Examining Underinvestment in Agriculture: Measuring Returns to Capital and Insurance Among Farmers

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Project overview and background

Managing business and personal finances can be an immense challenge for rural farmers, whose financial fortunes are frequently determined by forces beyond their control, such as weather and crop prices. Farmers who might increase their productivity and their incomes by making new investments in agricultural inputs are wary of the potential riskiness of the outcomes. In Ghana, where 52% of Ghana's population lives in rural areas and 44% of the rural population lives below the poverty line, the situation seems particularly acute.[1]

Farmers face a unique set of risks that makes the decision to invest very complex. Crop prices and weather patterns beyond farmers' control have an enormous impact on farmers' fortunes – and on their ability to repay any loans they have taken. As such, some farmers are reluctant to take loans to finance seemingly profitable ideas for fear of not being able to repay. That farmers often abstain from potentially productive investments may be explained by two distinct hypotheses. It may be that farmers are risk averse, and fear the unknown outcomes of new ventures. Equally likely, farmers may refrain from investments because they lack the initial capital to do so.

By examining how insurance products and capital shocks impact farmers' investment decisions, this study will distinguish between the effects of risk aversion and of capital constraints on farmers' behavior.

Traditional insurance is not an easy sell for those unfamiliar with the concept, and with the exception of the new National Health Insurance in Ghana, formal insurance of any sort is not common in rural areas. In Ghana, certain non-governmental organizations plan to begin marketing crop insurance products in the next few years, further highlighting the immediate need to learn more about farmers' interest in crop insurance.

Another critical outcome of the project is the measurement of returns to capital for farmers.

Study Design

Complete lists of maize farmers will be collected from the Millenium Development Authority (MiDA) sample in Tamale, Wale Wale and Savelugu districts. Working within MiDA-targeted districts provides access to a great deal of rich data. Detailed surveys have just been completed at the household level which will serve as a baseline. MiDA surveys will be repeated every three years in the same districts. The three selected districts are both MiDA districts and also districts with working rainfall stations.

The 470 Maize farmers selected for this study will be randomly allocated into one of four groups. Three different treatments will be marketed to farmers and measured in this study: the direct transfer of capital (116 farmers), a rainfall insurance product (116 farmers), or both the transfer of capital and the insurance product (84 farmers). The fourth group of farmers will receive no treatment, but be monitored and surveyed as the control group.

Maize was selected as the focal crop because it is widespread in the three districts, sensitive to rainfall and inputs, and grown buy farmers of all socio-economic levels. Shea nuts, groundnuts, and soybeans require few inputs, so that a capital drop may not be required or used effectively.

[1] World Bank, Ghana Poverty Reduction Strategy, February 2003.

Farmers consistently listed maize and rice as the two most difficult crops to grow, based on the cost of inputs and labor requirements. While the success of both is affected by rainfall, maize is more susceptible to both drought and flood. Maize is mostly grown for consumption, while rice tends to be grown for commercial sale. Many farmers listed food security as a big yearly concern, implying that the success of a maize harvest is very important. Because maize is also farmed widely in the Eastern Region (rice is less common), operations during the pilot will closely represent those in the full launch.

The type of insurance will be rainfall insurance. The farmers repeatedly listed rain as a key determinant of the success of a harvest. For example, in a bad year there is drought, or the rains come late and so planting is late. Both too much and too little (largely defined by frequency) rain can spoil a harvest. In comparison, the majority of the farmers we spoke to in the North do not regularly sell their crops. When they do sell, they state that it is easy to find a buyer.

The exact amount of capital provided to each farmer will be further refined, but will be roughly around 200 Ghana Cedis. The Northern Region farmers listed many different things they could invest in to increase their yields, including fertilizer, new seed varieties, rental or purchase of more land, rental of bullocks or a tractor for plowing, and more by-day labor. Many of the listed items are not sold at agric dealers. For that reason, it may be better to offer farmers cash, as opposed to credit at a dealer.

The outcomes to be measured include: size of farm plot; number and variety of crops planted; inputs used, including equipment, labor, chemicals, and seeds; amount and value of crops harvested; and household income, consumption, and nutrition.

Measuring returns to capital

It is challenging to estimate the returns to capital for farmers because the optimal level of capital stock likely depends on characteristics of entrepreneurial activity that are difficult to measure. Eliminating any ability bias can prove difficult, especially if it means exploiting an exogenous shock that is uncorrelated with entrepreneurial ability to select a sample, but therefore limiting the sample to firms exposed to that shock. For example, while restricting a sample to firms applying for credit eliminates ability bias, it introduces a selection bias because firms applying for loans are those who specifically anticipate high returns to capital. Those who apply for credit also differ from those who do not because they anticipate higher returns to capital and are informed about lenders and the lending process. By sampling farmers independent of their applications for formal credit, we are removing the self-selection bias inherent in a sample made up of credit applicants. In this way, we will be able to more accurately develop a measure of the return to capital for the broader spectrum of farmers.

Project update and next steps

In August and September, eighteen focus groups session have been held with farmers in the northern and eastern region of Ghana. These sessions helped to gain a better understanding of the risks and challenges facing farmers, and whether crop price or rainfall fluctuations are of greater concern. Also a detailed listing of existing crops and average yields has been collected, along with information on the market for various regional crops and the input costs per acre for different crops. In the coming months, historical rainfall data will be collected to inform the specific insurance product design. In early January 2009, the intervention will be piloted, and the study design accordingly modified if necessary. The full launch will begin in time for the major farming season in the Northern Region, in February/March 2009.