



# Linking small-scale farmers to the durum wheat value chain in Ethiopia: Assessing the effects on production and wellbeing

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## ARTICLE INFO

### Keywords:

Ethiopia  
Smallholders  
Wheat  
Value chain  
Impact evaluation  
Cooperatives  
Food security

## ABSTRACT

Food security and agricultural-led industrialisation are pivotal development objectives in Ethiopia. One of the main challenges this country faces is increasing agricultural productivity by integrating smallholder farmers into a high-value agricultural commodity supply chain. This paper examines an integrated project—the Agricultural Value Chains Project in Oromia (AVCPO)—that aims to improve the livelihoods of smallholders in the Bale Zone by involving them in the production of high-quality durum wheat and linking them to the pasta industry via farmers' cooperatives. Using primary data collected in 2014 and retrospective information, this paper investigates the AVCPO's effects on the quantity of cereal production, the share of cereals that have been sold through cooperatives, food security, and education. In order to account for potential violations of the exclusion restriction assumption, an instrumental variable approach is applied, together with three additional estimation strategies.

The results suggest that the project has had a large and positive effect on gross and net values of cereal production per hectare, as well as on the share of production sold to pasta makers through cooperatives. These benefits accrue equally to land-rich and land-poor farmers. Furthermore, our analysis suggests that the AVCPO has improved educational outcomes and reduced food insecurity, without affecting crop rotation practices. Overall, our findings point to the effectiveness of the project. Before replicating or scaling up this intervention, however, it is necessary to understand how to better involve poorer farmers and which adjustments are needed if the areas selected have a lower potential than Bale Zone.

## 1. Introduction

Ethiopia is the leading producer of wheat in Sub-Saharan Africa (SSA) (FAOSTAT, 2015) as well as the only country where smallholders have a majority share in its production (Spielman et al., 2010; Shiferaw et al., 2014). As in many other SSA countries, a growing population, urbanisation and rising incomes are driving a continuous increase in food demand, especially of processed and convenience-oriented foods such as pasta (Jayne et al., 2013; Mason et al., 2015; Donley, 2016). Wheat consumption in Ethiopia has risen faster than any other major food grain, especially for pasta and bread consumption, and is expected to continue to rise rapidly in the future (Minot et al., 2015). While the rising demand for pasta in Ethiopia is largely satisfied by the domestic pasta industry (Shiferaw et al., 2014; Chiari, 2015), the growing demand for durum wheat that results is largely met through imports. Ethiopia's increasing reliance on food imports from volatile global markets has raised concerns over national food security, as has the

possibility that imports may negatively affect the livelihoods of small-scale farmers (Gebreselassie et al., 2017).

It is not an easy task to generate systematic linkages between and among smallholder cooperatives, pasta manufacturers and consumers in a relatively nascent value chain (VC). Efforts to address this situation require attention to wheat production quality, input and output market failures and coordination problems facing smallholder farmers and other actors in the value chain. This implies, in particular, identifying institutional arrangements for linking farmers with each other and to marketing channels as well as bringing together public and private stakeholders (e.g. research, extension, and banking institutions) (Dorward et al., 2004; Jayne et al., 2010; Spielman et al., 2010). Two institutional arrangements that are often debated with reference to Ethiopia and indeed elsewhere are contract farming and farmer co-operatives, which have been the object of investigation from a theoretical and empirical perspective (Biénabe and Sautier, 2005; Holloway et al., 2000; Abebaw and Haile, 2013).

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<https://doi.org/10.1016/j.foodpol.2018.06.001>

Received 18 October 2017; Received in revised form 4 June 2018; Accepted 5 June 2018  
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Contract farming is an important element in the Ethiopian Government's Growth and Transformation Plan II to link small-scale farmers to sustainable market outlets and promote agricultural development. Contract farming is a commercial relationship between farmers and traders or processors over the production and sale of certain agricultural products, often at pre-agreed quality, quantity and price (Eaton and Shepherd, 2001). Smallholders might benefit from access to high-value output market and from the – often included – provisions for access to credit, technical advisory services and inputs (Jayne et al., 2004; Barrett et al., 2012; Abate et al., 2014). It may also help reduce marketing risks by guaranteeing more reliable prices than in the open market (Kaganzi et al., 2009). As a result, it might lead to increasing prices for producers and/or marketed quantity, and thereby to higher incomes.

At the same time, there are concerns about a potential rise in local inequality as access to contract farming opportunities is potentially limited to better-off farmers who have the necessary resources and skills (Barrett et al., 2012). Negative effects may also arise due to increased exposure to production and marketing risk as well as potential power imbalances (Sivramkrishna and Jyotishi, 2008). A number of studies have recently explored these potential effects of contract farming (e.g. Warning and Key, 2002; Simmons et al., 2005; Rao and Qaim, 2011; Bellemare, 2012; Narayanan, 2014; Herrmann, 2017). In an early study, Warning and Key (2002) find substantial income improvements for peanut farmers producing under contract in Senegal. Rao and Qaim (2011) find that selling under contracts to supermarkets in Kenya has positive income effects for vegetable farmers. Bellemare (2012), using an extensive dataset covering a number of crops, firms and regions of Madagascar, concludes that contract farming participation leads to significant income improvements. In Ethiopia, two existing studies on contract farming, one on castor beans by Negash and Swinnen (2013) and one on organic honey by Girma and Gardebroek (2015) find positive effects on food security and incomes, respectively.

A recent systematic review of 26 contract farming arrangements in 13 developing countries by Ton et al. (2017) confirms these positive income effects, estimating an overall pooled income effect of 38%. Yet, while only two of the reviewed studies report negative income effects in some of the contract farming cases (Simmons et al., 2005; Narayanan, 2014), Ton et al. (2017) find large differences depending on type of contract, crops and the institutional environment. In another recent study, Ragasa et al. (2018) also show that maize contract farming in Ghana, while leading to technology adoption and higher yields, did not increase farm profits. Ton et al. (2017) emphasise that such negative or insignificant effects are likely to be systematically underrepresented due to publication and other biases, requiring further rigorous evaluations. They find, for example, that in the majority of cases contract farmers were better off in terms of land or other wealth categories than average farmers in the regions.

Farmer cooperatives play a central role in the Ethiopian Government's strategy for increasing agricultural productivity, and could play an even more strategic role in linking farmers to markets (Bernard and Spielman, 2009; Bernard et al., 2010; Gebreselassie et al., 2017). Marketing cooperatives may help small-scale producers in overcoming minimum quantity, quality and frequency of supply constraints to participating in higher-value markets and contract farming schemes (Kaganzi et al., 2009). Collective action, in general, may enable farmers to aggregate produce, reducing transaction costs and diseconomies of scale (Biénabe and Sautier, 2005). It can also enhance groups' bargaining power and access to information and help establish contracts with buyers who require large volumes (Best et al., 2005; Kwapong and Korugyendo, 2010). Yet, cooperatives can also be instruments to reinforce rural elites and the established order, as they might serve to concentrate market power (Francesconi and Heerink, 2010).

A number of empirical studies find positive effects of cooperatives on technology adoption (Shiferaw et al., 2008; Abebaw and Haile,

2013), prices (Wollni and Zeller, 2007; Bernard et al., 2008; Shiferaw et al., 2009), commercialisation (Francesconi and Heerink, 2010) and farm incomes (Fischer and Qaim, 2012; Ito et al., 2012; Vandeplas et al., 2013), while others come to more mixed results (e.g. Mujawamariya et al., 2013; Verhofstadt and Maertens, 2014). While there is little research in Ethiopia on income effects of cooperatives, some studies have analysed grain marketing performance, but come to mixed conclusions. Bernard et al. (2008) do not find effects of grain cooperatives on agricultural commercialisation on average as well as for poorer farmers, but find effects on prices, implying some positive effects on bargaining power. Likewise, Bernard and Spielman (2009) find that the poorest farmers tend to be excluded from grain marketing cooperatives, although they might benefit through spillover effects, such as through higher prices. Francesconi and Heerink (2010) find higher commercialisation among cooperative members, yet only for marketing cooperatives, which is consistent with Bernard and Taffesse (2012) who find declining success in providing marketing services once a cooperative adopts additional non-marketing-related activities.

This study contributes to the literature on the involvement of smallholders in agricultural value chains by analysing the impacts on production and wellbeing brought about by the Agricultural Value Chains Project in Oromia (AVCPO) in the Bale Zone of Ethiopia. The AVCPO is a durum wheat VC development project that uses cooperatives and contract farming arrangements to improve the productivity and welfare of smallholders cultivating durum wheat. The project was implemented by the Ethiopian government in collaboration with the Italian Development Cooperation between 2011 and 2016.

Its aim was to improve the production and marketing of durum wheat among smallholders by improving the quality and quantity of their crops, strengthening cooperatives and establishing direct links between cooperatives and Ethiopian pasta makers in Addis Ababa through contract farming agreements. Later on, the Bale Zone was identified as a durum wheat commercialisation cluster (MAECI, 2016).

This paper has three objectives. The first objective is to investigate the project's impact on cereals production. The second objective is to assess the capacity of the programme to strengthen the role of cooperatives in marketing durum wheat. The third objective is to explore the impact the project has had on the wellbeing of farming households, paying special attention to education and nutrition.

Our evaluation is based on data that was collected in 2014 via a large-scale household survey. As is common in the evaluation of large agricultural value chain programmes, we had to rely on cross-sectional data and retrospective information. In order to assess the AVCPO's impacts, we applied an instrumental variable (IV) approach. To test the robustness of the results, due to the possible violation of the exclusion restriction assumption, three additional – recently developed – estimation strategies were implemented: a sensitivity analysis approach, an IV estimation on a sub-sample determined by propensity score matching (PSM) without replacement and a non-parametric approach.

The remaining paper is structured as follows: Section 2 briefly introduces the food policies concerning wheat in Ethiopia. Section 3 explains the AVCPO project and the theory of change that frames our evaluation. Section 4 discusses the data and methodology. Section 5 presents the results while Section 6 features our concluding remarks and the policy implications of our findings.

## 2. Background: the durum wheat sector in Ethiopia

In Ethiopia, wheat and wheat products, including bread and pasta, have become staple foods over the years. A nationally representative survey cited in Minot et al. (2015), for example, finds that most urban households in Ethiopia now consume wheat (nearly 90%). However, the survey also finds that only around 50% in rural areas consume wheat products, indicating that purchases increase with urbanisation and incomes. Since the 1990s, wheat consumption has increased by 4.2% annually, well above the population growth rate (Minot et al.,

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