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Limitations of Contract Farming as a Pro-poor Strategy: The Case of Maize Outgrower Schemes in Upper West Ghana

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SUMMARY

Contract farming (CF) arrangements have the potential to address market failures and improve technology adoption, productivity, and welfare. In Ghana, government and donors use CF as a strategy for increasing adoption of new agricultural technologies and developing value chains. Yet to date, there has not been a rigorous assessment of these CF schemes.

The focus in this paper is on different maize-based CF schemes in the poorest and most remote region in Ghana. It assesses the profitability and potential impact of these CF schemes, utilizing a unique plot-level dataset that covers two periods of data and two maize plots (scheme and non-scheme) per household, and employing matching techniques and an instrumental variable approach to address selection bias and unobserved heterogeneity across farmers. These are complemented by a community-level survey, in-depth interviews with scheme operators, and a series of key informant interviews. Results show that these schemes led to improved technology adoption and yield increases. In addition, a subset of maize farmers with high yield improvements due to CF participation have high profits. Maize CF schemes also enabled market coordination and consistent supply of quality maize to downstream industries. However, on average, the impact of the CF schemes on profitability is negative, even when input diversion is accounted for. Yield increases are not high enough to compensate for higher input requirements and the cost of capital under the schemes. Despite higher yields, the costs to produce one metric tonne of maize under CF schemes are higher than on maize farms without CF schemes, twice that of several countries in Africa, and more than seven times higher than that of major maize-exporting countries (the United States, Brazil, and Argentina). Sustainability of these CF schemes will largely depend on developing and promoting much-improved varieties and technologies that boost yields in order to compensate for the high input and credit costs.

1. Introduction

Contract farming (CF) has become an increasingly popular institutional tool to ensure the quality and quantity of inputs or raw materials for processors, exporters, distributors, and supermarkets (Reardon, Barrett, Berdegué, & Swinnen, 2009; Swinnen & Maertens, 2007). At the same time, CF may help farmers overcome production constraints, such as financial constraints, poor access to inputs, or lack of technical and managerial capacity, or assure a market for their harvests (Barrett *et al.*, 2012; Swinnen & Maertens, 2007). CF arrangements are potentially a win–win strategy for buyers and farmers, especially in developing and transition countries that experience a variety of market imperfections and poor public institutions (Maertens & Vande Velde, 2017; Swinnen & Maertens, 2007).

Despite optimism about the potential of CF to improve farmers' welfare (e.g., Bellemare, 2012; Dedehouanou, Swinnen, & Maertens, 2013; Maertens & Swinnen, 2009; Minten, Randrianarison, & Swinnen, 2009; Wang, Wang, & Delgado, 2014; Warning & Key, 2002), its role in rural economic growth, food security, and poverty reduction remains the subject of considerable debate (Barrett *et al.*, 2012; Oya, 2012; Swinnen & Maertens, 2007; Bellemare & Novak, 2017). While several studies show positive impacts on indicators of farmers' welfare, others do not find such effects (recent reviews on the impact of CF are Oya, 2012; Wang *et al.*, 2014, and Otsuka, Nakano, & Takahashi, 2016) and raise concerns that CF arrangements do not always include the poorest households, can only include a limited number of households, or may even increase relative poverty (Glover, 1987; Key & Runsten, 1999; Miyata, Minot, & Hu, 2009; Simmons,

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Winters, & Patrick, 2005). Moreover, many empirical studies struggle to establish causality (see discussions by Barrett *et al.*, 2012; Bolwig, Gibbon, & Jones, 2009; Miyata *et al.*, 2009; and Bellemare, 2012).

Most studies on CF focus on contracts for horticultural or industrial crops for export or for supermarket retail for high-value urban market segments, creating an evidence gap on the impact on farmers' welfare of CF for staple crops and crops for domestic consumption (Maertens & Vande Velde, 2017). An exception is a study of rice CF in Benin (Maertens & Vande Velde, 2017) which finds that CF participation doubles rice income and increases total household income by 17%. However, this analysis is based on a single community, with a sample size of 89 contract rice farmers, and covers one period of data under the CF scheme. Bellemare's (2012) study includes CF schemes for rice and maize, but the analysis does not differentiate between the impact of CF for these staples and CF for high-value crops. Because it is argued by some that CF for staple crops linked to domestic markets could reach more farmers and contribute much more to poverty reduction than CF for more exclusive horticultural or industrial crops (Miyata *et al.*, 2009; Gomez *et al.*, 2011), more evidence on the impact of CF for staple crops is needed to guide the policy debate.

Moreover, CF schemes are diverse, not only in terms of the commodity but also in terms of contractual arrangements (Bogetoft & Olesen, 2002; Oya, 2012). Most studies in the existing literature consider the impact of one specific scheme (with a few exceptions such as Bellemare, 2012; Narayanan, 2014; Simmons *et al.*, 2005). In their review of CF, Wang *et al.* (2014) conclude that the empirical literature on CF schemes could benefit from further investigation into their heterogeneity.

In this paper, we compare different CF schemes in order to provide insight as to whether CF can benefit smallholder farmers when the schemes focus on staple crops that are highly commercial but not necessarily high-value crops. We also explicitly analyze the role of technology specificity and profitability in the context of interlinked markets and value chains, highlighted by Kuijpers and Swinnen (2016) as an issue that has been largely ignored. We use data on maize CF in Ghana, which is a relevant case since the government is planning to increase support to CF as a strategy to modernize agriculture, increase agricultural productivity, and reduce rural poverty. Because there may be significant differences and lessons to be learned, disaggregating and comparing across schemes within the same commodity and location is a valuable exercise. The seeming longevity of most of the schemes (4–10 years) in the study site, and a high level of participation in one of the schemes (reportedly reaching 10,000 participants in 2015, much bigger than most CF schemes studied in the literature) make Ghana an interesting case to study in terms of sustainability of CF schemes and their potential for broad-based poverty reduction.

We use household- and plot-level data from smallholder farmers who participate in various maize CF schemes in the Upper West region of Ghana as well as data from nonparticipating farmers. The data are cross-sectional, but for each maize plot we have detailed information for two consecutive years and, where applicable, we have information on both with-scheme and without-scheme plots within the same household. We study the impact of CF participation on technology adoption, yields, and profits, using different matching techniques to distinguish the impacts of different CF schemes. The robustness of the results is verified using instrumental variable techniques and a correlated random effects model using the Mundlak-Chamberlain device. We analyze heterogeneity in outcomes within and across schemes, and account for input diversion. Finally, we discuss possible scenarios in which the productivity and profitability of the CF schemes could be improved.

The rest of the paper is structured as follows. Section 2 reviews the literature on CF. Section 3 describes the different CF schemes analyzed. Section 4 presents data sources and methods. Section 5 describes the nature of the data and main results. Section 6 discusses the results in comparison with earlier findings from the literature and outlines the main implications of the results. Section 7 summarizes the findings and highlights the contributions of the paper.

2. Literature review

A CF arrangement can be defined as a pre-planting agreement between a farmer and a buyer. In this agreement, the farmer commits to producing a specific product in a specific manner and the buyer commits to purchasing this product (Minot & Sawyer, 2016). The nature of these contracts can vary considerably, but there are two common types: marketing contracts and production contracts (Swinnen & Maertens, 2007). Marketing contracts are agreements between the buyer and farmer that specifies the pricing system, product quantity, or delivery time. Production contracts involve more extensive specifications related to the use of inputs, management practices, or quality attributes. The latter often involves the provision of key inputs on credit and technical assistance to the farmers (Swinnen & Maertens, 2007). There are numerous types and different design features of contracts applying concepts of contract, agency and game theories (Bogetoft & Olesen, 2002; Wu, 2014; Goodhue & Simon, 2016).

The economic rationale for CF has been explained using several theoretical frameworks, many of them based on the new institutional economics literature (Sykuta and Cook, 2001). In a complex world with conflicting interests and private information, institutional arrangements such as CF are necessary for coordination and for reducing transaction costs. CF is considered a hybrid institutional arrangement, in between spot markets on one end and vertical integration on the other. There is also a spectrum of different CF arrangements in terms of the distribution of decision rights and risks among players. More control and decision rights given to farmers (also referred to as basic contracts) gets closer to spot market conditions, while more control and decision rights given to buyers (restrictive contracts) gets closer to vertical integration (Bogetoft & Olesen, 2002; Goodhue & Simon, 2016). Choices on contract design features and decision rights distribution depend on various factors including the nature of technology and asset specificity, information asymmetries, and transaction costs (Sykuta and Cook, 2001; Bogetoft & Olesen, 2002; Kuijpers & Swinnen, 2016; Goodhue & Simon, 2016).

CF is an institutional arrangement that can be used to overcome uncertainties in labor, input, credit, insurance, and output markets, and therefore, can improve access to quality and timely inputs, improve productivity, and increase incomes (Abebe, Bijman, Kemp, Omta, & Tsegaye, 2013; Key & Runsten, 1999). However, CF schemes can also introduce a new set of coordination and enforcement issues. Principal–agent theory focuses on information asymmetries and incentive incompatibility between the principal (buyer) and the agent (farmer) (also referred to as a moral hazard problem) (Key & Runsten, 1999; Sykuta and Cook, 2001), and is useful in explaining frequently-observed problems such as contract breach, input diversion, and side-selling. Even though CF is portrayed as a win–win strategy for both buyers and sellers, there is a relatively high rate of failure in CF (see review by Minot and Sawyer (2016)).

In terms of staple crops, the literature has predicted that CF and other similar forms of coordination and collective action likely would not work for traditional, staple, non-perishable, and non-differentiated commodities because spot markets would be the most efficient system (see Berdegué, 2002; Hellin *et al.*, 2007; World Bank, 2014). In this scenario, transaction costs associated with market access are relatively low: there are so many buyers