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## Participation in the market chain and food security: The case of the Ugandan maize farmers

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## ABSTRACT

Empirical assessment of the links between market chain participation and food security is characterized by conflicting evidence. Our goal is to deal with this issue at different points of the commercialization chain by providing a sound identification strategy using the Uganda World Bank Living Standards Measurement Study-Integrated Surveys on Agriculture (LSMS-ISA) panel data. By looking at the dynamics of farmers' consumption over time and controlling for a variety of household and production characteristics as well as possible confounding factors, our results show that farmers' food security is positively affected by participation in the market chain, irrespective of the choice of outlet. This provides two key messages for policymaking: farmers selling to the market are better off and intermediaries do not hamper food security.

### 1. Introduction

A number of common wisdoms influence the narrative on the welfare effects of agriculture commercialization in low-income African countries. On the one hand, the integration of smallholder farmers into traditional markets is supposed to have strongly pro-poor outcomes thanks to a virtuous cycle of efficiency which increases household income, consumption, food security and nutritional outcomes. On the other hand, participation in the market chain is seen as being less beneficial for the poorest and most vulnerable groups who are often considered unable to reap the benefits of increased market orientation. Furthermore, intermediaries are seen as non-competitive rent extractors able to further exploit farmers' welfare.

Sub-Saharan (SSA) economies are undergoing a vast rapid process of rural transformation characterized by the increasing importance of agri-food chains and multinational food companies, increased demand for high-value products, and increasing food prices at the global level (McCullough et al., 2008; Swinnen and Maertens, 2007; Maertens and Swinnen, 2015). This type of structural change in SSA agricultural markets is fostering vertical co-ordination where buyer agents simultaneously control production, increase sales and reduce costs and risks. This implies further concerns about the actual benefits of small-

holder rural farmers' participation in this new agricultural system in terms of welfare, poverty and food security (Minten et al., 2009; Cattaneo et al., 2014; Swinnen, 2014; Warning and Key, 2002). On top of this, the performance of food markets is often hampered by poor infrastructure, inadequate support services and weak institutions, which push up transaction costs and price volatility (Renkow et al., 2004; Osborne, 2005; Barrett, 2007).

Although investigations on farmers' market decisions (in terms of labor and agriculture supply and/or shifting from staple to cash crops) date back to the Nineties (Fafchamps, 1992; Goetz, 1992; Von Braun, 1995; Key et al., 2000), a systematic investigation of the causal impact on food security of alternative farmers' selling strategies along the commercialization chain is scant and mainly based on case studies (Muriithi and Matz, 2015; Hagos and Geta, 2016; Awotide et al., 2016). This is due to the fact that different crops have special features which can affect the relationship between selling strategies and food security; farmers' characteristics may influence both food security and their selling strategy in different points of the market chain (Fafchamps and Hill, 2005); complementary issues may have a role, such as the new opportunities (but also the new challenges) related to vertical integration, e.g., via contract farming arrangements<sup>1</sup> (Minten et al., 2009; Barrett et al., 2012; Bellemare and Novak, 2016); the role of

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<sup>1</sup> Contract farming is the institution wherein a processor contracts the production of an agricultural commodity out to a grower.

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intermediaries and public policies in assembling markets is still ambiguous (Fafchamps and Hill, 2005; Sitko and Jayne, 2014; Muratori, 2016).<sup>2</sup>

We provide an identification strategy to suggest a possible causal relationship between rural farmers' commercialization choices, both in terms of market participation and outlet choice, and food security, measured both in terms of per adult equivalent total consumption, food consumption and caloric in-take. This is a relevant issue since the above relationship is theoretically ambiguous. As long as the markets of all goods are perfect and all goods are tradeable, the farm household is indifferent as far as consuming own-produced and market-purchased goods is concerned since, in the former case, it implicitly buys goods from itself (Taylor and Adelman, 2003). However, when markets are incomplete or missing, as is generally the case in developing contexts, food production acquires an insurance value which is additional to its normal contribution to income and farm households perceive food self-sufficiency as a source of protection against price risks in food markets (Fafchamps, 1992; Kurosaki and Fafchamps, 2002; de Janvry and Sadoulet, 2005). The hypothesis that food production income is likely to “stick” as food consumption may not bear out for all the available marketing options (Von Braun et al., 1991; Kirk et al., 2017) and the supposed benefits of agriculture commercialization on food security (cash vs in-kind income; better prices, higher standards, improved efficiency, etc.) may (at least partially) be offset by transaction costs, risk aversion or missing markets (Renkow et al., 2004; Osborne, 2005; Barrett, 2007). Indeed, the positive association between agriculture commercialization and nutrition is challenged by the most recent empirical analyses (Kirk et al., 2017; Carletto et al., 2017) and the positive effects on food security of the inclusion of small-holder farmers in contract schemes and high value export chains are not confirmed by the most recent literature (Ragasa et al., 2018). However, empirical assessments are fraught with difficulties both in terms of data and methodology: on the one hand, the market choice is not randomly assigned but depends on a number of factors that could influence both the households' decision making process and their food security (Key et al., 2000) and on the other hand, alternative forms of vertical integration in the commercialization chain may have heterogeneous impacts on food security (Swinnen and Vandeplass, 2014; Wohlgenant, 2001; Weldegebriel, 2004; McCorrison et al., 2001; Wang et al., 2006).

Instead of relying on case studies and/or specific data collections, our empirical strategy relies on exploiting the three wave panel data (period 2009–12) of the Uganda World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA). We are aware that this dataset does not include all the elements that may allow deeper analysis and test all the alternative hypotheses. For instance, there is no differentiation between spot and contract transactions or input/output market linkages which could be driving market outlet choice. Furthermore, it lacks proper measures of prices (farmgate as well as for each point of competition), transport and other access costs (e.g., margins, processing, handling, taxes and fees, etc.). Finally, the detailed household consumption expenditure module allows us to track household per adult equivalent food consumption (and the corresponding estimated caloric in-take) over time, but food security entails more than food/calories availability. However, our measure can be seen as a suitable proxy of food security if compared with those adopted in similar empirical assessments such as the number of days without eating a certain number of meals (Bellemare and Novak, 2016) or children's anthropometric measures (Kirk et al., 2017; Carletto et al., 2017) where good nutrition also depends on a set of non-food factors such as sanitary conditions, water quality, infectious diseases and access to primary health care (Pinstrup-Andersen, 2009).

Our analysis presents clear advantages over the previous literature. First, by building upon a consolidated empirical literature that looks at farmers' consumption in any period as a semi-logarithmic econometric specification of a set of observable and unobservable household and production characteristics (Deaton, 1992; Browning and Lusardi, 1996; Chaudhuri, 2003; Dercon, 2005), we can test the significance of household market chain participation and position by looking at measures of farmers' commercialization choices along the different points in the market chain and simultaneously control for both crop and household heterogeneity and eventually household self-selection. Second, the same analysis can be replicated for other countries and/or crops, and future revisions of the LSMS-ISA initiative may include new information regarding marketing choices, such as contract farming.<sup>3</sup>

The choice of maize in Uganda as the object of our empirical analysis is justified by several reasons: (i) Uganda is among the least well-nourished countries in the world and its hunger situation is considered to be serious (Shively and Hao, 2012); (ii) maize is assuming increasing importance in the Ugandan economy because of the growing costs of traditional staple food (e.g., plantains); (iii) the Ugandan maize market has been completely liberalized since government intervention through its parastatals (the Produce Marketing, and Food and Beverage Boards) ceased in the 1990s and farmers are free from constraints when choosing their selling strategy; (iv) maize is a key activity for many small-scale farming households and is predominantly grown by farmers at the subsistence level; (v) maize is the most natural candidate when looking at small-holder farmers' food security since it is produced both for home consumption and as a cash crop. Specifically, maize provides some insight into the trade-off between direct consumption and revenue generation which is at the heart of the agricultural household decision-making process and does not take place in the case of cash crops.

By controlling for a variety of observable household and production characteristics as well as possible confounding factors, results consistently show that farmers' food security is positively affected by participation in the market chain. The increase in total and food consumption associated with the market option also leads to a parallel increase in calorie intake, although such an increase is not robust to different possible specifications. Conversely, the position along the market chain (upstream and/or downstream of the final markets) does not seem to have a significant impact. This empirical evidence, supported by a number of robustness checks, is consistent with the theoretical prediction that vertical coordination across actors reduces the market power of intermediaries.

The paper is organized as follows: Section 2 reports the theoretical and empirical evidence on the links between agricultural commercialization and food security; Section 3 describes the Ugandan maize market chain; Section 4 provides a detailed description of the Uganda Living Standards Measurement Study – Integrated Survey on Agriculture (LSMS-ISA); Section 5 presents the identification strategy, comments on the results and provides some sensitivity analysis; Section 6 concludes and presents the main policy implications of the work.

## 2. Agricultural commercialization and food security: theory and empirical evidence

Agricultural commercialization as an effective way forward to support food security is a moot point. If household consumption choices depended only on total earnings, all kinds of income would have the potential to improve food security. Observed deviations from this theoretical case may originate from multiple sources. On the one hand, food production is more likely to “stick” as food consumption outside the marketing channel where the hypothesis of non-separability

<sup>2</sup> In this work we use the generic term “intermediaries” to identify a broad set of categories that have a role in linking farmers with the market such as traders, middlemen, and assemblers.

<sup>3</sup> Panel data within the same initiative are currently available for the following African countries: Ethiopia, Malawi, Niger, Nigeria, Tanzania and Uganda.

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