Feed the Future Innovation Lab for Food Security Policy

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Did the e-voucher approach to Zambia's Farmer Input Support Programme (FISP) outperform the traditional FISP? Evidence from the Crop Forecast Surveys

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Introduction

Although modern input use is on the rise in sub-Saharan Africa (SSA), finding cost-effective ways to increase it further as a means of reducing poverty and food insecurity remains a key policy challenge (Alliance for a Green Revolution in Africa 2016, Sheahan & Barrett 2017). Many governments in the region use agricultural input subsidy programs (ISPs) as one of their primary strategies to achieve this goal (Jayne & Rashid 2013, Jayne et al. 2018, Holden 2019). In some countries, use of ISPs dates back to as early as independence in the 1960s, and the programs have come in to and out of favor in the intervening decades.

A distinguishing feature of the wave of post-structural adjustment ISPs that began sweeping SSA in the early-to-mid-2000s is an emphasis on making the subsidy programs "market-smart" (Morris et al. 2007). Yet there has been little rigorous evaluation of the impacts on program effectiveness of ostensibly market-smart reforms to ISPs. The main exception is Kaiyatsa et al.'s (2018) analysis of the 2015 reform to Malawi's ISP that allowed beneficiary farmers to redeem their vouchers for subsidized fertilizer at selected private sector retailers; previously, all fertilizer for the program had to be collected from government depots. The vast remaining literature on ISPs in SSA analyzes program targeting or estimates the effects of participation in an ISP on various outcomes, holding a program's design or implementation modalities constant. (See Jayne et al. 2018 and Holden 2019 for recent, comprehensive reviews of this literature.) This is useful and can sometimes point to potential program design or implementation changes that could increase an ISP's effectiveness, but equally important is understanding the impacts of those changes once implemented.

This study uses data from the nationally- and district-representative Crop Forecast Surveys (CFS), collected by the Zambian Ministry of Agriculture (MoA) and Central Statistical Office (CSO), to estimate the short-run effects of a major change in the design of Zambia's ISP, the Farmer Input Support Program (FISP), on selected outcomes that can be calculated from the CFS data. This change entailed a shift in FISP from a 'traditional,' maize-centric program that distributed subsidized fertilizer and improved seed in-kind to beneficiaries through their farmers' groups, to a flexible, electronic voucher- (e-voucher-) based program through which beneficiaries redeemed e-vouchers for the subsidized agricultural inputs or equipment of their choice at private agrodealers' shops. The FISP e-voucher (e-FISP) was piloted in 13 and 39 districts in 2015/16 and 2016/17, respectively, before being rolled out nationwide in 2017/18 (Figure 1). We estimate the effects of the shift to the e-FISP in the pilot years on various outcomes linked to the program's objectives (namely, unsubsidized fertilizer purchases; access to, use of, and timely availability of modern inputs; and crop diversification).

Key Findings

- Based on Zambia Crop Forecast Survey (CFS) data from before and during the 2015/16 and 2016/17 piloting of the e-voucher approach to the Farmer Input Support Programme (e-FISP), the results suggest that the e-FISP fell short of achieving some of its objectives, at least in the short-run and based on the outcomes that can be analyzed with the CFS.
- At best, the outcomes analyzed were not statistically different under the e-FISP versus the traditional FISP (for farmers' purchases of unsubsidized fertilizer, use of herbicide, and field crop diversification); at worst, outcomes were worse under the e-FISP relative to the traditional FISP (for fertilizer and hybrid maize seed use, and the timeliness of and distance to FISP fertilizer for beneficiary households).
- These disappointing e-FISP results are likely due more to implementation challenges and lack of political will than to fundamental flaws in the e-FISP concept and design.

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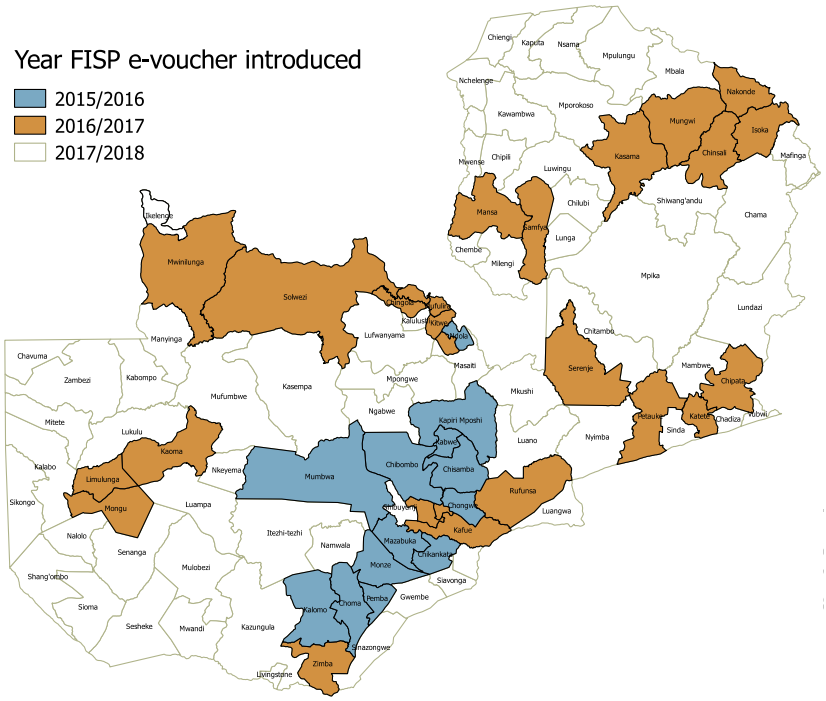

Figure 1. The rollout of the e-FISP

Data and Methods

We use the CFS data for 2013/14 through 2016/17 (i.e., two years before and then during the two-year pilot phase of the e-FISP). These data contain approximately 13,200 observations per year on smallholder farm households, and a total of nearly 53,000 observations. We use a difference-in-differences approach to estimate the short-run effects of the shift to the e-FISP. See the full research paper for further details on the data and methods. The outcome variables analyzed and our key findings are summarized in Table 1. Note that the e-FISP may have affected other outcomes, but we are constrained here by the CFS data.

Main Findings

Contrary to the e-FISP goal of further improving farmers' access to inputs, the results suggest that the shift to the e-FISP either had no significant effect on or negatively affected input use – in the short run and based on the outcome variables analyzed (Table 1). More specifically, the shift from the traditional- to the e-FISP had no significant effect on smallholder households' purchases of fertilizer at unsubsidized prices or their use of herbicide on field crops. The shift negatively affected households' likelihood of using fertilizer and hybrid maize seed (by 11% and 18%, respectively), and reduced the maize fertilizer application rate and area under hybrid maize by 19% and 16%, respectively. The results also suggest that the e-FISP pilot did not achieve its agricultural diversification goal – at least based on field crops. Relative to the traditional FISP, the e-FISP had no significant effect on any of the cropped area or crop diversification outcome variables considered in Table 1. Finally, we examined the effects of the shift to the e-FISP on the distance households had to travel to acquire fertilizer through FISP and whether or not that fertilizer was available at the time the households needed it (henceforth, "on time"). Unfortunately, here again, we find no evidence that the e-voucher approach to FISP fared better than the traditional FISP. Rather, the shift to the e-FISP is associated with a 7-8 km *increase* in the distance farmers had to travel to collect fertilizer through the program, and about a 30% decline in the likelihood of receiving FISP fertilizer on time (Table 1).

The piloting of the e-voucher approach to FISP was a well-intended policy change, and it was hoped that this innovation in program design would improve farmers' access to and use of modern inputs; incentivize private sector investment in fertilizer and other input value chains, thereby improving the timely availability of the inputs and bringing them closer to farmers; and encourage farmers to diversify away from maize by allowing them to use the e-voucher for the farm inputs or equipment of their choosing – not just maize seed and fertilizer. Our results suggest that these goals were not achieved, at least in the short-run and based on the outcome variables considered here. At best, outcomes were no different under the e-FISP

Table 1. Estimated effects of the shift to the e-FISP in 2015/16 and 2016/17 on smallholder farmer outcomes (relative to the traditional FISP)

Category	Specific outcome variable	Result
Use of modern inputs	Whether or not purchased **unsubsidized fertilizer**	No statistically significant effect
	Whether or not the HH **used fertilizer**	**11% less likely**
	Fertilizer application rate on maize (kg/ha)	**19% lower (36 kg/ha less)**
	Whether or not grew **hybrid maize**	**18% less likely**
	Hectares of **hybrid maize**	**16% lower (0.1 ha less)**
	Whether or not used **herbicide**	No statistically significant effect
Cropped area and crop diversification (based on the 23 field crops reported by CFS respondents)	**Maize share** of total area planted	No statistically significant effect
	Hectares of **maize**	No statistically significant effect
	Hectares of **other crops**	No statistically significant effect
	Whether or not **grew any non-maize crops**	No statistically significant effect
	Number of crops grown	No statistically significant effect
	Simpson index of crop diversification	No statistically significant effect
FISP fertilizer proximity to farmers and timeliness [a]	**Distance** to **FISP fertilizer collection point** (km) (cooperative for traditional FISP, private retailer for e-FISP)	**More than double (7-8 km farther away)**
	Whether or not **FISP fertilizer** was available on time	**30% more likely to be late**

Note: The Simpson Index is 1 minus the sum of the squared shares of the total area cultivated devoted to each crop. [a] Among households sourcing fertilizer through FISP.

versus the traditional FISP (in a statistically significant way); at worst, outcomes were worse under the e-FISP. So what happened? Independent monitoring and evaluation reports of the e-FISP by the Indaba Agricultural Policy Research Institute (IAPRI), based in Lusaka, point to several implementation challenges in the e-FISP pilot years that likely explain these results.

First, there were substantial delays in both pilot years in getting e-FISP Visa cards (henceforth "e-cards") into farmers' hands and/or getting the e-cards activated in a timely manner. More specifically, in 2015/16, delayed submission of e-FISP beneficiary lists to the main MoA FISP Programme Coordination Office by some District Agricultural Coordinators (DACOs, to whom Camp Agricultural Committees submit approved beneficiary lists) delayed the production and distribution of e-cards to farmers (Kuteya et al. 2016). Kuteya et al. attribute the delayed submission of beneficiary lists to the lack of equipment at the district level for the DACOs to scan and email the necessary forms – a problem that was exacerbated by frequent power cuts. The authors also indicate that there may have been deliberate efforts by some civil servants to derail the e-FISP because they materially benefited under the traditional FISP – e.g., by diverting the physical inputs for their own use or to sell on the market.

Delays continued in 2016/17, this time due to delays in the release of government funds for the e-FISP, resulting in late distribution of e-cards (Kuteya & Chapoto 2017). By the time many farmers received their e-cards in late December 2016, they had already planted their maize, so some maize inputs acquired through FISP were likely held until the next agricultural season.

Other challenges included e-card activation taking three or more weeks after farmers made their contributions of K400; issues with e-card PINs, or names being misspelled and not matching beneficiaries' national registration cards; and other unexplained e-card failures (e.g., cards that were activated but did not work when swiped at an agrodealer's point of sale machine) (Kuteya et al. 2016; Kuteya & Chapoto 2017). The authors argue that in both pilot years, agrodealers had inputs stocked on time and ready for farmers to purchase with their e-cards, such that the bottlenecks were on the demand side, not the supply side (Ibid.). The various challenges outlined here likely explain the negative effects of the shift to the e-voucher on the timely availability of fertilizer through FISP, and the negative or null effects on fertilizer, hybrid maize seed, and herbicide use in Table 1.

An additional challenge that likely contributed to the negative effects on fertilizer use and the maize fertilizer application rate was rising fertilizer prices over the course of the season, especially in the 2015/16 pilot year (Kuteya et al. 2016). This would have disproportionately affected e-FISP beneficiaries, as the inputs they purchased would have been at the market price, with the value of the e-voucher defraying their out of pocket costs. In contrast, traditional FISP beneficiaries were to receive four 50-kg bags of fertilizer and 10 kg of maize seed for their K400 farmer contribution, regardless of the market prices. The Zambian government raised the total value of the e-

voucher in 2015/16 to try to offset the fertilizer price rise, but it may have been insufficient (Ibid.).

Second, there were issues with e-FISP beneficiaries either not being aware that the e-voucher could be used on things other than fertilizer and maize seed, and some cooperative/farmers' group chairpersons arranging for fertilizer and maize seed to be delivered by agrodealers to farmers (Kuteya et al. 2016; Kuteya & Chapoto 2017). Although the latter may have reduced the distance some e-FISP beneficiaries had to travel to redeem their e-cards, it also denied them the opportunity to purchase other farm inputs or equipment if maize inputs were not what they would have purchased had they been given a choice. Both of these issues, coupled with late distribution and activation of e-cards, likely explain the lack of effects of the shift to the e-FISP on herbicide use and crop diversification in Table 1.

Another contributing factor may have been lack of inputs other than maize seed and fertilizer at some agrodealers' shops (Kuteya et al. 2017). Particularly if input suppliers were not convinced that government would continue to implement the e-FISP in future years, and/or they were uncertain of the effective demand for such inputs, they may not have had the confidence they needed to invest to build up the requisite supply chains.

Third, Table 1 reveals that the e-FISP pilot resulted in FISP fertilizer beneficiaries having to travel farther to collect their fertilizer relative to the conventional FISP. This is almost certainly due to the fact that e-FISP beneficiaries had to travel to a private fertilizer retailer/agrodealer to source the fertilizer (unless special arrangements were made – e.g., by their cooperative chairperson), whereas traditional FISP beneficiaries collected the fertilizer from their cooperative. Although it was hoped that the e-FISP would encourage more private sector agrodealerships to be set up, thereby improving farmers' access to inputs (via FISP and in general), it is unlikely that this happened right away. Most farmers do not have an agrodealership right in their community; instead, these are often located in district towns, at considerable distance from many smallholders' homesteads.

The CFS data do not include information on all respondents' distances to the nearest private fertilizer seller, agrodealer, or FISP collection point, but the Rural Agricultural Livelihoods Survey data collected by IAPRI, MoA, and CSO do. Table 2 shows summary statistics on these distances as of June-July 2015 (prior to the e-FISP pilot) and June-July 2019 (after the e-FISP had been rolled out nationwide and subsequently scaled back to roughly 60% of the beneficiaries). As shown in Table 2, prior to the e-FISP, the median distance to the nearest FISP collection point was 2-5 km, with some variation by (future) e-FISP pilot status, whereas the median distance to the nearest private fertilizer seller (agrodealer) was 25 km (20-21 km).[1] By 2019, the median distance to the nearest FISP collection point was 5-6 km (because about 60% of FISP beneficiaries were under the e-FISP at that time). The median distance to the nearest fertilizer retailer (agrodealer) was lower in 2019 than in 2015 but especially so in areas where the e-FISP had been piloted. While we cannot attribute this reduction to the e-FISP, these data are consistent with what we would expect to see if, with a few years' lag, the e-FISP did incentivize more input retailer outlets to be set up. This is also consistent with descriptive (not causal) estimates by Kuteya and Chapoto (2017) that approximately 230 new agrodealerships were set up in response to the 2015/16 e-FISP pilot, and that this rose to 422 in 2016/17.

Finally, two other factors likely further discouraged private input supplier participation in the e-FISP and/or their investment in their retail networks. First, there were issues with the retailers' portion of the e-voucher value not being automatically remitted to their account when the e-card was swiped at their point of sale machine (Kuteya et al. 2017; Kuteya and Chapoto 2018). And second, even once e-FISP pilot districts were announced prior to the 2015/16 and 2016/17 agricultural seasons, respectively, there was major uncertainty as to if and where the e-FISP would actually be implemented.

[1] Not all agrodealers sell fertilizer, hence this distinction. For some households, the nearest private fertilizer seller is the nearest agrodealer, or the two establishments are located near each other.

Table 2. Distances to the nearest private fertilizer seller, agrodealer, & FISP collection point, 2015 & 2019

	2015 (N=7,933)				2019 (N=7,241)			
		Percentiles				Percentiles		
Districts	Mean	25th	50th	75th	Mean	25th	50th	75th
All districts								
Private fertilizer seller	35.2	10	25	50	32.0	7	20	45
Agrodealer	32.5	8	20	45	29.5	5	16	40
FISP collection point	7.7	1	3	7	16.4	2	5	20
2015/16 e-FISP pilot districts								
Private fertilizer seller	30.6	8	25	45	25.9	6	18	40
Agrodealer	27.4	8	20	40	22.5	5	13	30
FISP collection point	7.8	2	5	8	16.1	3	6	20
2016/17 e-FISP pilot districts								
Private fertilizer seller	36.7	10	25	50	29.6	6	20	40
Agrodealer	33.6	8	20	45	26.2	5	15	35
FISP collection point	6.5	0	2	6	14.8	1	5	15
Non-pilot districts								
Private fertilizer seller	36.0	10	25	54	36.1	8	22	50
Agrodealer	34.0	8	21	50	34.5	7	20	45
FISP collection point	8.5	1	3	8	17.6	2	5	20

Source: IAPRI/CSO/MoA Rural Agricultural Livelihoods Surveys, 2015 and 2019.

Conclusions and Policy Implications

The e-FISP was intended to be smarter than the traditional FISP: (i) by involving the private sector to a much greater extent; (ii) by putting farmers in control of what inputs or equipment they acquired through the program; (iii) by targeting households with smaller farm sizes; and (iv) through additional efforts to prevent non-farmers and ineligible farmers from participating in the program. The results presented here suggest that, at least in the short run and relative to the traditional FISP, the e-FISP pilot program had no effect on the likelihood that a smallholder farm household purchased unsubsidized fertilizer or used herbicide, and no effect on cropping patterns and crop diversification for field crops. In addition, the shift was associated with reductions in the use of fertilizer and hybrid maize seed, as well as in the maize fertilizer application rate. And among households acquiring fertilizer through FISP, it was more likely to be late and collected from farther away under the e-FISP relative to the traditional program.

Above, we discussed several of the likely reasons for these disappointing results. Most of these issues point to implementation challenges as opposed to fundamental flaws in the design of the program. For the e-FISP to realize its potential and achieve its goals of increasing private sector participation in agro-input value chains as well as improving farmers' access to inputs and the timeliness thereof, it requires an earlier mobilization of funds for the program and an earlier start to program activities. Moreover, the rollback of the e-FISP in recent years coupled with a lack of clear signals about where it will be implemented in future years is likely undermining the potential of the e-FISP by creating even more uncertainty and fewer incentives for private sector players to invest in retail networks or to stock more diverse inputs. Greater sensitization of beneficiaries on the flexibility of the e-FISP may also be needed. Much of this comes down to questions of resource availability, political will, and there being policy champions that can advocate for the e-FISP at high levels of the Zambian government (Resnick et al. 2018).

Further analysis using other data is needed to understand the longer-run effects of the shift to the e-FISP, as well as its effects on other outcomes such as agricultural diversification more broadly (including horticultural crops and livestock), savings to the national treasury, as well as the number of new agrodealerships and jobs that may have been created.

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