



## What Factors Drive Smallholder Crop Diversification in Zambia?

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### Key Points

- Crop diversification is a proven strategy to stabilize, diversify and enhance farm households' income and nutrition security but Zambia's sectoral policy focus on maize input and output subsidies through the Farmer Input Support Programme (FISP) and Food Reserve Agency (FRA) respectively in the past 15 years has led to a maize dominated smallholder agricultural sector;
- FRA and FRA (government key policy instruments) are significantly and negatively associated with smallholder crop diversification. Government need to realign public expenditure to other agriculture key growth drivers such as feeder roads, education and extension, irrigation to promote smallholder crop diversification.
- Smallholder access to land and productive assets is positively and significantly related to crop diversification. This suggests that resource poor smallholder farmers may need well-targeted assistance with farm working capital, increased land access or productivity enhancement technologies to increase crop diversification.
- A robust and well-functioning agricultural extension system disseminating appropriate production and productivity enhancing messages that encourage crop diversification is also very important.

**INTRODUCTION:** Zambian agricultural policy recognizes that crop diversification is one of the key essentials for achieving food and nutrition security and ultimately agricultural transformation among smallholder farm households. Although crop diversification targets are prominent in almost all development objectives, it appears difficult for the country to attain its desired level of diversification as most of the land remains typically mono-cropped with maize dominating agricultural production. The dominance of maize in Zambia's agriculture systems appears to be a direct result of the country's policy focus since independence of maize production by consistently spending more than two thirds of the country's public expenditure in the agricultural sector to maize input and marketing subsidies through FISP and FRA respectively (Hichaambwa, Kabwe, and Chamberlin 2015).

Household crop diversification is often viewed as key for achieving food and nutrition security as well as for mitigating the risk of crop failure and

market uncertainties. Crop diversification is a strategy to stabilize, diversify, and enhance household farm income. It is mostly considered a risk management strategy of cultivating more than one crop. Not only has it the added advantage of mitigating price risk, but also of reducing the risk of crop yield fluctuations.

In addition, there is strong evidence that diversification in agriculture has tremendous benefits on uplifting resource-poor smallholder farmers (Singh, Squire, and Strauss 1986). If well implemented, diversification can be used as a tool to improve household incomes, reduce malnutrition, alleviate poverty, and conserve water and soil (Joshi et. al. 2004). According to Mofya-Mukuka and Hichaambwa (2015), a lack of agricultural diversification and specifically a focus on maize production limits the potential to use agriculture as a poverty reduction tool. As a low value cereal, maize production is more likely to benefit larger-scale farmers. Because the majority of Zambian farmers cultivate less than two hectares of land, maize production is

unlikely to serve as means out of poverty. Additionally, low crop diversification tends to limit the economic multiplier effects of agriculture, by limiting the scope and scale of agro-processing, intermediation/trading, and input supply.

Crop diversification can also improve food and nutritional diversity as it provides a broader choice in the production of a variety of crops in a given area and lessen the risk of crop failure. It can also offer comparatively higher net returns from crops, higher net returns per unit of labour, optimization of resource use, and higher land utilization. Therefore, a farmer's decision to diversify is considered a major economic decision that has a strong bearing on the farmer's income level and food security (Pope and Prescott 1980).

This policy brief is based on IAPRI Working Paper by Mofya-Mukuka and Hichaambwa (2016) on the factors influencing smallholder crop diversification in Zambia and the implications for policy. The study's main objective was to investigate the factors determining smallholder crop diversification including government policy of supporting maize through FISP and FRA, household demographics, availability of agricultural services in community and market access factors.

**DATA AND METHODS:** The study uses the Simpson Index of Diversification (SID<sup>1</sup>) as a measure of crop diversification and econometric methods for fractional response variables as developed by Papke and Wooldridge (1996). Two waves of nationally representative panel data on rural farm households in Zambia that were collected by IAPRI, in collaboration with the Central Statistical Office (CSO), and the Ministry of Agriculture and Livestock (MAL) are used. The first wave is the 2012 Rural Agricultural Livelihoods Survey (RALS), which has 8,090 observations at household level and representing the 2010/11 agricultural season. The second wave of the RALS covers 7,934 households covering the 2013/14 agricultural season conducted in 2015.

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<sup>1</sup> The SID ranges from 0 to 1 such that 0 is a complete lack of diversification or complete specialization and 1 indicates complete diversification

## **KEY FINDINGS:**

### **A Robust and Well-Functioning Extension System Plays a Key Role in Crop Diversification:**

Access to crop diversification related extension advice such as minimum tillage, crop rotations and mixed cropping has a positive significant effect on crop diversification. Access to such advice increases the probability for smallholder farm households to diversify their cropping by 1.7 percentage points all other factors kept constant. This has a direct bearing on the type of extension messages that Ministry of Agriculture should promote in order to enhance smallholder crop diversification.

### **Land Size and Value of Productive Farm Assets Influence the Extent of Crop Diversification:**

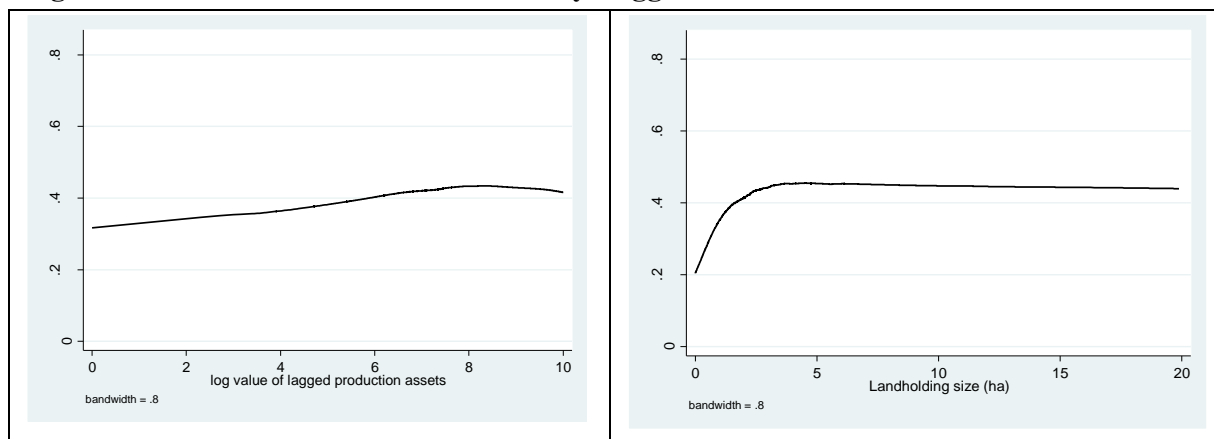
Both the value of productive assets at the beginning of the season and landholding size have significant positive effects on smallholder crop diversification (see Figure 1). A one percent increase in the productive assets and landholding size is associated with an increase in the SID of 0.6% and 0.2% respectively, all other factors kept constant. This suggests that poor smallholder farm households need some form of support with working capital and productivity enhancing technology considering that most smallholder farmers are land constrained in order to increase their crop diversification.

**Access to Markets:** Distance to the market proxied by the number of hours to the nearest urban centre (with at least 100,000 inhabitants) has a significant positive overall effect on SID. The longer the distance to urban markets the more the diversification index. This suggests that proximity to markets is an important factor in smallholder farm households' decisions to diversify

### **Weather Conditions Can Pre-Condition Crop Diversification:**

Weather conditions as reflected by long-term average district rainfall conditions influences household's decision to diversify. Good weather conditions is positively correlated

**Figure 1. Distribution of Household SID by Lagged Productive Assets**



Source: Authors’ Computations and CSO/MAL/IAPRI 2012, 2015.

with an increase in crop diversification (see Figure 2).

For example, the results show that an increase in the long-term average rainfall by 100 mm is associated with an increase in crop diversification of 4 percentage points all other factors held constant. This suggests that investments in smallholder irrigation would go a long way in promoting crop diversification.

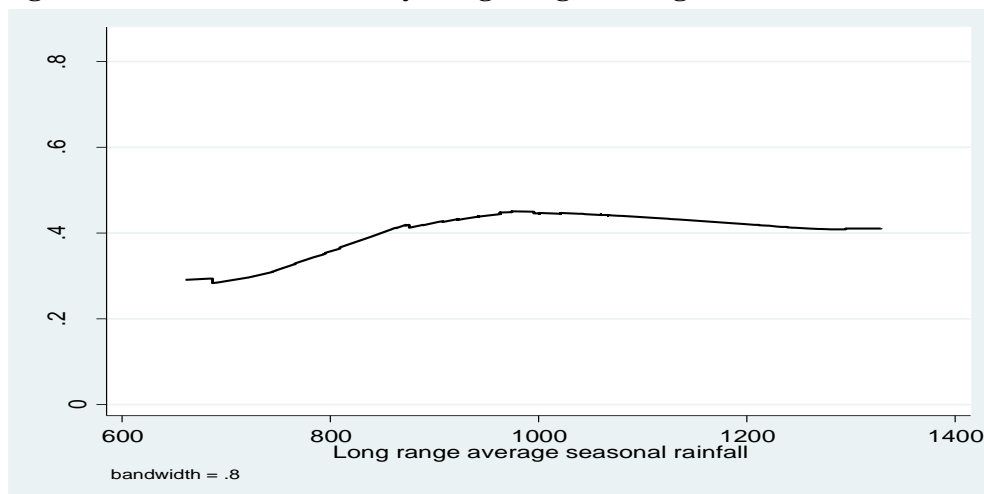
**FRA and FISP Stifle Crop Diversification:**

The key government policy instruments (FRA and FISP) to help smallholder farmers get out of poverty as well as achieve food security are negatively associated with smallholder crop diversification (see Figure 3). An increase in FRA community maize purchases of 100,000 MT is associated with a decrease in diversification of 25 percentage points all other factors held

constant. On the other hand, traditional FISP impact on crop diversification is modest, for example, a 100,000 metric increase in FISP fertilizer received by the community decreases diversification by 0.1 percentage points all other factors held constant.

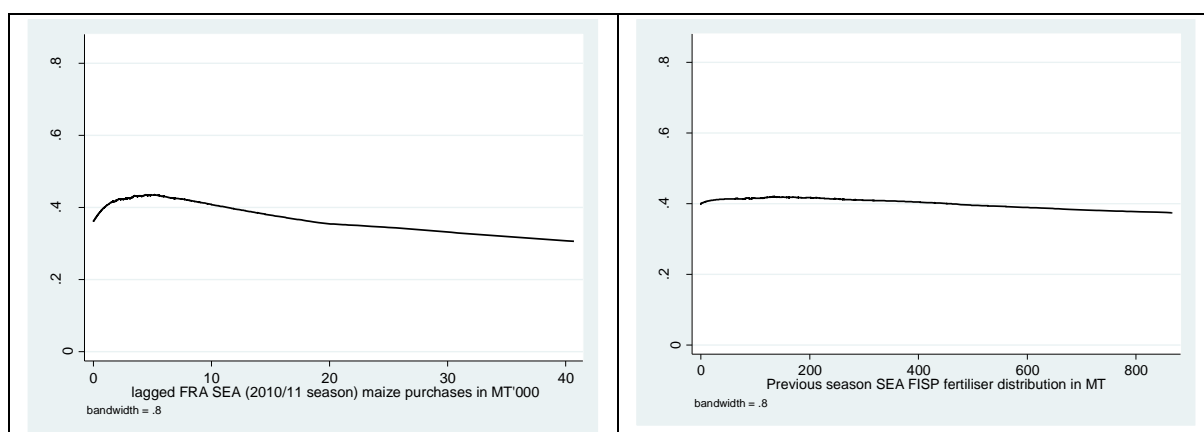
These results support recommendations made by other researchers that the government has to seriously consider limiting the role of FRA in order to effectively promote smallholder crop diversification (see IAPRI 2012; Kuteya 2012; IAPRI 2015). With regards to FISP, the government has to hasten the implementation of the flexible electronic voucher system because there is evidence to support that the e-voucher programme promotes agricultural diversification (Kuteya et al. 2016).

**Figure 2. Distribution of SID by Long Range Average District Seasonal Rainfall**



Source: Authors’ Computations and CSO/MAL/IAPRI 2012, 2015.

**Figure 3. Distribution of SID by FRA Maize Purchases and FISP Fertilizer Receipts**



Source: Authors' Computations and CSO/MAL/IAPRI 2012, 2015.

### CONCLUSIONS/RECOMMENDATIONS:

**First and Foremost:** this study shows that Government's desire to assist smallholder farmers through the implementation of FRA and FISP negatively affect crop diversification in addition to their many other effects in the smallholder agricultural value chains such as distorting input and output markets. This should be viewed together with the fact that continued Government spending on these programmes deny resources for key drivers of agricultural growth and tend to benefit mostly a small proportion of better off smallholder farmers. The findings of this study amplify previous IAPRI work including stakeholder consultations (e.g. IAPRI 2012; Kuteya 2012; IAPRI 2015) which have pointed at a much reduced role of Government in maize purchases, perhaps only for purposes of maintaining strategic reserves and purchases from remote areas that cannot be reached by the private sector.

However, the Government piloting of FISP input distribution through the electronic voucher need to be commended as this is expected to increase agricultural diversification, crowd-in private sector participation in input distribution and overall efficiency of input distribution. IAPRI is in the process of empirically assess the impacts of the distribution of FISP inputs through the electronic voucher and the programme needs to be quickly rolled out to benefit more and more farmers

**Second:** the findings show that the role of extension in promoting productivity enhancing technologies including crop diversification is very important. Therefore, there is need for

Government, cooperating partners and other concerned stakeholders to ensure that sufficient resources, both human and financial, are put in place to revitalize the extension system of the country. Not only should as many agricultural camps as possible be manned but also equip extension workers with transport and appropriate advice to disseminate to their smallholder farming clients. Key among the messages should be productivity enhancing technologies including climate smart agriculture and agricultural diversification. The introduction of IT district extension hubs a move in the right direction.

**Third:** the findings have shown that crop diversification is positively influenced by asset endowments of smallholder farm households. This means that poorer smallholder farm households need support with working capital to fulfil their crop diversification needs. A well-targeted FISP input distribution using the electronic voucher would go a long way in contributing to this cause. Furthermore, the study and other IAPRI work have shown that increasing smallholder access to land would significantly increase crop diversification and commercialization, which would significantly contribute to broad-based rural poverty reduction. Therefore, efforts targeted at increasing smallholder commercialization should include deliberate efforts to increase smallholder access to land.

**Fourth:** access to markets tends to positively influence crop diversification. This implies that deliberate effort and resources need to be devoted to developing input, output, and food markets in remote areas of the country, especially since over the years, IAPRI work has consistently

demonstrated that a significant proportion of smallholder farm households are net buyers of even the staple food, maize. Furthermore, development of feeder roads, warehouse receipt systems, and market intermediaries are some of the measures that increase market access.

**Fifth:** is that rainfall increases crop diversification. Rainfall is a natural phenomenon over which man has little control and therefore this finding suggests that investments in irrigation need to be promoted in drier southern parts of the country in addition to deliberate extension messages to enhance crop diversification.

All in all, the agriculture sector offers potential to contribute significantly to national Gross Domestic Product (GDP) through producing a diversified range of products for the local and international markets. However, current and past agricultural development policies have inclined towards promoting maize production. If the Government's spending on agriculture is to yield meaningful results especially with regards to poverty reduction, Government needs to create an enabling environment in which alternative value chains to maize can flourish.

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