17b. The Effect of Credit Access on Storage and Infrastructure in Northern Ghana

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Abstract/Summary

Within the three northern regions of Ghana (Upper East, Upper West, and Northern), food insecurity affects sixteen percent of the population, making food security a major focus of many of the development programs targeting poverty reduction and economic growth. The USAID's Feed the Future Initiative works partly through integration and partnership with USAID Ghana Mission (USAID|Ghana) for the Resiliency in Northern Ghana (RING) Project. This effort was designed to contribute to the Government of Ghana's efforts to sustainably reduce poverty and improve the nutritional status of vulnerable populations. Recent policy initiatives emphasize the importance of agriculture in economic growth and poverty reduction in northern Ghana, where the seasonality of agricultural production makes crop storage necessary. However, there are several reasons that motivate farmers to store in developing countries. To successfully increase food security, it is necessary to identify what factors affect a storage decision and model policy accordingly. The purpose of this paper is to increase the understanding of storage behavior of smallholder maize farmers in northern Ghana. In order to do so, it is necessary to identify factors affecting storage behavior and the magnitude of their influence. Through achieving these objectives and fulfilling the overall purpose, this paper may serve a role in guiding the focus of future policy initiatives focused in northern Ghana towards initiatives focused on factors having significant effects on storage behavior. The analysis is based on data from a USAID funded agriculture production survey conducted in 2013 and 2014 in northern Ghana. Econometric analysis was performed using the Maximum Likelihood Estimation method. Results suggest that farms within areas targeted by development initiatives benefit from extension education programs. Those not directly associated with extension and development programs may benefit from spillovers of knowledge and resources from their neighbors.

Credit Access & Storage Behavior: Smallholder Maize Farmers in Northern Ghana

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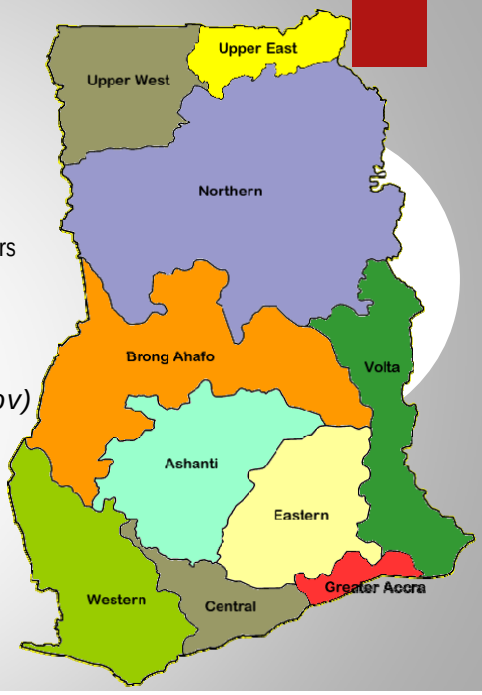
Ghana

- Agricultural sector contributes 25% GDP *(Wood, 2013)*
  - Largest source of employment - mostly smallholders *(Feed the Future, 2011)*
- Several regions identified as targets by USAID's Feed the Future Initiative *(www.feedthefuture.gov)*
- Poverty rate: 22% *(Zereyesus et al., 2014)*
- Fear income gap will widen between North and South *(Feed the Future, 2011)*



Outline

Problem Statement: Storage

- Storage serves multiple purposes in developing countries
  - Liquidity, convenience yield, arbitrage
    (FAO, 1994; Saha & Stroud,1994; Tefara et. al, 2011)
- Binding credit and liquidity constraints cause farmers to sell to meet cash needs (*Stephens & Barrett, 2011)*
- Sell low, buy high phenomenon (*Stephens & Barrett, 2011)*

Poverty Trap

Harvest

- Increased food supply
- Lower commodity prices
- Sell to meet cash needs
- Food stock below expected need

Post-Harvest

- Tighter food supply
- Higher commodity prices
- Signal for coming food scarcity
- Buy to meet expected need

Result

- Smallholder farmers cannot invest in productive assets or capitalize on price and supply shifts

Problem Statement: Credit

- *Credit Rationing*: when a farmer is not able to receive enough credit to meet their operation's needs *(Winter-Nelson & Temu, 2005)*
  - Credit Supply < Credit Demand
- Profit-Liquidity Effect *(Foltz, 2004; Guirkinger & Boucher, 2008)*
  - Sufficient credit access allows for more optimal usage of inputs
  - Credit-rationed farmers have their usage of inputs constrained by availability of capital

Objectives

Purpose

- Increase understanding of how credit access affects storage behavior of smallholder maize farmers in northern Ghana.

Primary Objective

- Examine effect of adequate credit access on quantity of harvest stored by smallholder maize farmers

Potential Outcomes

- Increase understanding of how credit access affects storage behavior by increasing liquidity
- Help in designing strategies to overcome "sell low, buy high" phenomenon

Research Framework

Literature

- Largely market participation in lesser developed countries

Assumptions

- Market participation and storage are implicitly related
- Utility from storage is unobservable outside of the observed intensity of storage
- Utility is maximized at the observed quantity stored

$$\text{Utility from Storage} = f(\text{Convenience Yield, Liquidity, Profit from Arbitrage})$$

Data

- USAID: Agricultural production survey (APS), 2013-2014
  - 527 households total
- USAID: Population-based survey (PBS), 2012
  - Used data for credit and age
- 98% store a portion of maize harvested
- Price: Revenue/Volume of sales at time of harvest
- Dependency Ratio: Children/Adults in a household

Descriptive Statistics (n=354)

Variable	Mean	Std. Dev.	Min	Max
Production				
Farm Output (kg)	806.40	845.35	0	6000
Storage				
Stored (kg)	583.86	783.67	0	7800
On-Farm Storage	0.57		0	1
Marketing				
Harvest Sales (kg)	56.95	188.21	0	2000
Price (GHS)	0.38	3.22	0	60
Market Distance (km)	1.80	14.09	0	261
Demographic				
Consumption (kg)	93.41	231.28	0	3000
Dependency Ratio	1.35	1.04	0	9
Female	0.08		0	1
Member of Extension Organization	0.29		0	1
Access to Adequate Credit	0.42		0	1
Within RING Zone	0.52		0	1

Model

- Continuous Decision Model (OLS):

$$Y_i = \beta_1 Adequate\ Credit\ Access + \beta_i X_i + \varepsilon_i$$

- Y_i: Qty stored at harvest
- X_i: Demographics, and data on marketing, production and storage

Results

Variable	Coefficient	Robust SE	[95% Conf.	Interval]	Significant
Price	-1.16	1.13	-3.38	1.06	
Farm Output	**0.78**	**0.05**	**0.68**	**0.89**	***
Harvest Sales	**-0.81**	**0.18**	**-1.17**	**-0.45**	***
Consumption	**-0.23**	**0.10**	**-0.43**	**-0.02**	**
Extension Organization	**189.07**	**100.11**	**-7.83**	**385.97**	*
Access to Adequate Credit	-59.71	52.81	-163.60	44.17	
Female	34.67	45.58	-54.98	124.32	
Dependency Ration	17.96	22.05	-25.42	61.33	
Market Distance	-0.29	0.29	-0.87	0.29	
On-Farm Storage	**-185.35**	**77.75**	**-338.29**	**-32.42**	**
Within RING Zone	**133.38**	**60.60**	**14.19**	**252.57**	**
Intercept	2.68	48.75	-93.21	98.58	
Adjusted R^2				0.64	
N				354	

***,**,* denote significance at the 99, 95, 90 percent confidence levels, respectively

Discussion & Conclusion

- Adequate credit access did not test to have a significant effect on quantity of maize stored at harvest
- Being a member to an extension organization greatly increased storage at harvest.
- Knowledge of production and marketing practices could be the binding constraint instead of adequate credit access

Suggested Policy

- Significant focus on increasing extension education.

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