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Financing agricultural inputs in Northern Togo through an inventory credit system: an economic analysis of institutional response

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Abstract

Agricultural intensification is widely seen as a condition sine-qua-non for enhanced food security and as a major driver for overall economic growth in sub-Saharan Africa (SSA). In this process, the financial system has an important role to play, especially to finance agricultural inputs. However in SSA, the financial institutions initiated by governments and donors have in general not lived up to the expectations, in particular not for the agricultural sector, because of inappropriate design and weaknesses in implementation. Even the microfinance institutions which were supposed to support the small-scale farmers have deflected for their goals due to the risks that the agricultural sector represents. To date, the economic research tends to concentrate on the mechanisms that secure the credit of microfinance institutions. However, the effective implementation of new mechanisms to secure credit appears more difficult than foreseen, as the decision making processes involved are complex and constrained by the lack of information. This paper argues that sustainable agricultural financing needs alternative schemes that secure both the credit of financial institutions and farmers' income. It will also be shown how the new institutional economics perspective can be used to analyze and guide decision-making with respect to alternative schemes for agricultural financing. This paper which is based on quantitative and qualitative data presents the case of the inventory credit scheme on maize to facilitate access to agricultural inputs in Savannah region of Togo. In conclusion, some research areas will be indicated to improve our understanding of the inventory credit system.

Keywords: Financing, agricultural inputs, inventory credit, Togo

Introduction

In the Northern part of Togo (West Africa), the Savannah region, agriculture is by far the most important economic activity and provides food, and a large part of the income of its population. this region is also the poorest region of the country; 86% of the rural population are considered (Ministry of Economy, 2004). Under these circumstances, increased productivity of the agricultural sector is seen as an essential element of any strategy to stimulate economic growth within the region. It is also noted that increased agricultural production (and productivity) will largely depend on the adoption of more intensive technologies. To sustain such a process, financial institutions will have an important role to play. Farmers, in particular, will need loans to buy inputs (and eventually also better equipment). Financing will also play a pivotal role both down or upwards in the value chains, for input suppliers (e.g. inventory), processors (e.g. small-scale processing equipment), transporters and traders (Konlambigue, 2006). However, because of market failures and perceived riskiness of agricultural production, microfinance institutions (MFI), the only group of formal lenders is reluctant to provide the financial services that would enable intensification to take off. Small scale farmers generally sell part of their agricultural production right after the harvest to meet social obligations, to repay loans – from informal lenders – and satisfy other consumption needs. As prices are low, in particular during that period, farmers often have to sell more than the actual surplus that they produced to meet their immediate obligations. Later on during the season, they will buy the cereals back. The major point is that small scale farmers in the Region lack sufficient income from either agriculture or other non-agricultural activities to buy agricultural inputs, nor to invest much capital in any other way (e.g. construction of compost pits) in agricultural intensification. As a consequence, smallholder farmers are trapped in a vicious circles all leading to (increased) food insecurity and poverty. In response to these difficult circumstances, a large farmers' organization in the Region, the CAP has been

experimenting various mechanisms to provide agricultural inputs to their members, based on collective strategies (pooling of demand) and pro-active networking with public and private sector input suppliers. Yet, the mechanisms have quickly shown their limits. Today the organization is looking for new innovative solutions, among which the inventory credit system. It has however some concerns about the feasibility.

In this paper – which results from a case study – first, some concepts from the New Institutional Economics will be used to analyze the role and strategies of the actors involved in the input supply system, including their inter-relationships. Both farmers' and lenders' perceptions will be addressed. Secondly, the volatility of the maize price in the region will be studied using quantitative methods in order to verify that price risks justify the implementation of an inventory credit system. Finally it will be shown that innovative institutional arrangements that solve at least part of the coordination problems are required to that secure access to credit for agricultural inputs.

Materials and methods

The information presented in this paper is based on information retrieved from all kinds of documents (including statistical reports – though only very marginally available and of uncertain reliability, reports from NGOs and producer organizations), results observations and in-depth discussions with the main actors: the Centrale d'Auto-promotion Paysanne (CAPs), a farmer – based organization (FBO), the 'Caisse Mutuelle d'Epargne et de Crédit' (CMEC), a farmer – controlled savings and credit structure, input suppliers and facilitation institutions.

For the quantitative analysis, a data set consisting of monthly maize prices from 1999 to 2004 on representative markets of the four prefectures in the region (Kpendjal, Oti, Tandjoaré and Tône) has been established and exploited. The price in the Prefecture of Tône has been used as reference. E-views 5.0 is the computer software used to perform the analysis.

The New Institutional Economics and agricultural credit market failures

In most of the Sub-Saharan African countries, the high level of transaction costs (infrastructure and information), thin markets and difficulties in the enforcement of contracts are the main reasons of the unwillingness of the private sector, notably banks and MFI, to offer credit to farmers. As a result, there is a market failure in the provision of credit to rural households and farmers are unable to finance the purchase of agricultural inputs such as modern seeds and fertilizers (Kherallah and Kirsten, 2003). In such risky environments, formal lenders have little incentive to invest in financing of smallholder agriculture. The riskiness of agriculture, from the formal lenders' point of view, is essentially the result of price and/or climatic risks; risks that are relatively well-known and understood. Dorward and Kydd (2004) add two other sources of risk, the lack of economic coordination and opportunism. Coordination risks refer to those situations where the returns to an investment of actor A, is dependent upon complementary action involving other actors, whose behavior is uncertain. Opportunism in this context, refers to the situation where an actor who involved in any complementary action has some kind of monopoly power, and is able (and probably willing) to capture an undue share of the revenues in the supply chain. Particular attention is required to reduce such risks during the elaboration of any policy that aims to stimulate private sector investment, and chain development. The New Institutional Economics perspective sees institutional response and innovation as key to facilitate and improve coordination between actors. Williamson (2000) defined an institution as an arrangement between economic units that governs the ways in which its members can cooperate and/or compete (Kherallah and Kirsten, 2003). Many alternative systems of financing, through vertical and horizontal 'integration' are experimenting in rural areas as an institutional response to agricultural credit market failures.

The forecasting of agricultural products prices volatility

The inventory credit scheme has its interest in areas where the price variance, and thus the risk, is high. So it is important to model the volatility forecast using the volatility of a product's price in this paper, the model ARCH developed by Engel (1982) and generalized in GARCH (Generalized ARCH) by Bollerslev (1986) and Taylor (1986). The GARCH (1, 1) is based on the assumption that forecasts of prices variance changing in time depend on the lagged variance of prices (Matringe, 2004). An unexpected increase or decrease in the price at time t will generate an increase or decrease in the expected variability in the next period. The model is defined in this study as such:

$P_{tône,\ t} = \beta_0 + \beta_1 P_{tône,t-1} + \beta_2 P_{tand,t-1} + \beta_3 P_{oti,t-1} + \beta_4 P_{kpen,t-1} + u_t$

$\sigma_t^2 = \alpha_0 + \alpha u^2_{t-1} + \gamma \sigma_{t-1}^2$

$\alpha > 0$ et $\gamma \geq 0$

$P_{tône,\ t}$ = Price in the prefecture of Tône at t
$P_{tône,\ t-1}$ = Price in the prefecture of Tône at t-1
$P_{tand,\ t-1}$ = Price in the prefecture of Tandjoaré at t-1

$P_{oti,\ t-1}$ = Price in the prefecture of Oti at t-1
$P_{kpen,\ t-1}$ = Price in the prefecture of Kpendjal at t-1

Where u^2_{t-1} and σ_{t-1}^2 represent respectively news about the volatility and the forecast variance from the previous period.

To capture the best periods for the storage and the selling of maize, a series of dummy variables have been introduced in the model through following steps.

Step 1: Model 1

First, dummy variables related to the months of the years have been integrated in the regression in order to identify the months of highest price and lowest one

$P_{tône,t} = \beta_1 P_{tône,t-1} + \beta_2 P_{tand,t-1} + \beta_3 P_{oti,t-1} + \beta_4 P_{kpen,t-1} + \beta_5 Jan + \beta_6 Fev + \ldots\ldots\ldots + \beta_{16} Dec$

$\sigma_t^2 = \alpha_0 + \alpha u^2_{t-1} + \gamma \sigma_{t-1}^2$

Step 2: Model 2

As the mean price of each month is known, they can be regrouped in two, the highest period (High) and the lowest one (Low). These periods are also introduced in the regression as dummy variables such as:

$P_{tône,t} = \beta_1 P_{tône,t-1} + \beta_2 P_{tand,t-1} + \beta_3 P_{oti,t-1} + \beta_4 P_{kpen,t-1} + \beta_5 High + \beta_6 Low$

$\sigma_t^2 = \alpha_0 + \alpha u^2_{t-1} + \gamma \sigma_{t-1}^2 + \beta High$

Results and discussions

An insufficient and incomplete institutional mechanism

To respond to the difficulties of its members to have access to credit, the CAP choose the institutional way in developing both informal and formal relationships with the main actors involved in the input supply value chains in the region through a system that worked for a while. In this system, the CAP has played an important brokery role. Each year, it ordered agricultural inputs from input suppliers, both the government agency (DRAEP) and private actors, based on the needs of their members. To facilitate the operation the CAP had negotiated and signed a contract with the DRAEP (fertilizers were still subsidized by the government) for fertilizer supplies. So when an individual or a group received an input credit from the CMEC, a receipt was delivered to get the correspondent input from the CAP. For the repayment, the representatives of each group were in charge of recovering the amount due by their members for deposit at the CMEC. The CAP has carried out horizontal coordination by pooling member's demand of inputs and credit; and vertical coordination through the contract established with input suppliers and the CMEC, then reduced the transaction costs both for farmer's and lender. However, this arrangement did not overcome the constraint of access to finance for small scale farmers. After a short experience, the CMEC recorded an important unpaid debt, it hardened the conditions and the amount of credit to farmers decreased. The institutional mechanism failed to resolve the problem of economic coordination risks as indicated by Dorward and Kydd (2004). The main reasons of this situation were the incapacity of the CMEC to control the receipt of borrowers and the absence of a collective marketing of the product. To invest in the financing of small scale farmers now, the CMEC would like to be sure that there is a secure outlet for the production. This calls for the integration of a new group of actors, i.e. the traders of maize in the mechanism. So there is a need to improve the existing arrangement that should secure both the CMEC (credit) and farmers (income). This is what Poulton (2004) calls second level coordination. The essence of this coordination activity is the establishment of linkages between input suppliers, financiers, output buyers and public service providers (extension, research), so that each actor can invest, confident that the complementary services that the farmers need to make profitable use of their service are indeed available (Poulton, 2004). This is what the CAP intends to do through the experimentation of the inventory credit system. The main questions that they raise are: Is it feasible? How can it work? The answers to these questions will be addressed in the next sections.

The persistence of the volatility of the maize price over the time

The results of the variance equation indicate that the term error coefficients (news on the volatility) are positive for the two models as showed in Table 1. So

we obtain a coefficient of 57.37 % and 57.95 % respectively for models 1 and 2. It indicates that the volatility of the price observed the previous year has 57% of chance to repeat the next year in the case of the two models. Shocks tend to persist over the time. In other word the changes in the price have a good chance to repeat during the next years.

The variance of models 1 and 2 is high and is the result of high price risk. This characteristic of the intra-annual price evolution is favorable for the inventory credit system setting-up in the region.

The planning of storage and selling off of the maize

Table 2 shows that the coefficients of all dummy variables are positive and significant. The highest are observed between March and August with a peak in June and the lowest one in December. It means that the price of maize in the prefecture of Tône is at the high level in June and low level in December. In the case of the model 2, we can say that there is a difference in the price (mean) of 14 FCFA/Kg between the lowest period (harvest time) and the highest period. However, the best period to constitute the stock is localized around December and the period to sell off around June in order to capture a difference of 35 FCFA/Kg. If we consider the mean, the difference of 14 FCFA/KG must be sufficient to cover operation cost and margins before to conclude about the feasibility of the system.

Contractual relationships for the implementation of the inventory credit system

In the two previous sections, we have shown through an econometric analysis that there is a good chance of success for the inventory credit system in the region. Now, it is important to analyze the institutional aspects that will support the new system in order to fill the gap observed in the former one. Given that there is no professional warehouse keeper in the area, the CAP will play this role and products will be stocked into the warehouse (to be build). So the inventory credit scheme will run as such:

(i) At the harvest, each farmer's group will make a deposit (stock) of maize at the CAP on behalf of its members. The product must be well packaged and the name of the owner and the group should be put on each bag. A scrupulous control of the quality and the quantity will be done both by the CAP and the CMEC before the closing of the warehouse with two padlocks, one for the CAP and the second one for the CMEC. So a deposit certificate is delivered by the CAP to the farmer's groups concerned to guarantee the request of loan at the CMEC. The amount of the guarantee should be based on the quantity, the quality and above all the price of the product at the harvest period (In our case, December). The credit will be granted in two parts: in kind (for input purchase) an in cash (to do another business or for consumption). Then it will be easy for the CAP to gather input needs, in order to negotiate a good price with input suppliers and for the delivery on time.

(ii) Towards the lean season**,** we could face two cases.

Each group can pay back to the CMEC the loan and storage fees with the income earned from their business if it has been profitable. After the repayment, a withdrawal receipt will be given to the group in order to get back their products. So they will have enough time to negotiate with traders a good price for their products. Many of farmers will also choose to use the product for family consumption.

In the case where they cannot pay back with the income of their small business (or because they use all of the money in cash for consumption or other investment), a marketing mechanism led by the CAP will be in charge of exploring market outlets and to negotiate with traders.

This activity will start since the constitution of the stock and the sale must be collective and well planned. Here the CAP has to extend vertical coordination through formal contracts with traders that indicate clearly the quantity and the quality of maize at a designated price. Contract farming reduces both production and marketing risk by ensuring a guaranteed source of supply with specific quality requirements to processors on intermediaries and ensuring farmers an immediate market outlet for their produce (Kherallah and Kirsten, 2003).

The main advantage is that the maize price will be more attractive at that time (around 14FCFA/KG). At the end of the marketing process, a balance sheet will be established for each group by deducting their repayment amount due and storage fees from their receipts. When it is positive, the group will get back the balance. To avoid the risk of opportunism the CAP have to increase its bargaining power by planning the marketing, the differentiation of the offer and/or by reducing the production costs in order to be competitive.

Conclusion

The institutional arrangement implemented by the CAP was not able to overcome markets failures because of the lack of downstream vertical coordination. The output market has been neglected in the mechanism and constitutes a risk for the MFI.

The inventory credit system that proposes to experiment the CAP should, in principle, fill the gap. Concerning its feasibility, it has been shown that the system has a good chance of success in the area, but we need to complete the analysis to verify whether 14FCFA/KG is enough to cover storage costs and margins.

As the CAP will be involved in contractual relationships with traders/processors, there is a big risk to become dependent from downstream actors with limited negotiation capacity. They need to improve their organizational structure by integrating real marketing specialists in its staff. They have also to improve their bargaining power by developing competitive strategies. In this context of contractual relationships, the unknown is the capacity or the unwillingness of actors to respect their commitment. Then, it becomes important to analyze their behavior in order to identify the most efficient contract. The contract theoretical framework through the principal – agent model can be use to model behaviors and propose the 'best' contract.

References

Dorward, A., et al., 2004, Institutions, Markets and Policies for Pro-Poor Agricultural Growth, Center for Development and Poverty Reduction, Imperial College, Wye.

Kherallah, M., and Kirsten, J., 2001, The New Institutional Economics: Application for Agricultural Policy Research in Developing Countries, MSSD Discussion Paper IFPRI, Washington, 41p.

Konlambigue, M., 2006, Les relations contractuelles pour le financement des intrants agricoles chez les petits agriculteurs au Togo: le cas du warrantage, Mémoire de DESS Economie et Sociologie Rurale, UCL, Louvain-La-Neuve, 52P

Matringe, O., 2004, Application of GARCH models in forecasting the volatility of agricultural commodities, Switzerland. Ministry of Economy, 2004, Avant projet de document intérimaire de stratégie de réduction de la pauvreté, République Togolaise, Lomé, 82p.

Poulton, C., et al., 2004, Priorities and Preconditions for Successful Investment in Smallholder Agriculture in Sub-Saharan Africa. In Proceedings of the Inaugural Symposium of the African Association of Agricultural Economists, Nairobi, Kenya.

Table 1. Results of the variance equation

	Model 1				Model 2			
	Coefficients	Stand-Dev	Z - Stat	Probability	Coefficients	Stand-Dev	Z - Stat	Probabilité
α_0	376.7897	149.7803	2.515616	0.0119	230.9398	61.13291	3.777667	0.0002
α	0.573768	0.174677	3.284741	0.0010	0.579528	0.114656	5.054474	0.0000
γ	-0.251031	0.194013	-1.293891	0.1957	-0.330702	0.066585	-4.966593	0.0000
β					489.1649	64.19332	7.620185	0.0000

Table 2. Results of the main equation of the regression

	Model 1				Model 2			
	Coefficients	Stand-Dev	Z - Stat	Probability	Coefficients	Stand-Dev	Z - Stat	Probability
β_5	114.7457	11.99588	9.565427	0.0000	107.8253	5.725216	18.83340	0.0000
β_6	116.1746	15.77466	7.364629	0.0000	121.8274	8.638004	14.10366	0.0000
β_7	140.5330	14.90054	9.431401	0.0000	-	-	-	-
β_8	118.8994	10.64655	11.16789	0.0000	-	-	-	-
β_9	125.0648	9.584765	13.04829	0.0000	-	-	-	-
β_{10}	145.3561	13.40453	10.84380	0.0000	-	-	-	-
β_{11}	126.2694	12.00835	10.51513	0.0000	-	-	-	-
β_{12}	125.9813	9.654965	13.04834	0.0000	-	-	-	-
β_{13}	113.4527	7.806306	14.53347	0.0000	-	-	-	-
β_{14}	112.1648	8.612445	13.02357	0.0000	-	-	-	-
β_{15}	110.7511	7.363381	15.04079	0.0000	-	-	-	-
β_{16}	109.8750	9.651993	11.38365	0.0000	-	-	-	-