From: One Acre Fund Cost Benefit Analysis Group
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Introduction

One Acre Fund is a non-governmental organization that works to lift smallholder farmers in Sub-Saharan Africa out of poverty by providing high quality agricultural inputs, training, financing, and distribution support. The organization serves over 800,000 farmers in Burundi, Kenya, Malawi, Rwanda, Tanzania, and Uganda. One Acre Fund provides its services through agro-vets stores (*dukas*). Currently, it has four stores in operation in Kenya and six more are expected to open in 2019. In the next year, the fund hopes to scale up to 150 stores. This project will evaluate the social welfare and secondary market impacts of scaling up the Fund's efforts. This memo will first provide a brief background and discussion of literature, then it will give an overview of what we expect the outcome of the scaling up would be, and it will end by providing a completion plan for the whole project.

Background

Sub-Saharan Africa (SSA) is home to nearly half of the world's uncultivated, arable land. However, out of arable land that is cultivated, yields in Sub-Saharan Africa are five times lower than the global average. These low agricultural yields contribute to the fact that approximately 70% of Africans living below the World Bank-defined poverty line are smallholder farmers (World Bank, 2015; Ashour et al., 2019). An increase in agricultural productivity in SSA is necessary to assist these African farmers on their journey toward lifting themselves out of extreme poverty (Deutschmann et al., 2019). Despite the necessity for increased agricultural output, there has been little

improvement in productivity across sub-Saharan Africa over the last fifty years (Bold et al., 2017).

One reason for persistently low productivity may be the fact that many smallholder farmers in SSA do not use adequate amounts of fertilizers due to a prevailing perception that these inputs are of low quality (Michelson et al., 2018). The market for agricultural inputs in SSA is not competitive, largely unregulated, and existing regulations are mostly unenforced. As a result, smallholder farmers generally lack access to agricultural inputs of reliable quality. A study in Uganda (Ashour et al., 2018) that looked at the quality of fertilizes found that of sampled fertilizer, “30% of nutrient is missing in fertilizer, and hybrid maize seed is estimated to contain less than 50% authentic seeds.” This research also estimated that if the inputs were to contain the promised levels of nutrients and authentic seed, smallholder farmers would see an 80% increase in productivity. However in some cases, when farmers decide to invest in what are intended to be productivity-boosting products sometimes they may also experience sub-par agricultural outcomes (Bold et al., 2017). Additionally, the low availability of agricultural extension compounds this issue; as valuable farm technologies such as irrigation typically require a hefty initial investment as well as technological expertise (Food and Agriculture Organization, 2009). The reasons for this situation are complex. Agricultural inputs are “experience goods,” in that their quality is unknown to the consumer before consumption (Nyqvist et al. 2018). Furthermore, even after trying various inputs, it remains unlikely for an individual farmer to accurately identify a low-quality input, given that there are many disparate factors which influence agricultural outcomes (Nyqvist et al., 2018; Bold et al., 2017).

The Expected Impact of Scaling up

From our research so far, we know that One Acre Fund operates in a favorable market and policy climate. The Kenyan Government's ten year Agricultural Sector Development Strategy (2010-2020) recognizes that smallholder farmers have low adoption rates of improved agricultural inputs. The strategy also identifies the potential for a huge increase in productivity that would follow the adoption of better agricultural inputs. Research indicates that fertilizer use in Kenya has averaged about 35 kg/Ha since the fertilizer market was liberalized in the mid-1990s. Comparing this to 139 kg/Ha used in the United States, it is clear that there is a productivity gap (Fuglie, et al. 2013; D'Alessandro et al. 2015). Agricultural productivity has steadily grown in Kenya from 1961-2008. However, more recent trends indicate that there is a decline in productivity, especially in maize beginning from 2014 (Wiggins, 2018). From all these data points we can anticipate that scaling up these *dukas* is going to have a net positive impact on social welfare because there is an under-provision of agricultural productivity-boosting goods and services.

We anticipate that the opening of *dukas* would increase the welfare of smallholder farmers; as access to high quality agricultural inputs, financing, and training would increase yields. This would allow farmers to sell their surplus crops, thus increasing their profits. A study that examined One Acre Fund's impacts shows that the organization has increased engaged Kenyan farmers' yields by 24% and their profits by 16% (Deutschmann et al., 2019). Total welfare would also increase because the market would become more competitive, forcing existing vendors to provide products with better quality at a lower price. We anticipate that the major costs associated with scaling

up would be operation costs and environmental costs of using fertilizers, herbicides, and pesticides. The major secondary market impact that we anticipate from scaling up would be the loss of welfare for existing vendors because they would lose their market share.

Plan for Completion

The next step in our project is going to be answering these following questions using information we will get from our clients. These questions would help us better understand how the project is going to be scaled up.

(i) Where are they going to be opening the *dukas*?

(ii) Do other public or private vendors exist in these areas?

(ii) What are the demographic, economic, and ecological conditions in these areas?

(iii) How many farmers are going to be served by these *dukas*? (ex. of 8 - 12 farmers in Kenya)

(iv) Does more fertilizer that increases yield lead to more profit? What about market forces that decrease the price for the cash crop when supply is high?

(v) Is starting soil condition controlled for in any of the yield tests?

(vi) What about depleting marginal returns? If farmers learn the practices, how much additional value do fertilizers, seeds, and insurance have on yields?

(vii) Propensity/ability for farmers to re-enroll in the program?

(viii) Land tenure

(ix) Drought, climate, price plunge volatility

(x) Could poor seeds lead to sickness of eaters; poor fertilizers lead to sickness of farmers?

(xi) Does the cost of seeds and fertilizer change with increasing demand?

(xii) Would insurance be most diverse/less costly with more participants or would price actually increase the tail of large climate-change related risks that would devastate a region (and increase price)?

(xiii) How does poor seed, poor fertilizer come about? How is it made?

(xiv) How many incumbent sellers are present in the average village, in the villages looking to place a One Acre Fund officer?

(xv) Would more households farm if profitable?

(xvi) What fertilizers is One Acre Fund selling? Is it creating a convoluted concentration in Monsanto, genetically-modified seeds and dependence?

(xvii) Why are the farmers in SSA growing maize? Why aren't they growing a diversity of crops that feed their households?

(xviii) What are the pollution impacts of herbicide? How it is/would it impact water and air quality?

(xix) Do all SSA countries have the use of herbicide as a goal? Do some countries see it as a threat?

After answering these questions we will use data that we will get from our clients and other sources to conduct a cost-benefit analysis.

Sources

Ashour, Maha, Daniel Orth Gilligan, Jessica Blumer Hoel, and Naureen Iqbal Karachiwalla. 2019. “Do Beliefs About Herbicide Quality Correspond with Actual Quality in Local Markets? Evidence from Uganda.” *The Journal of Development Studies* 55 (6): 1285–1306. https://doi.org/10.1080/00220388.2018.1464143.

Bold, Tessa, Kayuki C. Kaizzi, Jakob Svensson, and David Yanagizawa-Drott. 2017. “Lemon Technologies and Adoption: Measurement, Theory and Evidence from Agricultural Markets in Uganda.” *The Quarterly Journal of Economics* 132 (3): 1055–1100. https://doi.org/10.1093/qje/qjx009.

D’Alessandro, Stephen P, Jorge Caballero, John Lichte, and Simon Simpkin. “Kenya: Agricultural Sector Risk Assessment,” 2015. http://documents.worldbank.org/curated/en/294711467992513646/pdf/97887-REVISED-WP-P148139-PUBLIC-Box393257B-Kenya-Agricultural-Sector-Risk-Assessment.pd.

Deutschmann, Joshua W, Maya Duru, Kim Siegal, and Emilia Tjernström. 2019. “Can Smallholder Extension Transform African Agriculture?” Working Paper 26054. National Bureau of Economic Research. https://doi.org/10.3386/w26054.

Food and Agriculture Organization. “The Special Challenge for Sub-Saharan Africa,” 2009. http://www.fao.org/fileadmin/templates/wsfs/docs/Issues_papers/HLEF2050_Africa.pdf.

Fuglie, Keith, and Nicholas Rada. “Resources, Policies, and Agricultural Productivity in Sub-Saharan Africa.” *SSRN Electronic Journal*, 2013. https://doi.org/10.2139/ssrn.2266459.

Nyqvist, Martina Björkman, Jakob Svensson, and David Yanagizawa-Drott. 2018. “Can Competition Reduce Lemons? A Randomized Intervention in the Antimalarial Medicine Market in Uganda,” May, 56.

The Government of Kenya. “Agricultural Sector Development Strategy 2010–2020.” The Government of Kenya, 2010. http://extwprlegs1.fao.org/docs/pdf/ken140935.pdf.

Wiggins, Steve. “Agricultural Growth Trends In Africa.” *Agricultural Policy Research in Africa*, 2018, 46.

World Bank. 2015. “FAQs: Global Poverty Line Update.” Text/HTML. World Bank. September 30, 2015. https://www.worldbank.org/en/topic/poverty/brief/global-poverty-line-faq.