Feed the Future Innovation Lab for Food Security Policy

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Taking Stock of Africa's Second-Generation Agricultural Input Subsidy Programs, 2000-2015

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Input subsidy programs (ISPs) remain one of the most contentiously debated development issues in sub-Saharan Africa (SSA). These government programs, through which farmers receive fertilizer (and in some cases seed) at below-market prices, were largely phased out during the 1980s and 1990s as evidence accumulated that they did little to contribute to agricultural productivity growth, food security and poverty reduction goals, imposed major burdens on national treasuries, and hindered the development of commercial input distribution systems.

However, since the early 2000s the landscape has changed quickly and profoundly. Under the 2003 Maputo Declaration, African governments committed themselves to spend more on agriculture, reviving consideration of a second generation of ISPs. Skepticism of ISPs based on their past performance was countered with arguments that a new genre of *smart* subsidies could be designed to correct earlier shortcomings with careful targeting and more involvement from the private sector. Malawi was one of the first sub-Saharan African countries to revive large-scale input subsidies, targeting most farm households in the country according to smart criteria starting in 2005. The Malawi program was quickly deemed to be a success, even though more detailed subsequent analysis indicated that its achievements were overstated in some cases and factually incorrect in others. Nevertheless, aided by the Malawi program's initial positive assessments, by 2010 at least 10 African countries accounting for more than half of the region's population had adopted *second-generation* ISPs. In recent years, annual total expenditures on ISPs by these 10 countries have ranged from 600 million to over 1 billion US dollars and accounted for up to 26% of their combined public expenditures on agriculture. Large-scale ISPs remain the centerpiece of many African governments' agricultural development programs.

Now that the second generation ISPs have been in place for over a decade in some cases, often in countries where statistically representative farm survey data are available over time, there is a growing evidence base to draw upon to evaluate the performance of these second-generation ISPs and their effects on farmer behavior and welfare. This brief summarizes the main lessons from a comprehensive review of nearly 70 studies of input subsidy programs in eight countries: Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Tanzania, and Zambia.

Key Findings:

- Input subsidy programs (ISPs) have proven effective in raising national food production quickly, but by considerably less than was originally envisioned
- Hence, most recent ISPs in Africa have had contributed only weakly to economic growth processes
- Nevertheless, there remains strong potential for ISPs to more effectively catalyze farm productivity growth and contribute to other development goals such as resilience and climate smart agriculture if ISPs were part of a more comprehensive strategy that focuses on helping farmers to use fertilizer more efficiently and profitably.

Main Findings

In terms of national food production, ISPs have proven effective in the short run. Most studies show subsidy recipients increase grain yields and production levels in the year they receive the subsidy. Importantly, however, the overall production and welfare effects tend to be smaller than originally expected. Attenuated impacts are consistently driven by three under-appreciated characteristics of these second generation programs: (1) their tendency to partially crowd out commercial fertilizer demand, thereby contributing less than anticipated to total (commercial plus subsidized) fertilizer use; (2) the diversion of subsidized fertilizer for commercial sale, which alters the distribution of benefits

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fertilizer on most smallholder-managed fields compared to expectations based on published evidence from fertilizer trials.

The magnitude of crowding out depends on the characteristics of beneficiary farmers and tends to be smallest when beneficiaries have not previously purchased commercial fertilizer. Panel survey data, however, consistently show subsidy programs most often distribute fertilizer to beneficiaries who *did* regularly purchase fertilizer in the past. The tendency for subsidy programs to target farmers already purchasing fertilizer may be partially because it is less costly to reach these farmers, although studies consistently show that farmers with more land, wealth, and better social connections disproportionately benefit from ISPs even after controlling for market access conditions.

Targeting of fertilizer subsidies to non-poor households predictably fails to enable poor households to directly generate more income or food from subsidy programs and, in a static sense, regressively distributes benefits from public programs. General equilibrium impacts of ISP on wages and commodity prices could conceivably be important, but most available evidence suggests that they are negligible.

Production impacts of ISPs also tend to be lower than expected because a large proportion of smallholder farmers use fertilizer under adverse agro-ecological conditions in terms of the physical, chemical, and biological makeup of their soils. A positive trend in farmer surveys has been the inclusion of soil metrics such as texture, pH, soil organic matter, or soil carbon measures. Survey evidence consistently shows smallholder farmers obtain highly variable response rates to fertilizer across farms and plots, and substantially lower response rates on average than those obtained from researcher-managed farm trials. Response rate, of course, is highly correlated with profitability. The average value cost ratio estimates for fertilizer, which generally must be 2.0 or more before most farmers are observed to use fertilizer, tend to range from 1.2 to 1.7 across studies.[1]

Because of these hindering factors, there is little evidence to indicate that the second generation fertilizer subsidy programs—many of which had been implemented for at least five consecutive years—have kick-started dynamic economic growth processes in the region. Most studies find production and income impacts last just one to three years. Studies examining ISPs' effects on grain prices usually find either insignificant or small impacts. Even if the production effect of an ISP was measurably large, it was often not large enough to displace cereal imports, so prices tended to remain at import parity and thereby mitigate potential general equilibrium effects. Among the micro-level studies analyzing ISP effects on local food prices or wage rates, most find either small or non-existent impacts.

In short, while it seems feasible to design smart subsidies on paper, the smart features of recent ISPs in Africa have frequently been watered down or re-interpreted on the ground by local administrators, or otherwise proven difficult to implement. The summarized evidence underscores the point that ISPs' effectiveness cannot be considered in isolation of the institutional, political, and cultural contexts in which they are applied.

Where from Here?

As of early 2017, political enthusiasm for *status quo* ISPs has noticeably waned. Programs in Malawi, Nigeria, Tanzania, and Ghana have been at least temporarily discontinued or significantly downsized in recent years. The stated reason for these cutbacks has often been insufficient funds to implement the program. Zambia began transitioning its ISP to a flexible e-voucher program in 2015, which allows farmers to choose from a wider range of subsidized inputs and uses vouchers redeemable at private agro-dealers—major changes from the maize-centric and mainly government-distributed ISP that was in place from 2002-2014. Other national governments are actively considering ISP reform options. These quiet reforms and cutbacks to ISP programs challenge the conventional wisdom that large fertilizer subsidy programs are here to stay. Perhaps the most important signal in recent years is that African governments are receptive to alternative approaches for improving the performance of ISPs

For these reasons, now could be an opportune time to help governments identify cost-effective reforms or alternatives to the second generation ISPs. There may even be scope to design ISPs such that they promote sustainable intensification and support smallholder farmers' resilience to climate change rather than encouraging questionable mono-cropping and continuous cultivation practices. While further research is needed to identify how ISPs might effectively encourage climate smart agricultural practices, options include: (1) offering subsidies conditional on the adoption of climate-smart agricultural practices; (2) subsidizing inputs that can directly contribute to sustainable intensification or resilience such as legume seed and drought tolerant varieties of maize seed when

[1] VCRs variable widely across seasons and regions, depending on weather, soil conditions, market conditions, and the type of fertilizer used. Farmer practices such as timing of application can also have significant effects. See Table 2 of the main study for further details.

early warning systems suggest El Nino years; and (3) encouraging the production and distribution of missing inputs that are increasingly viewed as central to holistic approaches to sustainable agricultural intensification, such as organic compost. Beyond these possibilities, there remains considerable unexploited potential for ISPs to achieve in practice some of the potential benefits of *smart subsidy programs*.

Improved Targeting

Good targeting criteria are difficult to define because they depend on program objectives, which are variously articulated throughout Africa. Explicit identification of goals and targets would be a tractable starting point for improvement. But there is a need for greater recognition that targeting difficulties will be unavoidable. There are options that may improve targeting, but each has its own drawbacks.

For one, effective targeting will be expensive with any approach. There are not many good examples to draw from to estimate what the full cost might actually be, but it would be useful to anticipate costs borne by local extension services and administrative units (costs that are often not included in official estimates). Decentralized targeting may be attractive because of reduced costs associated with tapping local knowledge, but there is little evidence that local political or social systems are more likely to adhere to official program targeting criteria than central authorities. Alternatively, universal subsidy programs (as seen in much of Asia) eliminate targeting costs but bring much higher total costs because large volumes of fertilizer must be added to the market to appreciably reduce prices. Moreover, the benefits of universal subsidies are concentrated amongst those best able to afford the inputs.

Geographic targeting presents a third option for reducing the crowding out of commercial demand by avoiding areas where commercial input markets are already active. Focusing on specific areas could also reap some of the benefits of a targeted ISP by concentrating efforts in poorer areas. Of course, one must then consider *why* the private sector has not been active in these areas. If the reason is poverty-constrained effective demand, subsidies may be a viable economic growth strategy. If the reason is that low response rates render fertilizer use unprofitable, alternative strategies that identify and help farmers adopt appropriate technologies and practices that promote sustainable forms of intensification may be a more appropriate starting point.

Alternative Subsidies

Flexible input subsidy programs focusing on new inputs and practices (e.g., lime in areas where soil acidity impedes fertilizer profitability) could lead to conditions where inorganic fertilizers would eventually be profitable at unsubsidized prices. If high transfer costs are driving down profitability, alternative strategies (e.g., infrastructure investments) have been shown to be more effective than fertilizer subsidies at stimulating agricultural growth and poverty reduction.

Innovations in subsidy design and implementation can create new, sustainable market-led input delivery systems whereby the private sectors' incentives are geared toward satisfying farmers' needs. By contrast, when the government contracts out to a handful of favored firms, the government (not the farmer) becomes the customer, which tends to depress the dynamism, competition and customer/supplier relations that are needed for a vibrant input delivery system. The most promising innovations are voucher-based ISPs where farmers redeem their vouchers at private shops of their choosing in exchange for inputs also of their choosing similar to the new Zambia program, but such programs still remain highly vulnerable to benefit diversion and the involvement of politically influential new *companies* formed in response to the potential to benefit from the subsidy program. Moreover, flexi-voucher programs still depend on timely government decision making about the size of the program in specific locations to allow private traders sufficient time to stock inputs commensurate with the size of the program.

Non-subsidy Alternatives

At subsidized costs or otherwise, farmers will demand more fertilizer if crop response to fertilizer is higher. Crop response will increase with greater public investment in effective agricultural research and extension programs that emphasizes bi-directional learning between farmers and information providers, so that researchers, together with farmers and extension workers, can discover best practices for appropriate input use and management practices for localized agro-ecological conditions. Not all practices and technologies will be feasible for resource-constrained farmers, and understanding feasibility will also be the product of effective bi-directional learning.

Updating and distributing soils maps that depict functional properties rather than taxonomic soil classes is another very low-cost option for improving the efficiency and profitability of fertilizer use. In Zambia, for example, government soil maps are based on roughly 300 samples collected more than 30 years ago. Cost-effective techniques are now available for soil sample collection and analysis. Building capacity for soil testing services for rural farmers themselves could also dramatically improve their knowledge of how to manage their soils, and how the nutrient composition of fertilizers could be tailored to specific areas where appropriate. The bottom line is that the impacts of ISPs and fertilizer use more generally could

be significantly greater if it were part of a more holistic strategy that considers agro-ecological differences, focuses on rehabilitating and maintaining soil quality, and directly addresses the transfer costs of inputs.

Policy Coherence

Finally, seemingly unrelated policies may have had unintended adverse consequences on governments' efforts to promote fertilizer use. For example, police checkpoints and road taxes increase fertilizer prices and decrease output prices at the farm gate, reducing incentives to use fertilizer.

In another example, Tanzania has many redundant agencies mandated with controlling fertilizer imports. This includes the Tanzania Fertilizer Regulatory Authority, Weight and Measures Authority, Radiation Commission, Chief Government Chemist, and the Tanzania Bureau of Standards. This multiplicity of bodies means multiple fees that are inevitably passed on to farmers. An important means of raising fertilizer use in many African countries is to reduce the costs and risks borne by private actors along the fertilizer value chain in distributing fertilizer to farmers. Many of these costs and risks are related to policies and regulations, and hence represent low-hanging fruit.

Conclusion

It is widely recognized that increased fertilizer use is needed for sustainable agricultural intensification in Africa. Input subsidy programs have contributed to raising fertilizer use at least in the short-run, but the empirical record is increasingly clear that improved seed and fertilizer are not sufficient on their own to achieve profitable, productive, and sustainable grain-based farming systems in most parts of Africa. Sustainable soil and moisture management practices and complementary inputs tailored to specific microenvironments are often required to make farming profitable and sustainable. For these reasons, it is increasingly apparent the second generation African ISPs have given too much attention to giving fertilizer to farmers and too little attention to enabling them to use it effectively. Going forward, a more holistic approach that encourages the use of complementary inputs and management practices in addition to greater use of inorganic fertilizers could substantially and sustainably raise agricultural productivity in Africa.

This brief is a summary of the full report: *Agricultural Input Subsidy Programs in Africa: An Assessment of Recent Evidence,* by Thomas Jayne, Nicole Mason, William J. Burke, and Joshua Ariga. 2016. International Development Working Paper No. 145, East Lansing, Michigan State University, Department of Agricultural, Food, and Resource Economics.

To download the full report: http://fsg.afre.msu.edu/papers/idwp145.pdf

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