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## Big cities, small towns, and poor farmers: Evidence from Ethiopia

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### ABSTRACT

Urbanization is happening fast in the developing world and especially so in sub-Saharan Africa where growth rates of cities are among the highest in the world. While cities and, in particular, secondary towns, where most of the urban population in sub-Saharan Africa resides, affect agricultural practices in their rural hinterlands, this relationship is not well understood. To fill this gap, we develop a conceptual model to analyze how farmers' proximity to cities of different sizes affects agricultural prices and intensification of farming. We then test these predictions using large-scale survey data from producers of teff, a major staple crop in Ethiopia, relying on unique data on transport costs and road networks and implementing an array of econometric models. We find that agricultural price behavior and intensification is determined by proximity to a city and the type of city. While proximity to cities has a strong positive effect on agricultural output prices and on uptake of modern inputs and yields on farms, the effects on prices and intensification measures are lower for farmers in the rural hinterlands of secondary towns compared to primate cities.

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### 1. Introduction

Urbanization rates are quickly increasing in developing countries, with two-thirds of the world population anticipated to be living in cities by 2050 (UN Population Division, 2014). Urbanization is considered an important long-term driver of economic development as it involves the structural transformation of the economy from being rural and agricultural-based towards one that is modern, urban, and industrial (Henderson & Wang, 2005). Mostly through rural-urban migration, employment typically shifts from agricultural to more remunerative non-farm activities (Gollin, Parente, & Rogerson, 2002). Moreover, agglomeration in primate cities (metropolization) can generate localized external economies of scale, technological innovations, industrial clustering or knowledge accumulation, and additional employment opportunities (Bloom, Canning, & Fink, 2008; Henderson, 2010). Recent evidence has confirmed the positive correlation between urbanization rates and income per capita (Dorosh & Thurlow, 2014; Henderson, 2010; Ravallion, Chen, & Sangraula, 2007), although establishing causality remains an important challenge when interpreting these empirical findings (Bloom et al., 2008).

In Africa, the share of the population that is urban, at 40 percent, is lower than in Latin America or Asia, but rapid increases in urbanization rates are anticipated over the next decades, resulting in a projected African urban population of 55 percent in 2050 (UN Population Division, 2014). However, the process of urbanization in sub-Saharan Africa is argued as substantially different from the rest of the world. First, economic growth in African countries has been much slower compared to regions that have experienced similar changes in urbanization rates in the past decades (Bloom et al., 2008; Brückner, 2012). Second, while industrialization and the creation of non-farm job opportunities have been the main drivers behind urbanization in Asia, African urbanization has occurred without industrialization. Instead, urbanization has been induced by population pressure, natural resource exploitation, climate change, conflicts, and political or ethnical tensions (Bloom et al., 2008; Gollin, Jedwab, & Vollrath, 2016; Henderson, Storeygard, & Deichmann, 2014). As a consequence, there is renewed interest in policy research on how urbanization determines the structural process of transforming African economies (Brückner, 2012; Henderson, Storeygard, & Roberts, 2013).

It is not only the aggregate rate of urbanization, but also its nature that affects the structural transformation process (Christiaensen, De Weerd, & Kanbur, 2016; Ferré, Ferreira, & Lanjouw, 2012). Urbanization in Africa is characterized by a concentration of individuals in smaller urban centers. Only 10 percent of the African urban population resides in larger cities with

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between 5 million and 10 million inhabitants—the majority of the urban population lives in medium or small-sized cities of between 1 million and 5 million inhabitants (35 percent) or in small urban areas (55 percent) (UN Population Division, 2014). Moreover, the populations in medium-sized cities has doubled in the last decade and is expected to grow by more than 30 percent in the next decade (UN Population Division, 2014). As a consequence, the urban population in Africa is widely dispersed across cities of different sizes.

Urbanization affects poverty levels in the rural hinterland of urban cities through multiple spillovers and economic linkages to these rural areas. Migration to urban centers is associated with cash flows towards the rural hinterland (e.g. remittances), and the growth of secondary towns also indirectly affects rural poverty levels through upward pressure on rural wages, and rural non-farm income opportunities (Cali & Menon, 2013; Dorosh & Thurlow, 2013). Moreover, consumption linkages between urban markets and rural producers seem important, primarily because higher food consumption and changing diet preferences in urban centers increase urban demand for rural agricultural products (Djurfeldt, 2015; Dorosh & Thurlow, 2014; Reardon & Timmer, 2014; Tschirley, Haggblade, & Reardon, 2013). However, it remains unclear which type of urbanization (metropolization vs. more dispersed) is most beneficial for farmers in the rural hinterland and through which channels (different sized) cities affect rural producers (Gibson, Datt, Murgai, & Ravallion, 2017).

While there is no general consensus on how urbanization patterns affect rural livelihoods, a hierarchical pattern of settlements is believed to be more conducive to modernize and commercialize subsistence agriculture (Brutzkus, 1975).<sup>1</sup> As smaller cities are more closely located to the rural hinterland, the production and marketing linkages for agricultural products could be stronger because of lower transportation costs and stronger local ties (Richards et al., 2016). Hence, the growth of secondary towns could directly benefit rural farmers – and other actors in agricultural value chains – because of improved market access and opportunities (Reardon, 2016). Moreover, secondary towns provide rural farming households access to specialized services and facilities, input markets, and non-farm employment opportunities (Richards et al., 2016). Furthermore, as cultural ties and social networks might be stronger in smaller sized towns, these might be more effective in spreading and disseminating new ideas, agricultural innovations, and knowledge to farmers in the rural hinterland (Brutzkus, 1975; Rondinelli, 1983; Berdegué, Carriazo, Jara, Modrego, & Soloaga, 2015).

This paper contributes to the literature on secondary towns and on spatial economics in the rural hinterland. First, we investigate the role of city size in the rural development process (Christiaensen, Demery, & Kuhl, 2011; Christiaensen, Weerdt, & Todo, 2013; Christiaensen & Todo, 2014; Dorosh & Thurlow, 2013, 2014; Berdegué et al., 2015; Gibson et al., 2017; Ingelaere, Christiaensen, De Weerdt, & Kanbur, 2018). Unlike the previous literature – which has mostly focused on poverty outcomes for migrants (i.e. structural transformation) – we explore how urbanization patterns affect output prices and agricultural practices of farmers in the rural areas (i.e. agricultural transformation). We first develop a conceptual framework illustrating the effect of different sized towns on agricultural prices and intensification outcomes. Using a unique large-scale survey of staple crop (teff) producers in Ethiopia, our analysis and empirical results show that the size

<sup>1</sup> In contrast, concentration in primate cities (e.g., national capitals) increases the demand for agricultural products, provides economies of scale for commerce at large central markets and concentrates the development of new agricultural technologies and innovations (Brutzkus, 1975). Therefore, spread effects are hypothesized to be stronger for larger cities and for farmers located in the close vicinity of such cities (Benziger, 1996).

of the city matters for agricultural prices and intensification. Therefore, these results suggest the importance of differentiating city size when estimating the impact of urbanization on agricultural transformation, both in empirical regressions and in computable general equilibrium (CGE) models.

Second, this paper also relates to the literature that examines the effect of transportation costs on different aspects of economic growth in rural areas (Jacoby & Minten, 2009; Gollin & Rogerson, 2014; Jedwab & Moradi, 2016; Storeygard, 2016). We contribute to this literature in two important ways. First, while most research uses distances to cities to identify urban proximity, we calculate for each farmer the transportation costs to potential market outlets. Second, we control for the potential endogeneity of transportation costs by using an IV-identification strategy that introduces exogenous variation in transportation costs using geo-referenced data to estimate natural path transportation costs (Damania et al., 2016). We illustrate important effects of transportation costs to primate and secondary cities on staple crop prices and production practices through different econometric methods, with a battery of controls of household and farm characteristics, as well as controls for self-selection and endogeneity of transportation costs.

## 2. Urbanization patterns and teff production in Ethiopia

In Ethiopia, the population living in cities is expected to grow from 15.2 million in 2012 to 42.3 million by 2034, corresponding to an annual growth of 5.4 percent (World Bank, 2015). Addis Ababa is by far the largest city in Ethiopia and about a quarter of the urban population in Ethiopia lives in the capital (Schmidt & Kedir, 2009; CSA (Central Statistical Agency), 2013b). At the same time, the expansion of smaller and medium sized cities is on the rise. This affects urban – rural relationships. For example, the percentage of the rural population less than 3 h away from a city with a population of at least 50,000 has increased from 15 percent in 1997/1998 to 47 percent in 2010/11, partly driven by this city growth, but also by infrastructure improvements (Kedir, Schmidt, & Tilahun, 2015).

In our analysis we focus on how these cities are related to teff prices and production in Ethiopia. In 2011, teff constituted 23 percent of the total grain crop area and 17 percent of total grain production in Ethiopia (CSA (Central Statistical Agency), 2012). 29 percent of teff production is sold, which is a relatively high share compared to other cereals, such as wheat and maize (at 20 percent and 11 percent, respectively). Hence, teff has a higher commercial surplus, and is often considered a cash crop for farmers engaged in its production (Minten, Tamru, Engida, & Kuma, 2015, 2016). The production of teff in the major production areas is increasingly coordinated in a local value chain, and especially so in the production areas around the capital (Minten et al., 2016). Teff farmers receive a large share of the final teff price, which ranges around 80 percent depending on the quality traits of the teff sold and the type of output market (Minten et al., 2016). Using the same dataset as used in this paper, Vandecasteele, Tamru, Minten, & Swinnen (2017) document that net teff profitability (monetary value of teff production minus input expenditure – including labor) for farmers in the commercial production zones around Addis Ababa is on average 410 USD per hectare in 2011. Similarly, Vandecasteele, Dereje, Minten, & Taffesse (2018) find that the total net returns in ETB per hectare of land is 385 USD per hectare in Oromia. More disaggregated data on teff prices, profits and producer margin for different zones is presented later on in Table 1.

Teff is more readily eaten in urban than rural areas. In urban areas, teff has a high share (23 percent) of per capita consumption

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