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The impact of agricultural extension services in the context of a heavily subsidized input system: The case of Malawi

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ABSTRACT

This paper examines the interplay between Malawi's input subsidy and access to extension services, and the impact of both on farm productivity and food security using Malawi's Integrated Household Panel Survey. A correlated random effects (CRE) device is used, and consistency and robustness of results are checked using various other estimation models. The receipt of fertilizer and seed subsidies is shown to have an inconsistent impact on farm productivity and food security; at the same time, access to agricultural advice is consistently insignificant in explaining these. Further analysis, however, shows a statistically significant and strong association with farm productivity and food security when access to extension services is unpacked to include indicators of usefulness and farmers' satisfaction. Households that reported receipt of "very useful" agricultural advice had greater productivity and greater food security compared to those that reported receipt of advice that they considered not useful and those that did not receive any advice at all. This result implies the need to ensure the provision of relevant and useful agricultural advice to increase the likelihood of achieving agricultural development outcomes.

1. Introduction

Sub-Saharan Africa (SSA) is confronted with persistently low levels of agricultural productivity and chronic food insecurity. Governments and donors have initiated many programs to improve the agricultural productivity and food security of many poor SSA countries, albeit with mixed results. Among such efforts, agricultural extension was heavily promoted in the 1970s and 1980s through implementation of large-scale training and visit programs. Due to concerns of the high cost and limited impact of these programs, major declines in investments in agricultural extension in many countries were seen in more recent years. Fertilizer and other farm input subsidy programs have also been popular. Such programs started in the 1980s and declined in the 1990s during the structural adjustment period, but were recently reintroduced, triggered by concerns of food price crises and growing food insecurity in SSA. Malawi's Farm Input Subsidy Programme (FISP), which started in 2005, is the most cited national subsidy program of recent years, popularly supported and recognized by many as an effective program in bringing about an African Green Revolution (Denning et al., 2009; Javdani, 2012). However, many observers also point out its high, possibly unsustainable costs and inconsistent farm-level impact and development outcomes (Chibwana et al., 2014; Holden & Lunduka, 2010a, 2010b; Ricker-Gilbert & Jayne, 2011).

Malawi made some progress in increasing agricultural production and economic growth and in reducing food insecurity in recent years, but much still needs to be done. Undernutrition and food insecurity is still widespread – 37 percent of children under five are stunted according to the 2015/16 Demographic and Health Survey and 6.7 million people are estimated to be in need of food assistance in the 2016/17 crop year (MoAIWD, 2016). Despite the FISP's early successes (as clearly seen in the maize production and yield in 2006 and 2007 in Fig. 1), agricultural productivity has stagnated and food insecurity conditions remain in many areas of the country. For instance, since the 2010/11 season, maize productivity has been around 2 metric tonnes per hectare (mt/ha), remaining below the Agriculture Sector Wide Approach (ASWAp) target of 3 mt/ha (MoAIWD, 2016). Maize productivity in 2014 was at 1.66 mt/ha, and estimates for 2015 and 2016 are also low (MoAIWD, 2016). This necessitates bold actions to revisit the FISP's design and implementation and, at the same time, to rethink other

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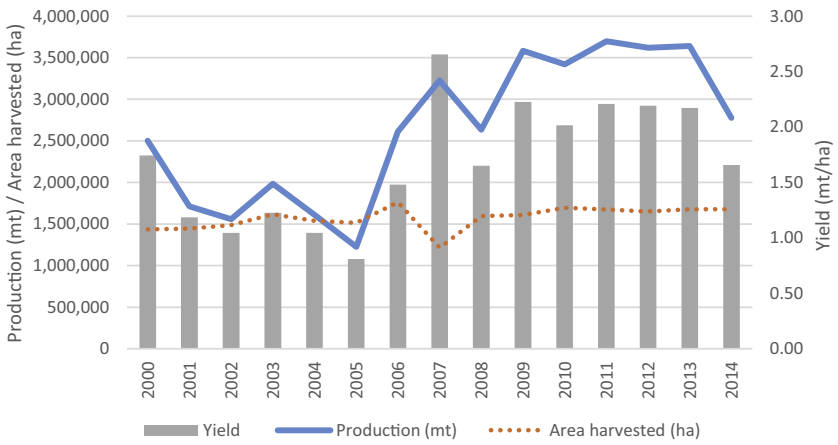

Fig. 1. Maize production, area harvested and yield in Malawi, 2000–2014. Source of raw data: FAOSTAT accessed on August 15, 2017.

complementary services and systems, both within agriculture and other sectors, that need to be strengthened.

Malawi spent an annual average of 9.8 percent of its national budget subsidizing fertilizer and seed between 2005/06 and 2008/09, subsidies that accounted for a large share of agricultural spending (Dorward & Chirwa, 2011). In more recent years, the FISP accounted for 44 percent of agricultural spending in 2013/14, down from 58 percent in 2012/13 and from 74 percent in 2008/2009 (raw data from Malawi Ministry of Agriculture, Irrigation and Water Development [MoAIWD]). The large allocation of funding to the FISP leaves minimal funding for other services and roles in the public agriculture sector. For instance, investment in agricultural extension made up only 1.6 percent of agricultural spending in 2012/13 (raw data from MoAIWD).

This sharply unequal funding raises concerns among experts, who suggest that inadequate provision of information for farmers might account for some of the FISP's inconsistent farm-level impacts (Lunduka, Ricker-Gilbert, & Fisher, 2013). Snapp, Jayne, Mhango, Benson, and Ricker-Gilbert (2014) suggest that the untimely delivery of inputs coupled with lack of knowledge on state-of-the-art and improved technologies may be one of the contributing factors to the observed low nutrient use efficiency observed among FISP beneficiaries, limiting the productivity and development impact of the Government of Malawi's flagship agricultural development program.

This paper aims to test this hypothesis to understand the interplay of agricultural extension services and the fertilizer subsidy in affecting the productivity and food security of Malawian smallholder farmers. It aims to contribute to the literature in three ways.

First, this paper assesses whether access to relevant extension services augments the effectiveness of the fertilizer subsidy in enhancing agricultural productivity and food security; to do this, we model both factors as direct inputs into input demand models and standard agricultural production models using a panel dataset from a nationally representative survey of farming households.

Second, this paper models the effect of access to extension services, controlling for a farm household's receipt of the FISP input subsidy, on farm productivity and food security. Existing research focuses on measuring the marginal product or direct effect of access to extension services on farm productivity by using production models (in which production output is expressed as a function of factors of production) or frontier models (in which extension services are used as a factor to explain differences in technical efficiency levels rather than as an input in the production function) (see Dinar, Karagiannis, & Tzouvelekas, 2007). However, in a country with heavily subsidized[2] farm production, measuring the contribution of agricultural extension services to productivity levels may not be straightforward, as adoption of a new crop or technology may be profitable only as a result of the government subsidy.

Therefore, estimates of the marginal product or direct effect of extension services on output from standard production models may be biased if input subsidy receipt is not controlled for. To our knowledge, these inquiries have not been dealt with adequately in the literature, even though they can have major implications on whether greater attention to and investments in complementary agricultural extension services are needed alongside the fertilizer subsidy. Whether or not the fertilizer subsidy is taken into account will also have implications on minimizing measurement errors and bias in evaluating the impact of agricultural extension services in the presence of input market distortions, such as those caused by the fertilizer subsidy. Many studies look at the effects of the FISP in Malawi (see the review by Lunduka et al., 2013), but none examine the role of extension and advisory services in accounting for these effects. Similarly, several authors examine the effects of access to extension services or agricultural advice on technology adoption and yield in various countries (see Ragasa, Berhane, Tadesse, & Taffesse, 2013), but not within the context of heavily subsidized input markets.

Third, this paper tests various indicators of access to extension services and the different types and modes of delivery, complementing and extending past studies that employ a simple dummy variable on whether the household was visited by an extension agent or the frequency of visits by extension agents as their proxy for extension service access. This paper unpacks the "access to extension services" factor and explores other measures of agricultural extension service delivery to provide insights as to what source, type, or form of extension services delivery matters in affecting agricultural productivity and food security. In particular, we test the following six hypotheses:

1. Whether households that meet more frequently with extension agents or receive advice from any source have greater productivity and food security.
2. Whether households that find the advice received useful and satisfactory have greater productivity and food security than those that find the advice received not useful. Some studies

[2] As in the title, "heavy" subsidy is used because of the magnitude of the FISP in Malawi's public agricultural expenditures; it does not necessarily imply the magnitude of subsidy received by the majority of individual farmers. We thank the reviewer who highlighted the need to make this distinction.