGX. Relative price variability = (price variation/av. price after harvest)100

Source: Uganda Bureau of Statistics (unpublished data)

Variation in average monthly retail prices could potentially reflect high storage costs as well as changes in market conditions specifically supply and demand fluctuations. In seasonal agriculture, food supply in isolated markets during the lean period comes from storage. Producers store food to smooth consumption between harvest and non-harvest periods and to take advantage of future high food prices. In a competitive market, storage plays a big role in ensuring that prices are dynamically consistent.

Seasonal price variations would be reduced if farmers could limit supply after harvest, and store their produce to sell a few months later. This strategy would also earn them higher income. Using our household survey production and marketing data, and market prices we show that households can raise their revenue from crops specifically grains by 64.6 percent if they could store their produce and sell at least three months after harvest. Table 3 presents the average returns that sampled households could earn from different food crops at the lowest and peak prices in the season. Farmers who sell immediately after harvest, may lose 25% to 200% of the crop sold after harvest depending on the type of crop. Maize and beans display the highest loss (200 and 100 percent, respectively). As mentioned above this is explained by the high demand for the maize and beans.

The quantity sold are the averages of crops sold by the sampled households. The average annual grain revenue is the unweighted average of total grain revenue from different crops for each household.

Table 3: Average estimated revenue by food crop at different prices in the marketing season

Crop	Number of farmers	Quantity sold (kg)	Average price per kg immediately after harvest (UGX)	Revenue if sold immediately after harvest (UGX)	Average price per kg before harvest (UGX)	Revenue if sold before harvest (UGX)	Percent change in revenue
Rice	408	541.8	2000	1,083,600	2850	1,544,130	42.5
Maize	914	309.6	500	154,800	1500	464,400	200.0
Millet	800	206.9	1000	206,900	1500	310,350	50.0
Beans	1,086	187.7	1000	187,700	2000	375,400	100
Ground nuts	529	102.4	2800	286,720	3500	358,400	25
Average annual grain revenue	-	-	-	836,782	-	1,377,230	64.6

Source of data: survey conducted by the authors.

For households that mainly depend on income from crops, they must have enough savings or access to credit to take care of household needs if they have to store their produce awaiting peak prices. Whereas, it is known that savings are low due to low income, the question is; why don't they borrow to offset temporally liquidity constraints? For instance, assuming two equal cropping seasons in a year, and that a household spends all crop income before the next harvest and not able to cut expenses, the average household would require a loan worth UGX 418,391 (one season crop income (836,782/2)) to defer grain sales for at least 3 months to the high price period just before the next harvest.

#### 4. Factors influencing farmers' decision on when to sell their produce

Using our household survey data, we run a simple logistic regression model to understand the various factors that may influence the farmers' decision on when to sell their produce. The results are presented in Table 4.

Table 4: Logit model estimates of factors influencing farmers' decision on when to sell produce

Variables	Coefficients	Std. Err.	z
Household obtained credit (1 = yes, 0 otherwise)	-0.2625*	0.1392	1.89
Age of household head	-0.0035	0.0060	0.59
Education of household head	-0.0549***	0.0191	2.87
Number of children	0.0471	0.0328	-1.44
Household has off farm income	-0.0421	0.1387	-0.3
Farm size (acres)	-0.0344**	0.0150	2.29
Membership in a farmer group = 1, otherwise = 0	-0.0071	0.1438	0.05
Distance to main market	-0.0233	0.0242	0.96
Constant	0.8052**	0.3177	-2.53
Number of observations	920	-	-
Log likelihood	-623.218	-	-
LR chi2	27.5***	-	-
Prob > chi2	0.0006	-	-

Source of data: survey conducted by the authors. \*Significant at 10%; \*\*Significant at 5%; \*\*\* Significant at 1%

Results indicate that credit, education of household head and land size significantly influence farmers' decision on when to sell produce. Households which obtained credit were

less likely to sell their produce immediately after harvest.

This confirms the hypothesis that obtaining credit can help the farmer to postpone sales at least for more than 4 weeks to a relatively high price period. The coefficient on education is negative and significant implying that every additional year of education reduces the likelihood of selling immediately after harvest. This might be explained by enhanced ability to understand marketing dynamics by those who have higher levels of education. We find that households with large farms are more likely to store their produce at least for more than four weeks and sell later at higher prices. This might be attributed to the fact that farmers with large farms tend to be market oriented and therefore are likely to sell their produce at a profitable price. Surprisingly we find no evidence that membership in farmer groups influence the decision on when to sell yet it was expected to be a source of credit to enable farmers to store and sell later in the peak period. A possible explanation is that not all group members can borrow at the same time and therefore some members may still sell immediately after harvest.

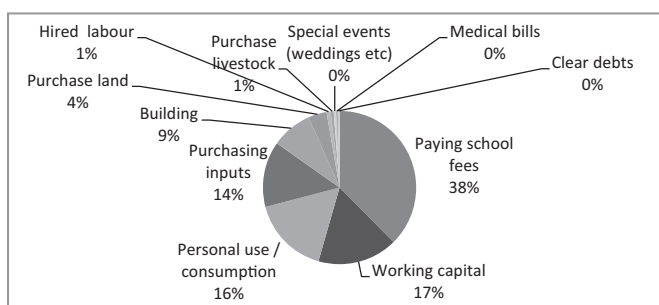
In what follows, we assess the role of informal credit in the food crop market focusing on how credit has influenced farmers to participate in intertemporal price arbitrage opportunities, but first, we present an overview of the rural credit market in Uganda.

## 5. Rural credit market in Uganda

### 5.1 Credit use in rural Uganda

There has been a general increase in demand for credit in Uganda. The national statistics indicate that the proportion of adults (aged 18 years and above) demanding loans increased from 17% in 2009/2010 to 22% in 2012/13 (UBOS statistics 2012/2013). Consistent with national statistics (UBOS statistics 2012/13), our survey reveals that the main purpose for which a majority (38%) of households borrow money is paying school fees. This is followed by working capital (17%) and consumption (16%) (Figure 2). Similar findings have been reported in other developing countries such as Nepal (Prina, 2015).

Figure 2: Percentage of households mentioning a particular purpose for borrowing



Uganda’s credit market consists of formal and informal sources of credit supply. Our findings indicate that a majority (84.2%) of sampled households has access to some form of credit. About 68.4 % of the households had obtained a loan in the past twelve months prior the survey and a majority (93%) obtained credit from informal financial services. Community-based saving methods, including accumulating savings and credit associations (ASCA) and rotational savings and credit associations (ROSCA) categorised as ‘self-help associations’, seem to dominate (Figure 3).

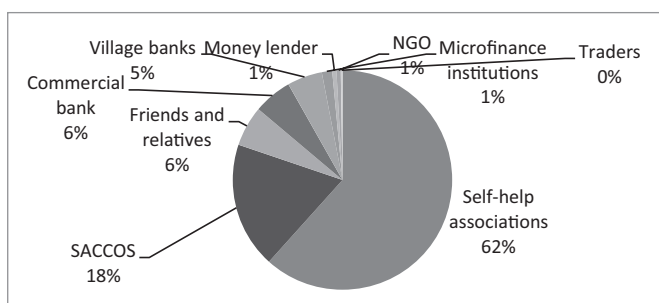


Figure 3: Source of credit

### 5. 2 Formal credit market

The formal credit market includes commercial banks and microfinance institutions. Uganda’s credit market is highly segmented and the proportion of the population accessing formal credit is still very low especially in rural areas. Financial exclusion of the rural population is attributed to lack of savings and reliable investment enterprises (Fletschner, 2008), high account transaction costs (Prina, 2015), documentation requirements and proximity to financial intermediaries (Allen, et al., 2016). Individuals in civil service and non-agricultural business are more likely to apply for credit compared to those in the agricultural sector (Mpuga, 2010). National statistics indicate that only 0.36 million (9.1% of 3.95 million) agricultural households access credit (MAAIF, 2011). This is explained by various factors, such as high risk associated with rain-fed agriculture and lack of physical assets for collateral. While land is the most credible asset for collateral, a large part of the land is not titled due to high costs involved, but also due to the customary land

tenure system where individuals have user rights but do not own the land. While those with land titles can access credit, in the absence of insurance markets they are unwilling to bear the risk of loss which may arise in case they are unable to payback (Boucher et al., 2008). For short term consumption credit, one would expect produce to be accepted as collateral. However, this is not viable due to poor marketing structures (individual marketing) and price fluctuations of agricultural commodities. High price of inputs/credit relative to output price and income volatility may significantly affect profits thus discouraging borrowers (Njeru et al., 2015). The small number of banks and delayed loan approval decisions equally discourage borrowers (Leon, 2015).

Moreover, there is a gender gap in use of formal financial services. Lending requirements of financial institutions limit rural women’s access to financial resources (Fletschner and Kenney, 2014). Considering their employment status (perceived as house wives), women are less likely to use formal financial services due to their lower level of income and education (Aterido et al., 2013). In Uganda 48% of women are not empowered and lack access to or decision-making ability over credit (Alkire et al., 2013). Women are more likely to be credit constrained to the extent that even those who apply get smaller amounts compared to men (Fletschner, 2009).

While the Government has introduced microfinance institutions (MFIs) to help farmers’ access credit, only 1% of sampled households had borrowed from microfinance institutions in the previous year before this study. MFIs have not helped poor farmers in rural areas as their requirements and procedure are not much different from those of commercial banks. This is further aggravated by insufficient infrastructure, low education levels and greater risks associated with agriculture production. Unless risks such as erratic weather conditions and income shocks are covered with micro insurance which is still lacking in Uganda financial markets microcredit will not benefit the rural poor farmers (Akotey and Adjasi, 2016). Consequently, most of the rural households have resorted to informal credit sources, which have relatively larger flexibility and where social capital may serve as collateral.

### 5.3 The role of informal credit market and its limitations in stabilizing food crop prices

Close to 100 million adults in sub-Saharan Africa use informal methods to save and borrow (Klapper and Singer, 2015). The informal credit market is not just a symptom of underdevelopment as viewed by many but complements the formal sector by supporting rural people who are excluded from the formal sector. Due to its flexibility, informal credit also provides another source in case of formal credit rationing (say when a borrower is offered less than requested for). Informal financial services are mainly community-based and exist in various forms including; savings credit and cooperatives organization (SACCO), unregulated village banks, accumulating savings and credit associations (ASCA), rotational savings and credit associations (ROSCA), traders,

private money lenders, friends and relatives (Anderson and Baland, 2002). The informal credit market plays an important role in supporting economic activities, including food crop production and marketing. Moreover, informal financial markets enable households to smooth consumption and deal with shocks, such as ill health. Proximity and economies of scope enjoyed by informal lenders reduce transaction costs and risks and enable them to serve various types of clients excluded from the formal sector (Guirkinger, 2008). The ability of the informal sector to utilise social networks to gather information on borrowers gives the informal market a comparative advantage over the formal sector in dealing with smallholder rural households that lack collateral and documented income records.

Why don't farmers borrow money against their expected high future produce prices to stabilize their income and smooth consumption?

To gain insight into the borrowing behaviour of farmers, and how this shapes their commodity marketing behaviour, it is important to understand the different sources of informal credit, the terms and conditions of borrowing, and the challenges faced on the supply and demand side. The most common sources of credit in the study area include self-help associations (ASCAs and ROSCAs), SACCOs and money lenders. We discuss each category in the subsequent section.

Community-based self-help associations (ASCA and ROSCA)

To minimise the effects of income fluctuations, households attempt to develop 'self-help' associations that enable them to smooth consumption. There are various community-based savings and credit associations in the study area, but their numbers could not be established because they are not registered. These are small village groups that operate almost a similar model of accumulating savings and provide loans to members with or without interest. About 62% of sampled households had received credit from the village associations in the past year prior to this study. The most widely used approach, especially by women, is a savings and credit association commonly known as 'Akabox' (a small box). The group derives the name from a metallic box that acts as a safe, it has 3 padlocks and the keys for each padlock are kept by 3 different people to ensure maximum safety of the money and books of account. Households select themselves and form small groups, each comprising about 30 people who are residents of the same village and known to each other. Each member of the group buys shares at Ug. 2,000 (0.6 USD) each and the maximum number of shares for one member is five (UGX 10,000). Every member is then required to save at least UGX 1000 – 5000 on a weekly basis and the money is borrowed by one or more members on application for a loan. The interest rate is determined by group members based on what they can afford. For most groups the interest rate varies between 3 and 5 percent per month. After a period of 12 months, all the loans must be paid. The fund and the accumulated profits are shared by the members and they start afresh.

ASCAs and ROSCAs have improved credit access for

many resource-poor households especially women to deal with shocks like ill health, payment of education expenses, and purchase of inputs such as seed and labour. Members do not need collateral to apply for a loan, they rely on social collateral and the main deterrent to default is the threat of community sanctions and fear of losing access to credit in future. The groups only require one to have a known source of income (e.g., a cash crop garden, livestock) and guarantors with a credible credit history within the group. However, the groups have established mechanisms for assessing their members' capacity to pay back the loan. They have a loans committee that does regular monitoring and categorises the risk profile of their clients based on land size, cash crop acreage and number/type of livestock owned. For example, in one of the groups (Rwentondo Tubebamwe) a member can access a loan of UGX 500,000 if s/he has at least one acre of rice. This suggests that there are still many households excluded from this category of informal credit market. What matters is not only access to credit but also how much credit one can access.

Although ASCAs and ROSCAs have helped to some extent in relaxing farmers' liquidity constraints, group loans are not sufficient to bail out farmers from selling produce during the peak season when prices are low. This is attributed to various limitations; The savings are generally very low and consequently the groups have limited capital. Credit rationing then becomes inevitable. A majority of the members are smallholder farmers depending on seasonal agriculture characterised by low yields and low prices. Some members have to sell produce to fulfil the requirement of weekly savings. In fact, some of the key respondents claim that 'akabox' contributes to food insecurity for poor households. We heard statements like; 'A woman will sell the only beans in the house to raise money for weekly contributions.' Others borrow from friends or relatives to raise weekly contributions; hence, they remain in a cycle of debts that compel them to sell their produce at low prices. Moreover, most rural households are involved in similar activities (agriculture), as a result credit needs (e.g labour, school fees) of group members tend to be concentrated in the same period hence decreasing the utility of intra-village credit. If all group members cannot borrow at the same time, this means that those who are credit constrained will sell their produce even when the prices are low.

Other risks include failure to pay back often times due to genuine reasons. Farmers borrow with the hope that they will generate sufficient crop revenue to repay the loan. However, they face the risk of commodity market imperfections. In the absence of government price support mechanisms and insurance, farmers bear price risks and may fail to repay the loans.

### *Savings and Credit Cooperative Societies (SACCO)*

Savings and Credit Cooperative Societies (SACCO) are another source of credit for rural households in Uganda. About 18% of the households in the study area had borrowed from a SACCO in the year prior the survey. SACCOs are



community-based, member driven cooperatives managed by the board as representatives. Unlike ROSCAs and ASCAs, SACCOs are organized under one umbrella body; Uganda Cooperative Savings and Credit Union Limited (UCSCU) which is registered under Uganda Cooperative Society. We can therefore, categorise them as semi-formal financial institutions. However, some SACCOs that do not meet minimum requirements are not registered. SACCOs are much bigger than community saving and credit associations and membership is open for anybody who can afford to buy shares.

To become a member, one must have shares and a savings account. One share is worth UGX 20,000 (7.5 USD). Members are required to deposit savings which finance members in form of loans. Credit access in SACCOs is restricted to members only. The interest rate ranges between 2% to 5% per month and is determined by members in the annual general meeting. Whereas the interest rate for SACCOs is often lower than that for community-based associations, a majority of households prefers to join the associations. This is explained by various factors such as; high costs, bureaucracy, and lack of trust based on a history of poor management and corruption (Mugenyi, 2010). Similar findings have been reported in Kenya by Dupas et al. (2014). For instance, it costs a total of UGX 34,000 to open an account in KICOD, one of the big SACCOs in the study area. This includes; an application fee, 3 passport photographs, shares, membership fee, savings ledger and a passbook. As pointed out by managers we interviewed, many poor households cannot afford such a cost. When poor households are excluded from a credit source that has one of the lowest interest rates, the only option they have is to sell their produce at the prevailing price even when it is low. Moreover, farmers decry the bureaucracy involved in accessing a loan. From the time of application, it may take four weeks or more to access a loan in a SACCO and this discourages borrowers.

Credit rationing is high in SACCOs as demand exceeds savings. Often times, applicants do not access loans due to limited capital which is a result of little savings by members. Similar to ROSCAs and ASCAs, loan demands tend to accumulate in the same period. Even those with access, the contribution of rural SACCOs is insufficient to offset farmers cash needs given the small size of loans. While SACCOs can borrow from commercial banks and microfinance institutions, most of them lack collateral. Hence, they cannot access loans. Moreover, farmers are given a short grace period of one month before they start paying back the loan and the maximum term is twelve months. This is not favourable for a farmer who would want to store produce for at least two to three months. Like in the formal credit market, imperfect information/information asymmetry is one major challenge that SACCOs face. The lender has less information than the borrower on ability and willingness to repay the loan. While some borrowers may have genuine reason for failure to pay back such as adverse weather conditions that may lead to crop failure, for others it is a moral hazard problem. Some borrowers acquire loans from various sources and there is no record to track them due to lack of coordination and limited

credit information sharing among lenders (Ghosh and Ray, 2016).

### *Money lenders/traders*

The number of individuals who have joined the credit market as money lenders has increased in the rural areas. They provide credit to about 1% of the households in our sample. Table 5 presents summary statistics on money lenders. Most money lenders are business people including traders who offer credit in form of cash or traders who offer goods on credit. The average money lender has primary education and has been in the money lending business for about 8 years. While money lenders are required by the government to register, only one out of sixteen lenders interviewed is actually registered. The rest operate illegally. They are therefore reluctant to provide information about their business. The money lenders we interviewed are willing to formalize their business but report to be constrained by a number of factors including; limited capital, rigorous procedures of forming a company, high registration fees and other charges as well as lack of information.

*Table 5: Summary statistics on characteristics of money lenders covered by the survey (N=16)*

Variable	Mean	Std. Dev.	Min	Max
Age of respondent	38.5	10.3	27	65
Education of respondent (years)	8.0	4.0	0	16
Experience in the business (years)	7.6	5.7	1	23
Interest rate (per month)	15.9	6.3	10	50
Repayment period (months)	2.7	1.3	1	6
Highest amount of loan given (thousand UGX)	1,058.3	771.6	500.0	3,000.0
Credit worth (thousand UGX)	26,400	37,600	250	120,000
Average monthly costs incurred in the business (thousand UGX)	164	156	5	400
Loan recovery rate	93.1	7.5	70	100

*Note: exchange rate: 1 USD ≈ 2650 UGX*

Money lenders charge the highest variable interest rate ranging from 10 to 50 percent per month. This is above the profit margin obtained by grain traders (Table 6) implying that money lenders may not help farmers to store their produce. The interest rate depends on the client, and is determined by many factors including; the amount of loan required, loan period, credit history, credibility and status of the borrower, personal relationship and commercial bank interest rates. The maximum loan period recorded is six months. The lender offers a contract based on his or her assessment of the risk of default. This perhaps explains the

high loan recovery rate ranging between 70% to 100% with a mean of 93.1%. The terms and conditions for borrowing include; collateral (land, commercial buildings, a car), a written agreement witnessed by a spouse, guarantor and a local government councillor. The registered money lender, in addition charges an application fee of UGX 50,000 and transport fee of UGX 100,000, which is used to verify the land, if used as collateral. Most of the land is not titled, however it can still be accepted as collateral by a money lender on the agreement that it has been sold to the lender. The contract/agreement involves the lender, borrower and witnesses who include a local council chair person, a spouse and parents or guardian if the borrower is not married. The agreement reads; "I (the borrower) have sold my property (land, house etc (collateral)) to... (lender) at a cost of UGX.... (market price)" Such an agreement is risky for the borrower as often the value of the collateral is much higher than the loan amount and some people have lost their property.

In addition to cash loans, some traders offer credit in the form of items such as seed (especially rice). What is striking is the interest attached on rice seed. Traders are not interested in cash but rather demand that at harvest, the borrower pays back twice as much of the seed quantity borrowed. For instance, if a farmer borrows 100 kg of seed, they pay back 200 kg of rice. This translates into 100% interest for a period of 4 months, and may significantly reduce the farmer's returns by twice the value of the seed used. Given such conditions and terms of borrowing it is clear that a majority of households cannot borrow from money lenders. And those that do borrow cannot store their produce to engage in arbitrage since they have to pay back as soon as they harvest.

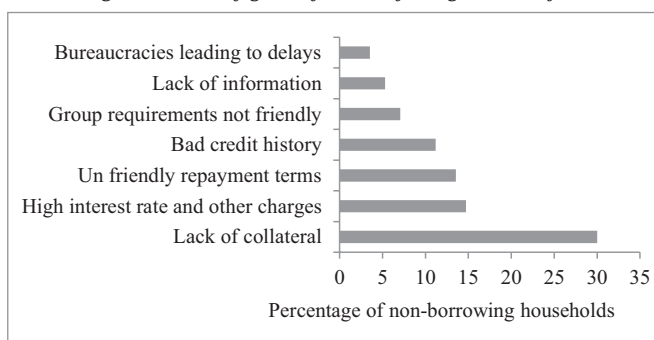
There is evidence of lenders reluctance to lend large sums of money to one individual. On average, the highest amount of loan offered is UGX 1.1 million. The amount of money given to one individual depends on what they can offer as collateral, the loan period and personal relationship. Land, vehicles and motorcycles are the most commonly accepted collateral for relatively large sums of money. Most farmers however, cannot afford such items as collateral and therefore can only access small loans from money lenders. The key challenge faced by money lenders is information asymmetry. There is no full information about the borrower, their capacity and willingness to pay back the loan. Strict measures are therefore taken to minimize "bad type" borrowers. Credit rationing is one way of reducing risks associated with moral hazard. In case of default, there is little faith in the ability of courts of law to seize collateral to recover the loan. One of the high court judges in Uganda Justice D. Batema is quoted by the national newspaper (The new vision 03/09/2015) warning money lenders to stop using courts as a way of recovering money from civil debtors: "A debt is not a crime. When you are recovering a loan of 1m you do not sell a house of 36m" The solution proposed by the judge is to renegotiate the payment schedule. Under such

circumstances, money lenders charge high interest rates to cover the risk. Limited capital is another constraint to both money lenders and potential borrowers. All the money lenders interviewed acknowledge limited capacity to satisfy their potential clients. Even when money lenders may borrow from SACCOs and banks, they are constrained by high interest rates in commercial banks, since their borrowers may not pay in time to enable them to service their own loans.

### *Limitations to credit access*

Our survey reveals that a portion (13.1%) of sampled households could not borrow from the informal credit market and have no access to credit due to various reasons (Figure 4). Lack of collateral, high interest rate and unfavourable repayment terms are most dominant. This is not unique to Uganda, even in more developed countries like China some poor households are still excluded from the informal credit market (Yuan and Xu, 2015). If some households cannot borrow, and those who have access cannot borrow at the same time, or borrow enough to offset their liquidity constraint they will be compelled to sell their produce even when prices are low.

*Figure 5: Flow of grains from the farm gate to the final*



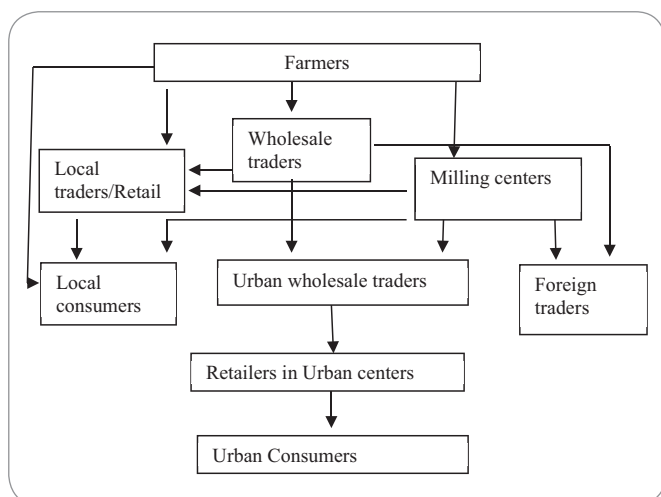
## **6. The role of traders in stabilizing food crop prices**

Economic theory predicts that, if a trader offers a lower price to the farmer than the equilibrium arbitrage price, another trader will offer a slightly higher price. The price will be bid up until the farmer achieves a full optimal arbitrage price for his produce. Why doesn't this happen in the food crop market? We attempt to answer this question in this section. But first it is important to understand the food crop marketing chain.

### *6.1 Marketing chain of food crops*

Our interaction with farmers and traders revealed there is no organized marketing system for food crops. The food crop market is characterised by many small buyers engaged in primary marketing and assembly. Figure 5 depicts the marketing chain of grains (specifically rice) from the farm gate to the final consumer.

Figure 5: Flow of grains from the farm gate to the final



Farmers sell their produce to three categories of buyers who include small local traders/retailers, wholesale traders and millers. While some local traders go to the villages and buy from the farm, some farmers deliver their produce to traders in the nearest trading centre. In our study area, we find four categories of traders; 1) Small local traders/retailers who buy produce from farmers, millers and other traders and sell directly to consumers. 2) A few traders with stores who go to the villages, buy produce from farmers, assemble it and do wholesale to retailers and large traders (from outside the district). 3) Millers who buy directly from farmers and sell to large wholesale traders (from outside the district), retailers and consumers. 4) Large wholesale traders from neighbouring urban centres especially Kabale and Kasese, as well as foreign traders from neighbouring countries, including Rwanda and the Democratic Republic of Congo, who buy from millers and local traders and sell to urban retailers.

### 6.2 Marketing margins and costs by type of grain traded

Middle men/traders operate at different stages of the market chain. While some deal directly with farmers, others only transact their business with fellow traders. In our case we assess average costs and profits of a local wholesale trader since they buy produce from a majority (73%) of the households. A total of five local traders were interviewed to gain insights in the grain trade dynamics at local level. The data were collected shortly after harvest in July 2016. Traders claim that this is their peak season confirming that most farmers sell shortly after harvest. We obtained the details of the most recently completed transaction of one wholesale local trader. A summary of the average marketing costs and profits is presented in Table 6. We present costs and profits from one trader because unlike the others interviewed, he is only engaged in marketing food grains. We therefore believe that he presents relatively accurate information. The others we interviewed could not easily separate grain marketing costs from costs of marketing other commodities in their shops.

Table 6: Marketing margins, costs and farmers' share of wholesale/retail price by type of grain traded

Marketing margins and costs per ton			
Type of grain	Rice	Maize	Millet
Purchasing price (UGX)	2,100,000	700,000	1,100,000
Selling price (UGX)	2,300,000	800,000	1,300,000
Total distance traded (km)	22.5	25.7	22.5
Quantity purchased (tons)	3	2	4
Sales period (days)	14	21	56
Gross margin (UGX)	200,000	100,000	200,000
Marketing costs (UGX)	71,407.4	70,861.1	37,930.5
Total costs (purchase price + marketing costs)	2,171,407.4	770,861.1	1,137,930.5
Net profit (UGX)	128,592.6	29,138.8	162,069.4
Marketing costs as a percentage of gross margin	35.7	70.9	18.9
Net profit as a percentage of total cost	12.6	5.3	7.8
Purchase price as a percentage of sales price	91.3	87.5	84.6
Marketing costs as a percentage of sales	3.1	8.8	2.9
Profit margin (net profit as a percentage of sales)	12.0	5.2	6.6

Note: Gross margin = selling price - purchase price, Profit = gross margin - marketing costs, and the time dimension for profit margin is one month (30 days)

Marketing costs are a comprehensive measure of all costs incurred in the marketing process from purchase to sale (assembly, transport, storage, processing, packaging, communication) and operating costs (rent of shop/storage facility, pest control, electricity, and market taxes, income tax on trading and wages). We find that local traders do incur relatively low costs (less than 10% of sales price) as they share some of these costs with farmers. For instance, farmers provide the bags, load the produce when collected from the farm and sometimes deliver the produce to the traders. Marketing costs for rice and millet form a relatively small percentage of the gross margin implying that traders get relatively higher returns from these crops.

Grain marketing in the study area is a profitable venture. The profits vary with different types of grains. In absolute terms, millet displays the highest net profit followed by rice and maize. However, it is important to note that millet had a relatively longer sales period. In terms of profitability rice marketing is more profitable. The local trader interviewed obtains a larger profit margin as a percentage of the cost price in rice (12.6%) marketing followed by millet (7.8 %) and maize (5.3%). This is expected in the local market where, compared to other crops rice has a higher demand from regional traders. Millet and maize are domestically traded and maize supply is much higher than the other grains as it is one crop grown by majority of households. The returns to money invested in grain trade is higher than the interest rate in

SACCOs implying that a trader can make profit by borrowing money to engage in grain trade. The traders interviewed do not add value in terms of transformation, they essentially undertake both spatial and intertemporal arbitrage.

One might argue that the food grain market is highly competitive and the wide gap between high and low food crop prices is due to high storage costs and risks incurred by the traders. We do not find evidence in the study area to support this argument. When prices are low, local wholesale traders buy produce in large quantities which they later supply to retailers and other traders from within and outside the district. Some of the produce purchased is immediately re-sold. For example, traders buy rice at UGX 2100 per kg and sell at UGX 2300/kg (Table 6) an increase of about 9.5%. Traders store part of the produce in expectation of higher prices in future. However, speculative returns may not be realized from inter-annual storage since most grains are produced for two seasons in a year. Storage costs therefore, are relatively low since grain stocks cannot be kept for a long time as they must be depleted before the next harvest. Considering all the traders interviewed, the storage period for grains reported ranges between 14 days to 84 days for a given consignment with an average of 45 days which is relatively short. It is also important to note that for most traders, the storage facility is multipurpose (acts as store, shop and residential for some). Thus, storage costs are spread across the different grains and enterprises. During storage, traders incur various costs including direct costs such as the cost of pesticides, rental costs, storage losses and the opportunity cost of capital. Save the high opportunity cost of capital, other costs are relatively small. For example, storage losses in case of rice were on average 0.44% of the grain stored in a period of about 38 days. These findings are consistent with reports from other studies (Delgado et al., 2017; Minten et al., 2016) in developing countries.

We acknowledge underestimation of costs due to lack of data on some unobserved trader costs such as opportunity cost of capital, time and risks such as quality deterioration in case the crop is not properly dried. Other risks such as theft and price shocks may be very small as they were not reported by the traders. Theft is not a big threat as most traders stay at the storage facilities and transportation risks for local traders are minimal considering a very short distance (25.7km) they move. Price shocks are not expected because traders store produce for short periods. We also note the difficulty in accessing true information from traders due to suspicion that they will be required to pay higher taxes. The other challenge is that most traders are involved in trade of different types of produce as well as selling other items, therefore it becomes difficult to isolate costs specific to food crop marketing from costs related to other activities. In the following section we discuss factors affecting competition in food crop trade in the study area.

### *6.3 Why is there no competition between traders, bidding up prices after the harvest, and dissipate rents from arbitrage?*

#### *Barriers to trade competition*

Although the food market is free entry and exit there seem to be some barriers to competition at different levels in the market chain, which could explain why farmers continue to receive low prices for their produce. Other than trade barriers, insufficient competition could also arise out of collusion among traders such that marginal changes in market entry cannot induce significant changes in competition (Bergquist, 2016). From our interviews with local traders an inquiry on why traders from neighbouring urban centres do not buy produce direct from farmers reveals two major barriers; limited information and high transaction costs. The traders outside the villages cannot easily identify the farmers since they operate as individuals. The non-local traders buy from their fellow traders or engage them as agents for procurement. In addition, farmers rely on traders for market information and this tends to establish personal relationships. There is therefore, an element of mistrust between farmers and traders who are not known to each other. Most, farmers are not willing to engage in direct transactions with strangers because of fear that they may not get a fair price. As alluded to by Mitra et al. (2016) such a situation becomes a barrier to competition and farmers may be exploited by local traders.

High transaction costs are caused by various factors, but mainly poor infrastructure and individual marketing. The area is characterised by a poor road network which makes it difficult and costly for traders to access the villages especially during the rainy season. Such conditions may discourage potential traders from outside the district. Poor roads not only increase transportation costs but also uncertainty about market prices and other transaction costs hence may significantly reduce producer shares (Cirera and Arndt 2008). Some remote areas have poor access to telephone networks which limits communication such that traders can only access the villages physically and this increases search costs especially for the non-local traders. Furthermore, poor storage infrastructure and other associated costs equally constrain traders from taking temporal arbitrage opportunities. We observed that traders lack proper storage facilities. The traders interviewed store the produce in their small shops which contain other items. This limits the quantity they purchase at a given time.

In absence of collective marketing by farmers, the low production levels of smallholders contribute to high transaction costs. Small quantities of output discourage potential traders to buy directly from farmers as it implies high search and transportation costs. While local traders make use of personal networks as well as get deliveries by the farmers, it becomes costly for non-local traders to acquire information about farmers' location, what and how much produce they sell. Consequently, the number of actors in the market chain increase as small local traders take advantage of assembling the small volumes for the large traders from regional markets in big towns. These conditions thus create an environment where the price margin becomes wide.

Despite efforts by government and NGOs to revive cooperatives and support farmer groups under the hypothesis that farmers bulk their produce to increase their bargaining

power (Bernard et al., 2008), we find that farmers continue to sell as individuals, a fact that may compromise their market selling prices. Consistent with Latynskiy and Berger (2016) our findings reveal that even farmers who belong to a marketing group prefer individual marketing through middle men and traders. They claim that traders can be easily accessed because they find them on the farm and that traders, in contrast to the farmer group, pay with cash on the spot (which enables farmers to manage liquidity constraints). While individual marketing may be convenient for farmers, in such circumstance farmers may be subjected to price discrimination as the trader negotiates the price with each farmer individually. Collective bargaining for example in farmer groups could reduce the number of middle men hence increase the farmers' share of the consumer price (Gruère et al., 2009). For instance, in Kenya female farmers who participate in groups, bulk their harvest and sell directly to the large trader, obtain higher prices for millet (Handsouch and Wollni, 2015). Moreover, lack of social capital and high-level organization to strengthen internal and external relations with farmer groups and market chain actors equally influence individual marketing behaviour which in turn affect farmers' sales prices (Fafchamps and Minten, 2001; Kaganzi et al., 2009)

Limited credit availability is another barrier to grain trade competition. The traders interviewed assert that due to limited access to credit and high cost of capital, they operate with low capital such that they are not able to make large purchases in advance of sales. Lack of; start-up working capital required for financing grain trade (purchasing and transporting grain), storage facilities and risks equally present substantial trade barriers for most potential entrants in the rural areas. The higher the fixed costs, the fewer traders the market will support, and the more likely farmers will receive a low price for their produce. Moreover, we do find that some poor households tend to sell to specific traders who offer them credit either in form of inputs and or food. Such households sell their produce at a fixed forward price to some local traders who offer them loans. The traders say they keep monitoring their clients' rice gardens to recover the loan as soon as they harvest. We cannot rule out effects of personalized relationship between farmers and traders as well as 'indirect monopoly power' by some local traders. Similar findings have been observed in other countries such as India (Minten et al., 2011).

## CONCLUSIONS

This study investigates the role of informal credit market and traders in stabilizing seasonal food crop prices. We discuss the imperfections in the rural Uganda credit market and how it shapes farmers' food crop marketing behaviour. Given the significance of traders in the market chain, we analyse traders' costs and profit structure in the study area, and we try to understand the imperfections in the grain market and the barriers that limit competition between traders at the local level.

While farmers do borrow from informal credit sources (specifically community-based self-help savings and credit associations), the credit that can be extended via these channels is insufficient to enable farmers to benefit from intertemporal arbitrage opportunities. It essentially supplements income from production rather than facilitate storage. In fact, loan repayment is one reason why farmers sell at low prices immediately after harvest. This is attributed to very small savings and reliance on agriculture as the only source of income. We also find that most of the (very) poor are unable to access informal credit to smooth their consumption. Thus, poor farmers will continue to 'sell low and buy high'. Local traders provide a valuable marketing service to many smallholder households by assembling and buying their small quantities of produce some from remote hard to reach villages. However, price volatility is consistent with limited competition in grain trade at the local level. We have provided several reasons why grain markets could be characterised by lack of competition. High transaction costs associated with poor infrastructure and individual marketing, and limited access to credit seem to be the main barriers to competition which in turn maintain excess margins in the grain market. Evidence from other sources suggest there may be collusion among traders, helping them to secure a greater share of the rents. For a colluding coalition it makes sense to maintain a condition where food can be purchased low and sold high. It remains to be researched how such a coalition can be maintained. We speculate that the many barriers to entry in the trader sector posed by information asymmetries, transaction costs, low trust between farmers and traders, and capital scarcity, help to maintain the current situation.

The policy implications of these findings in terms of market production and food security are several. There is need to reduce the cost of credit and increase access to credit. This can be done by encouraging and supporting community-based self-help savings and credit associations to raise their portfolio so as to enable more farmers to borrow at the same time. Low cost credit can stimulate investment in non-farm enterprises which may increase household income as well as savings. Other initiatives include the organisation of small-scale farmers to form cooperatives, and the creation and support of farmer- managed warehouses to facilitate storage of agricultural commodities. The receipts then can serve as collateral for farmers to access credit. Existing farmers groups at village level can be supported to bulk and store their produce, enabling them to negotiate for a higher price. Moreover, bulking will reduce search costs and promote competition. Investing in infrastructure will lower transaction costs and promote competition. This will in return raise farm-gate food crop prices. The relative effectiveness of these various options should be analysed in the future.

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