

UGANDA

Strategy Support Program



EVALUATING THE SHIFTING PRIORITIES OF UGANDA'S AGRICULTURAL EXTENSION SERVICES: A MICRO PERSPECTIVE

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The Ugandan government is increasingly emphasizing input distribution over extension advisory services in its agricultural budget allocations, broadly defined. Both expenditure items are arguably important; hence, this note makes an empirical case for a more balanced approach to allocating public resources within the agricultural sector. Econometric results from official household-level survey data suggest that combining inputs and extension services is associated with higher yields. For maize and groundnut, in particular, the benefits of offering modern inputs and extension together exceed those of providing either exclusively. We conclude that the government's current approach, which focuses mainly on the logistics of input distribution, may be misguided.

CONTEXT

It is increasingly evident that the government of Uganda is prioritizing subsidized or free input provisioning to farmers at the expense of providing information through its agricultural extension services system. Operation Wealth Creation, which has replaced the National Agricultural Advisory Services (NAADS) as the core agricultural advisory service since 2014, assumes that logistical challenges are the main barrier to agricultural technology adoption and, thus, focuses almost exclusively on input procurement and distribution. There are several reasons why a more balanced approach, i.e., one that combines agricultural extension information with time-limited and carefully targeted discounts on strategic inputs, may be preferable both in terms of short-run efficiency and longer-run sustainability.

INPUT SUBSIDIES OR INFORMATION PROVISION?

Input market inefficiencies related to poor market infrastructure, remoteness, or imperfect competition among input suppliers contribute to a situation where inputs in some areas of Uganda are either unavailable or available only at substantially higher prices than elsewhere, thus limiting agricultural technology adoption. Other supply chain issues include poor storage and inadequate handling of inputs, and willful adulteration by some middlemen, which introduces quality risk. Market inefficiencies are cited as at least one of the justifications for input subsidy programs. At the same time, input subsidies are controversial for several reasons. Subsidies may distort markets and are widely believed to discourage private sector development. They are often politically motivated and difficult to phase out. Subsidies are costly, considered financially unsustainable, and not necessarily the most

Farmers inspecting their maize fields.



cost-effective way to achieve the development outcomes desired. If targeting is difficult, subsidies result in misallocation of resources or lower returns on investment.

Information inefficiencies may be an equally significant barrier to agricultural technology adoption. If a farmer does not know that a technology exists or does not know about its benefits or how to use it effectively on-farm, then he or she will be less likely to adopt this technology. In the case of Uganda, a lack of adaptive and economic research studies on appropriate crop-fertilizer combinations in different parts of the country means that fertilizer use recommendations have not been updated in a long time. Consequently, farmers may not be able to accurately assess the respective returns of various input combinations. As strategies to address the lack of information often involve making information less costly, the provision of agricultural extension information has received a new impetus from the information and communications technology (ICT) revolution in Africa.

DATA AND METHODS

This study investigates the consequences of an agricultural extension policy environment that is increasingly biased towards input provision. We estimate interaction effects

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between agricultural extension information and input use through the econometric analysis of several rounds of the Uganda National Panel Survey (UNPS). The data was collected by the Uganda Bureau of Statistics (UBOS) in 2009/10, 2010/11, 2011/12, and 2013/14. The panel datasets are a sub-sample of about 3,000 households of the Uganda National Household Survey (UNHS) of 2005/06. We analyze impacts on four crops that are widely grown and consumed in Uganda: maize, bean, cassava, and groundnut. According to this data, use of fertilizer is extremely low for these four crops, and only for maize do farmers report using improved seeds in significant proportions (about 35 percent). Moreover, these data show that only about 30 percent of farmers in Uganda have access to extension services.

To answer our research questions, we use both non-parametric and Ordinary Least Squares regressions. In both approaches, we compare conditional means in crop yield between households that neither used modern inputs nor received extension services and (i) households that only used modern inputs; (ii) households that only received extension services; and (iii) households that both used modern inputs and received extension services.

RESULTS

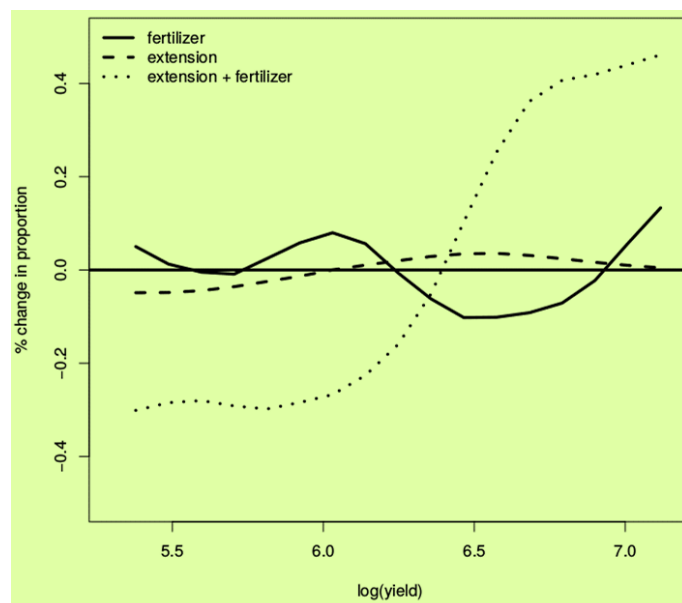
Figure 1 shows the result of non-parametric regressions for maize yields for the three groups defined above. The solid line shows the percentage deviation from the mean rate of fertilizer use across the range of yields (in log form) for maize. For instance, among households that report yields of around $\ln(665 \text{ kg per acre}) = 6.5$, the fertilization rate is about 12 percent lower than the overall mean rate of fertilizer use. The broken line represents the percentage deviation from the mean for the proportion of households that report access to extension services. The dotted line does the same for the proportion of households that report both fertilizer usage and access to extension services.

The relationship between yields and fertilizer use is not very straightforward. While farmers who recorded lower to median yields seem to have a higher propensity for using fertilizer, farmers with higher yields seem to be less likely to use it. This pattern suggests that a policy that focuses

A farmer using inorganic fertilizer on his maize field



Figure 1: Non-parametric regressions of conditional mean maize yields by use of fertilizer or extension services



only on increasing fertilizer use may not be the most effective way to increase yields, particularly for maize.

Access to extension appears to be slightly lower among households with lower yields, and slightly higher for households with higher yields. In general, we find the relationship between extension and yields to be more consistent and generally positive than for fertilizer use.

When fertilizer use is combined with agricultural advisory services, the relationship is clear: the higher maize yields, the higher the proportion of farmers that report both fertilizer usage and access to extension. For two other crops considered, bean and cassava, the relationship between yields and a combined provision of fertilizers and extension services is less clear.

Table 1: Ordinary Least Squares regressions of conditional mean crop yields by use of specific modern inputs with extension services

Input = fertilizer	Maize	Bean	Cassava
Input	0.092	0.369**	0.151
Extension	0.031	0.024	0.054
Input x extension	0.517*	0.063	-0.130
Input = seed	Maize	Bean	Groundnut
Input	0.250**	-0.070	-0.299
Extension	0.088	0.038	-0.039
Input x extension	0.129	0.328	0.583 ⁺

Note: Coefficients with ***, **, *, and ⁺ are statistically significant at 0.1, 1, 5, and 10% levels, respectively.

Table 1 shows that we come to similar conclusions when regression analysis is used. For maize, we find no effect on yields from the exclusive provision of fertilizer or extension services. However, the combined impact of fertilizers and extension services is significantly positive. The effect is also substantial: households that both use fertilizers and have access to agricultural extension services

attain yields that are on average 68 percent higher than those who do not get this package.¹ For bean, fertilizer use is associated with higher yields, while agricultural extension has no effect. The use of improved maize seed also leads to higher yields. But for groundnut, the largest effect comes from a combination of extension and improved seed.

CONCLUSION AND POLICY RECOMMENDATIONS

In summary, the data suggests that the relationship between yields, inputs, and agricultural extension cannot be captured in a one-size-fits-all policy: the optimal combination of input provision and access to extension services depends on the crop and the input used. For instance, we find that fertilizer use is associated with higher yields among cassava growing households, while use of improved seed seems to be highest among best performing maize farmers. We find that, generally, households that

report higher yields also report higher access to extension. For maize, in particular, but also for groundnut, highest yields are achieved on plots where modern inputs are used alongside access to extension information.

From this, we conclude that the focus of Operation Wealth Creation on providing farmers with inputs only may not be an optimal strategy. As input provision is likely to be more expensive than providing information, it may make sense to reallocate some of those resources to agricultural advisory services, since, at least for some important crops such as maize and groundnut, complementing inputs with information generally raises productivity more than the sole provision of inputs. As such, a more balanced approach to service provision, i.e., one that emphasizes agricultural extension provision alongside increased access to modern farming inputs, may be more sensible.

¹ In the analysis, the dependent variable is the natural logarithm of maize yield. Consequently, the percentage increase in maize yield due to both using fertilizers and having access to agricultural extension services is calculated from the coefficient presented in Table 1 as $\exp(0.517) = 1.68$.

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