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

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Sector(s): Agriculture, Social Protection

Fieldwork: Innovations for Poverty Action (IPA)

Location: Ghana

Sample: 1,146 rural farmers

Initiative(s): Agricultural Technology Adoption Initiative (ATAI)

Target group: Farmers

Outcome of interest: Earnings and income Technology adoption

Intervention type: Cash transfers Fertilizer and agricultural inputs Insurance Risk mitigation Unconditional cash transfers

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Research Papers: Agricultural Decisions after Relaxing Credit and Risk Constraints

Partner organization(s): BASIS Research Program on Poverty, Inequality and Development, Consortium on Financial Systems and Poverty (CFSP), Ghana Agricultural Insurance Programme (GAIP), Government of Ghana Ministry of Food and Agriculture, International Initiative for Impact Evaluation (3ie), Presbyterian Agricultural Services (PAS), Savanna Agricultural Research Institute (SARI)

Underinvestment in agricultural inputs such as fertilizer or labor is thought to drive low crop yields throughout the developing world. Researchers in northern Ghana conducted a randomized evaluation to assess the underlying reason for underinvestment by examining the relative effectiveness of cash grants and insurance grants in improving crop yields. Results suggest that uninsured risk, rather than a lack of capital, was the primary constraint on investment. Researchers found that farmers who received free insurance spent more on fertilizer and hired labor, and they also cultivated more land than those who received cash grants.

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Underinvestment in agricultural inputs such as fertilizer, hybrid seeds, and labor is thought to drive low crop yields in Africa and other parts of the developing world. Several factors may help explain why farmers fail to invest in such potentially profitable inputs. It is possible that they are wary of the riskiness of adopting new agricultural methods or tools—if they invest and their crops still fail, they will have even less money than if they had not invested at all. Farmers may also lack the capital necessary to purchase these inputs and be unable to obtain credit to finance investment in their farms. Because the returns to using new

technologies can be so high, encouraging use among farmers has the potential to greatly improve their welfare. Financial institutions and policymakers first need to understand what factors are truly driving underinvestment in agriculture.

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The climate of northern Ghana's Savannah Region has a single short wet season, with high annual variation in rainfall. These weather patterns create great risk for farmers who depend on the weather for their livelihood, particularly when agriculture is primarily rain-fed, as it is in this area. There is strong evidence that shocks in the amount of rainfall translate directly into consumption fluctuations for farmers, and so investment in new agricultural technologies or methods has the potential to significantly affect welfare. Throughout Ghana, the average farmer uses only 7.4 kilograms of fertilizer per hectare, while in South Asia fertilizer use averages more than 100 kilograms per hectare. Initial surveys in northern Ghana revealed that the median farmer participating in this study did not use any chemical inputs on their crops, often citing lack of money or concerns regarding the weather risk as key obstacles preventing investment.

Young woman waters her newly-planted field in Ghana.

Photo credit: Gerhard Petterson, Shutterstock.com

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In the first year of the study, researchers tested the relative importance of capital and risk in driving farmers' investment behavior. From a total of 502 households, 117 were randomly selected to receive a cash grant to fund agricultural inputs; these farmers received US$85 per acre for up to fifteen acres, delivered at a time of their choosing. Another 135 randomly selected households received a grant for an insurance scheme that paid roughly US$145 per acre of maize, if rainfall at a local weather

station went above or below specified thresholds. Ninety-five households received both the cash grant and the insurance grant, while 155 households received no additional services and formed the comparison group.

In the second year, researchers tested different prices for rainfall insurance among the original sample households, plus households in an additional twelve communities. Households were visited up to four times by marketers: during the first visit they were informed about the product, during the second visit they were asked to sign the contract and pay premiums, during the third visit the marketer issued a policyholder certificate, and during a fourth visit an auditor verified their understanding of the product. The price that people were offered for insurance was randomly assigned at the community level: households in the original sample would be offered rainfall insurance at a cost of either GHC 1 or GHC 4 (approximately US$0.74 or US$2.98[1]) per acre, while in the newly added communities, households would be offered insurance at either the market price of GHC 12-14 (US$8.94-US$10.43), or the actuarially fair price of GHC 8-9.5 (US$5.96-US$7.08).

In year three, the pricing experiment continued in collaboration with the Ghana Agricultural Insurance Programme (GAIP), to market their drought-indexed insurance. Because this product was more complex, scripts used at the four marketing visits were updated to make it more understandable. Pricing of the insurance was again randomized at the community level, with 23 communities receiving the market price, 23 communities receiving the actuarially fair price, and 26 communities receiving a subsidized price.

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Researchers found that farmers who received free insurance spent more on fertilizer and hired labor, and they also cultivated more land than those who received cash grants.

Importance of capital vs. risk: Results from the first year suggest that risk, rather than capital, was the major constraint on investment among farmers in this sample. Farmers who received the insurance grant increased their expenditure on farm chemicals, and also brought more acres of land under cultivation. If the primary constraint on investment was a lack of capital, then the insurance product, which offered no up-front payouts, would not have affected their ability to purchase materials. Many farmers appeared to recognize the value of the insurance product, with a significant proportion choosing to purchase insurance in years two and three. At the actuarially fair price of GHC 8-9.5 per acre, 40 to 50 percent of farmers purchased insurance; however, less than 20 percent of farmers purchased the product at the market price of GHC 12-14.

Impacts of weather insurance: Farmers with weather insurance invested more in agricultural inputs, particularly in chemicals, land preparation, and hired labor. Total cultivation expenditures were US$266 higher for farmers with insurance, representing a 13 percent increase relative to the comparison group, which spent approximately US$2,058. These impacts were even larger among farmers who received both insurance and a capital grant. Despite the increases in production, it is not clear that investments were actually profitable for farmers: the additional expenditures may have increased by more than the value of the additional output, depending on how household labor is valued.

Trustworthiness of insurance: Results suggest that how much farmers trust the insurance scheme has a large impact on their take-up and response to rainfall insurance. Take-up of insurance was considerably higher among farmers who also received a capital grant, but it was not higher among households who were wealthier. This suggests that farmers might not have been entirely confident that the promised insurance payouts would be made when trigger events occurred, and so they were more willing to take the risk of purchasing when they had been given extra cash. Similarly, individuals who were familiar with others who had received insurance payouts in previous years were significantly more likely to take-up insurance themselves.

Karlan, Dean, Robert Osei, Isaac Osei-Akoto, and Christopher Udry. 2014. "Agricultural Decisions after Relaxing Credit and Risk Constraints." The Quarterly Journal of Economics 129(2): 597-652.

1. Prices have been converted to USD using the World Bank's standard exchange rate from the year of the intervention and then inflated to 2014 USD.