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Smallholder farmers' participation in profitable value chains and contract farming

Evidence from Irrigated Agriculture in Egypt

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Key messages

- The participation of smallholder farmers in high-value and profitable value chains as well as contract farming remains low in Africa.
- Farmers with limited land resources are more likely to devote a larger share of their land to low-value crops such as cereals while this pattern weakens with increasing land size and slightly reverses for high-value crops such as spices and herbs.
- Smallholders in Egypt face a trade-off between ensuring food security to their households and maximizing profit, and land plays a major factor in moderating this trade-off.
- Younger and wealthier farmers are more likely to participate in the cultivation of high-value crops such as spices and herbs as well as contract farming.
- There exist strong complementarities between participation in high-value value chains and contract farming.

This policy note is based on the recently published discussion paper titled "Smallholder farmers' participation in profitable value chains and contract farming: Evidence from Irrigated Agriculture in Egypt".

1. Introduction

Agri-food value chains continue to trigger significant interest in both research and public policy discourse. This is not surprising given the importance and resilience of the agri-food value chains in domestic and global food systems.[1] The transition of smallholder farmers from production geared towards meeting household food demands to production for maximizing income and profitability motives is of key importance for developing countries (Otsuka et al. 2016). Typically, agricultural households in many African countries only participate in agricultural production and marketing to satisfy their household food demands. Theoretically, households in the upstream segment may decide to produce low-value crops for consumption purposes or high-value crops for profitability motives.[2] In leveraging these production and consumption decisions, smallholder farmers in Africa face a myriad of challenges including but not limited to low productivity, market failures, credit constraints, and high transaction costs which deter them from participating in markets (Bellemare et al. 2022).

Given these challenges and constraints, many governments in Africa have been encouraging participation in high-value and profitable value chains to facilitate the transition of smallholder farmers to market-oriented agriculture. This has largely taken the form of various programs geared at increasing productivity and improving rural and market infrastructure to reduce transaction costs. Relatedly, contract farming has emerged as a viable institutional tool to boost the realization of these goals by addressing different aspects of market failures (Barrett et al. 2012; Bellemare et al. 2022). Contract farming stands the promise of establishing and solidifying linkages between farmers and other actors in the value chain, enabling them to enjoy market opportunities (Biggeri et al. 2022). Contract farming may be even more appealing for high-value crops since they require substantial amounts of farm inputs such as fertilizers and pesticides which may often be provided through contracts.

2. What do we do?

We identify observable and unobservable factors that may constrain the participation of farmers in profitable value chains and contract farming, which can reinforce each other in most cases. We also examine the complementarities and trade-offs in participation in profitable value chains and contract farming. We examine participation in high-value horticultural crops such as vegetables, fruits, spices, and herbs as well as less profitable value chains such as wheat and maize, which are cultivated by households for varying purposes. We then assess whether participation in these various value chains encourages or discourages subscription to contract farming. In establishing these relationships, we also identify some of the correlates of the choice of these value chains and contract farming. We use detailed plot-level data from seven governorates in Upper Egypt and estimate a multivariate probit model to jointly examine participation in value chains and contract farming while allowing potential interdependencies in these decisions. We perform both plot level and household level analysis.

3. Data and Context

Agricultural production in Egypt like in other parts of the MENA region typically relies on irrigation due to extended dry seasons and lack of rainfall. Land resources are scarce and dwindling due to growing population. Despite scarce land resources, area under irrigated agriculture has been increasing due to

[1] Agriculture in general and agri-food value chains, in particular, proved to be resilient to the COVID-19 pandemic as well as related shocks (e.g., Zeufack et al.,2020)

[2] This refers to the production of crops while the downstream segment refers to the marketing of crops

reclamation of new lands. However, growing competition for water resources and associated policy priorities may have different implications on the participation of smallholders in various value chains. Smallholder farmers in Egypt compete with both medium and large-scale farmers who in most instances are engaged in high-value value chains. This could lead to significant marginalization and inequity.

Beyond the usual economic incentives, farmers in Egypt face additional policy induced incentives in their decisions to participate in various value chains. For example, the government of Egypt encourages production of wheat to satisfy food security goals using alternative instruments. Nitrogen fertilizer subsidies in Egypt are geared towards promoting wheat cultivation. Thus, wheat farmers have better access to subsidized fertilizer. Furthermore, to ensure sufficient wheat supply, the government of Egypt procures wheat from local farmers at government-sponsored procurement price, which is usually above local market price. Although we lack formal evaluations of the implications of these policies, we anticipate that they can affect smallholders' participation and preferences in various value chains.

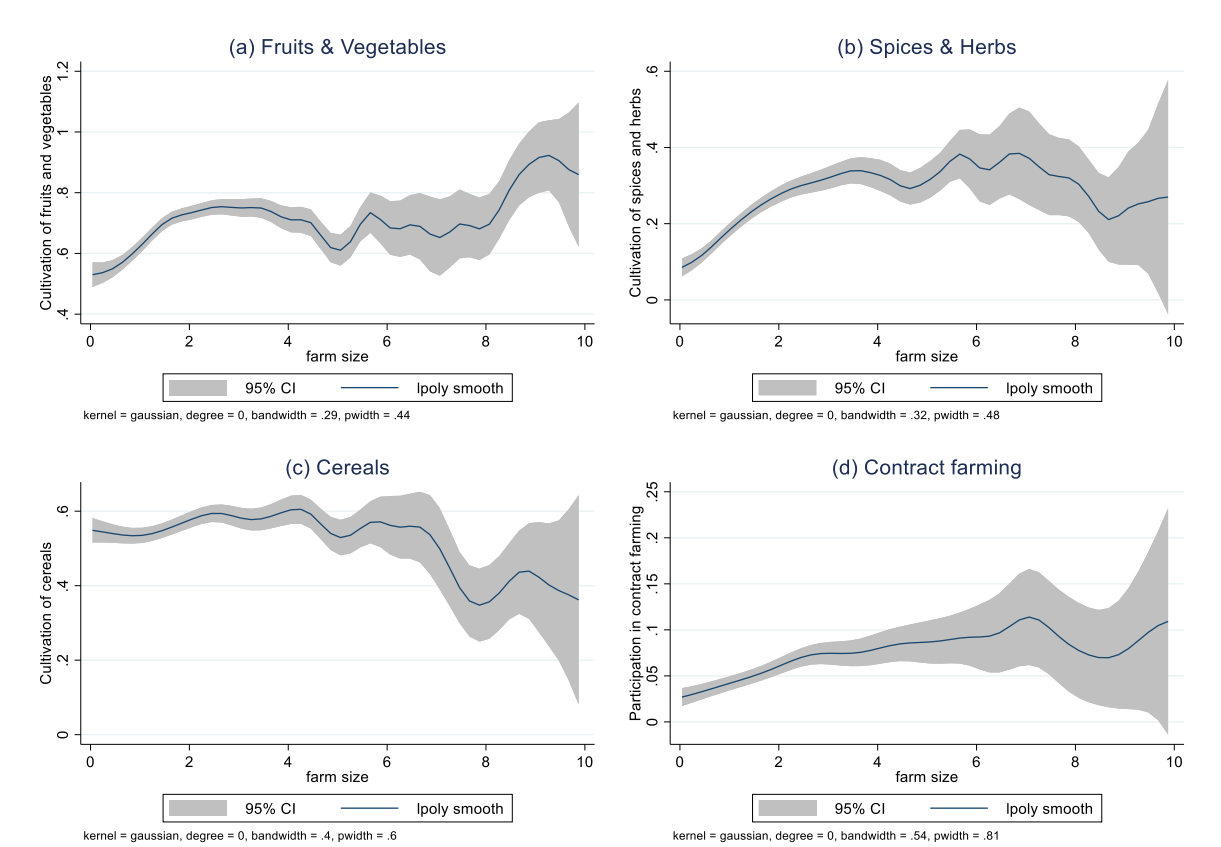
The data we use come from a survey meant to evaluate the Feed the Future Egypt, Food Security and Agribusiness Support (FAS) project, which sought to boost on-farm production, participation in horticultural value chains, agribusiness activities, and contract farming among smallholders in Upper Egypt. A farm household survey was conducted between April and May 2018 in seven governorates in Upper Egypt (Aswan, Assiut, Beni Suef, Luxor, Menya, Qena, and Sohag). The sample covers about 2237 households. A total of 5710 plots were cultivated by farmers across both seasons. On these plots, farmers are cultivating one or more different crops (intercropping). Smallholder farmers in Upper Egypt cultivate several crops, including high-value horticultural crops and cereals. We merged these crops into different broad categories of value chains: fruits, vegetables, spices, herbs, and cereals based on their agronomic definition. The cultivation of vegetables is the most popular value chain as about 70 percent of farmers are cultivating at least one type of vegetable. Spices and herbs are cultivated in about 12 and 14 percent of plots, respectively. Maize and wheat are two important cereals which are cultivated in about 27 and 34 percent of plots, respectively. Average plot size in our sample is about 1.5 feddans while average farm size is about 2.5 feddans.[3]

4. What do we find?

We find that several observable and unobservable factors reinforce and hence limit smallholders' participation in both high-value crops and contract farming. For example, we find a nonlinear relationship between land resources and participation in less profitable value chains such as cereals (Figure 1). This is likely to be driven by the important trade-offs between food security and profit motives of smallholder households. While we find large farm sizes to be associated with cultivation of spices and herbs, resource poor farmers with small farm sizes are more likely to participate in low-value chains such as cereals. these findings provide support to a part of the literature that has established that high-value value chains and contract farming may be scale dependent and positively biased towards medium and large farms (Meemken and Bellemare 2020). This is consistent with the notion that large farms may increase the returns to investments in high-value value chains and reduce transaction cost incurred by the contractor (Swinnen and Kuijpers 2020). We also observe that there exists a threshold point beyond which increases in plot or farm size may not matter for participation in high value chains.

3 A feddan is a unit of area commonly used in Egypt equivalent to 0.42 hectares or 1.03 acres.

Figure 1: Relationship between farm size and participation in value chains and contract farming



Besides land endowment, farm experience and associated risk-taking behavior may affect investment in profitable value chains and contract farming. For example, we find that older farmers are less likely to allocate larger share of their land on profitable value chains such as fruits and vegetables as well as spices and herbs. This could be explained by the fact that older farmers may be more risk averse to increase the share of land under these value chains. We also observe an inverse relationship between household wealth and share of farm allocated for low-value crops, highlighting that as wealth increases, the share of land allocated to cereals decline while the share of land under contract farming increases. The positive relationship between households' wealth and participation in contract farming suggests that the poor may also be excluded from contract farming by virtue of their limited wealth endowment.

We also find important trade-offs and complementarities between profitable value chains and contract farming: those smallholders cultivating high-value and profitable crops are more likely to participate in contract farming. This analysis is well-placed to inform policies aiming to boost smallholders' participation in profitable value chains. This finding has some important implications for informing effective policies to target and encourage smallholders join profitable value chains in Egypt and other comparable contexts. In the first place, targeting and encouraging young farmers to transit to market-oriented production may be cost-effective. Second, as Egypt is the largest wheat importer in the world, most of which come from Russia and Ukraine, these findings are even more relevant given the Russia-Ukraine crises which poses serious threats to wheat imports, threatening food security (Abay et al. 2022b). Indeed, this has reignited the debate on food "self-sufficiency" and many argue that boosting domestic

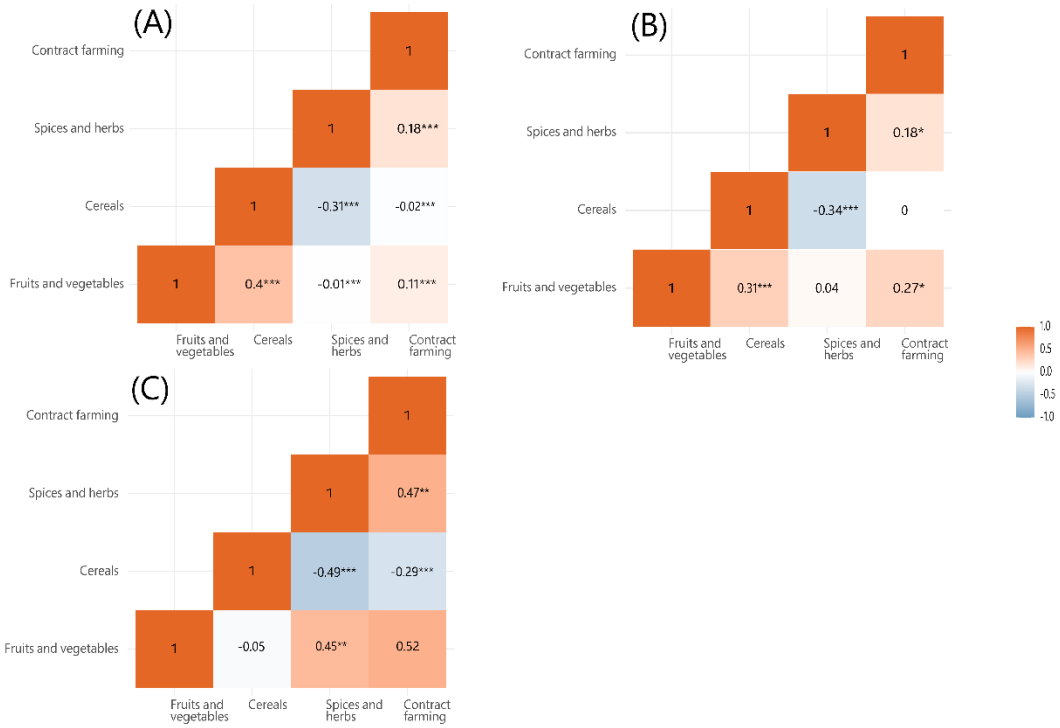
production of low-value cereals could have significant import substitution advantages, although the trade-offs we find in our study are not widely acknowledged.

5. Interdependencies across value chains and contract farming

Figure 2 shows the correlations between the various value chains and contract farming. The first panel (A) shows estimates based on plot-level estimation while the second panel (B) provides estimates from the household - level analysis. Panel C shows the interdependencies using the share of land under each value chain and contract farming. A positive correlation suggests potential complementarities while a negative correlation implies substitutability. The complementarity and substitutability across various value chains is sometimes stronger at the plot-level.This is likely to arise from the potential variation in the drivers of these complementarities at plot level and farm level. For example, complementarities at plot level are likely to be driven by potential biophysical factors that may affect intercropping patterns and choices. For example, vegetables are easy to intercrop with cereal production while this appears to be unlikely for spices and herbs.

Farmers who cultivate these high-value crops are more likely to participate in contract farming and this is likely to prevail at plot and household level. Specifically, major cereals such as wheat and maize are less likely to be cultivated on plots where high-value crops are cultivated. Relatedly, farmers who cultivate low-value crops are less likely to participate in contract farming. This is an important finding with implications for policy as this suggests some form of specialization. Households may prefer to specialize in categories of value chains depending on specific welfare objectives. Households that prefer to increase their income streams may get into high-value crops. The cultivation of high-value crops has been shown to be associated with increases in smallholder farmers and poverty reduction. However, small-scale farmers are usually excluded from these value chains given their resource constraints and other structural factors (Isager et al. 2018; Ton et al. 2018). This may explain their low participation in high-value and profitable value chains. Moreover, these resource-poor farmers may be more interested in improving food consumption and relaxing their household food demands than maximizing profits. This is not to say that there are no overlaps in ultimate decisions to either cultivate high-value or low-value crops. On the other hand, the cultivation of high-value crops may increase the purchasing power of households, enabling them to purchase food and improve their food security.

Figure 2: Complementarities and substitutability in value chains



6. Policy Implications

The findings from this analysis have important policy implications, mostly pointing to the direction that addressing smallholders' binding constraints, including risk and access to land, can encourage participation in profitable value chains and contract farming. Our findings offer suggestive evidence that may serve in targeting smallholders to join profitable value chains in Egypt and other comparable contexts. For example, despite the limited land resources young farmers usually own, they are more likely to participate in high-value and profitable value chains, which insinuates that supporting young farmers get access to land and financial resources may increase their participation in profitable value chains and contract farming. As land resources in most MENA regions are scarce, various land reclamation efforts may need to properly target the young. Given the seeming marginalization that young and smallholder farmers may face even when such reclamation policies are enforced, it is important that land redistribution programs target those who can generate maximum returns to limited land and water resources.

Another important finding relevant for policy is the apparent trade-off between high-value and low-value crops. While the high-value crops are more profitable with greater abilities to increase welfare and reduce poverty, the low-value crops may be more inclusive and important for ensuring household food security. This is not to mean that high-value crops are correlated with food insecurity as incomes from the cultivation of these crops can be used to relax household liquidity constraints households may be facing. Such incomes could be used to purchase diverse foods and improve food security and dietary diversity. That said, these are important trade-offs with varying implications across farmers with varying

land and wealth. Thus, policies geared at reducing the binding constraints farmers are facing may trigger their participation in high-value crops such that both value chains may be complementary.

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