

Global and Local Food Value Chains in Africa: A Review

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Abstract: The rapid expansion of agri-food exports from low- and middle-income countries and the contribution of global value chains to rural development is well-documented in the literature. Also studies on modernization of domestic food value chains in these countries are emerging. Yet, the linkages between global and local value chains are rarely studied. On the one hand, the development and expansion of global value chains may create competition with local value chains for land, labor, water, soil nutrients and other resources. On the other hand, positive spillover effects, such as investment, technical or institutional spillovers, may occur and spur the development of local value chains. In this paper we put forward a conceptual discussion on the type of linkages between global and local value chains, and how these depend on crop and value chain characteristics. We review the empirical evidence on these linkages. Our focus is on Africa, where agri-food exports and global value chains evolved rapidly and where challenges remain to upgrade and increase efficiency in local food value chains.

Keywords: global value chains, agri-food exports, globalization, food security, indirect effects

JEL codes: O13, O55, Q13, Q17

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1 Introduction

Agri-food export production in developing countries and global food value chains (GVC) are expanding rapidly. Agricultural Economics has published a large body of literature on GVC and the implications for rural development in low- and middle-income countries (e.g. Benali et al., 2018; Diaz-Bonilla & Rea, 2000; Harou et al., 2017; Maertens, 2009; Minten et al., 2007; Reardon & Barrett, 2000; Schipmann & Qaim, 2010; Swinnen & Maertens, 2007). In general, the expansion of GVC, especially for high-value products such as horticulture produce, is seen as a pro-poor development strategy (Govere & Jayne, 2003; Maertens & Swinnen, 2009; Van den Broeck et al., 2017). Yet, also the exclusive nature of GVC, largely excluding smallholder farmers, has been stressed (Maertens & Vande Velde, 2017; Reardon et al., 2009). There is some recent attention to the development and modernization of domestic or local value chains (LVC) in low- and middle-income countries (e.g. Reardon, 2014; Minten et al., 2013 & 2016; Vandeplas & Minten, 2015). Some argue that the development of LVC has the potential to benefit a larger number of farmers and rural households, and contribute more to poverty reduction and food security than the development of high-value GVC (Gómez et al., 2011; Minten et al., 2013). Yet, linkages between GVC and LVC are rarely studied.

The development and expansion of GVC may create competition with LVC for land, labor, water, soil nutrients and other resources. Yet, also positive spillover effects, such as investment or technical spillovers, may occur and spur the development of LVC. There is very few systematic evidence on how important these effects are, which likely depends on the type of crop and the institutional characteristics of the value chains. In this paper we review the linkages between GVC and LVC and evaluate what the development and expansion of export chains implicates for

domestic food production and upgrading of LVC. We rely on a terminology – used earlier in articles published in *Agricultural Economics* (Swinnen & Maertens, 2007; Swinnen & Vandeplas, 2010) as well as in other journals (Poulton et al., 2006; Swinnen et al., 2007 & 2010) – distinguishing three types of GVC, including fresh fruit and vegetables (FFV), tropical commodities and cereals, with distinct crop and value chain characteristics. We put forward a conceptual discussion on the type of linkages and their hypothesized importance in the three types of GVC. We review the empirical evidence on linkages between GVC and LVC and systematize the findings based on the conceptual framework. Our focus is on Africa because of its experience with rapidly expanding GVC in recent decades and its challenge to increase efficiency in LVC, reduce poverty among farm-households, and improve domestic food availability in the interest of food security.

2 Background

Following Poulton et al. (2006) and Swinnen et al. (2007), we distinguish three main export crop categories relevant for Africa: 1) fresh fruit and vegetables, 2) tropical commodities, and 3) cereals. For these crop categories, we discuss how production and trade evolved over the past 20 years in five African sub-regions (see appendix A), and describe crop and value chain characteristics.

2.1 Production and trade

A strong and steady growth in the production and export of FFV is observed in nearly all sub-regions (Fig. 1 & 2). Area harvested grew with 56.4% in the period 1997-2016 and production volume with 79.3%. Driven by strong demand for off-season vegetables and tropical fruits from Europe, FFV exports have increased spectacularly, with more than 600% in Eastern and Western Africa and with more than 400% in Northern and Southern Africa. Central Africa is lagging

behind. All African regions are net exporters of FFV, although imports are rising as well, especially in Northern Africa.

Tropical commodities include cocoa, coffee, tea, cotton, sugarcane, tobacco and palm oil, which are the main commodities in terms of export volume in Africa. Acreage and production of these crops largely stagnated during the past 20 years (Fig. 1), except in Western Africa where the cocoa acreage expanded and in Eastern Africa where sugarcane production increased. Tropical commodities represent the most important export category for all regions, except for Northern and Southern Africa where FFV exports are more important (Fig. 2). Their export value has increased substantially over the past 20 years; by 176% in Western Africa, 49.9% in Eastern Africa (despite a downward trend in recent years) and 40.5% in Central Africa. The growth in Western Africa is mainly due to the growth in cocoa exports, from 2 billion USD in 1997 to 7.5 billion USD in 2016, while exports of cotton, coffee and palm oil largely stagnated. In Eastern Africa tobacco, coffee, and tea exports are important. Imports of tropical commodities (processed and unprocessed), primarily driven by palm oil and sugar, have increased in all sub-regions.

For cereals, we focus on maize and wheat as the main cereals that are traded within Africa. In Eastern, Western and Central Africa, the acreage and production of cereals, mainly maize, increased more or less at the same pace (Fig. 1). In Northern Africa cereal production increased while the acreage hardly changed and in Southern Africa production stagnated with a decreasing acreage; pointing to important productivity increases in these regions. Cereals are primarily destined for the local market, but in Eastern and Southern Africa cereal exports to other African countries increased importantly in the last decade (Fig. 2). All sub-regions are net cereal importers, and even in Eastern and Southern Africa import values exceed export values more than 10-fold.

2.2 Crop and value chain characteristics

Fresh fruit and vegetables

Table 1 summarizes the main crop and value chain characteristics by export crop category. FFV are high-value products and their exports lead to high and rather stable foreign exchange earnings (Van den Broeck & Maertens, 2016). FFV encompass annual crops (most vegetables) and perennial crops (most fruits), and are highly perishable. The production and processing of FFV – which is limited to post-harvest handling such as washing, sorting and grading – is labor-intensive, which is seen as a potential for poverty reduction through employment of unskilled workers (Anderson & Martin, 2005; Van den Broeck & Maertens, 2016). The production of FFV for exports is mainly realized on agro-industrial farms but includes smallholder farms as well. There is very little state intervention in FFV chains and the sector thrives on private investment, including widespread foreign direct investment. International trade in FFV is strongly regulated through increasingly stringent public and private standards (Beghin et al., 2015; Fiankor et al., 2019; Henson & Humphrey, 2012; Swinnen, 2016). For example, GlobalGAP initially focused on FFV, and has become one of the world’s most widespread private standards (Fiankor et al., 2019).

FFV chains entail high levels of consolidation, with a few large export-producers dominating the chains, and high levels of vertical coordination. Production, processing and exporting is often completely vertically integrated within agro-industrial companies, which employ a large number of laborers. In countries like Ethiopia, Tanzania, Kenya, South-Africa, Senegal and Ghana, up to hundreds of thousands of workers are employed by FFV export companies. Also contract-farming between agro-industrial exporters and smallholder producers exist. Yet, sourcing from smallholders strongly reduced in the last decade, which is often attributed to increased regulation through standards (Beghin et al., 2015; Maertens & Fabry, 2018; Peter et al. 2018). Independent

smallholder production and spot market transactions are very rare. FFV entail a strong potential for product and quality differentiation. Supply chains for export are completely differentiated from FFV supply for the local market, with different producers and traders, different products, and different quality of produce.

Tropical commodities

Tropical commodities are medium-value perennial crops (cocoa, coffee, tea and oil palm) and semi-perennials that are cultivated as annual crops (cotton, tobacco, sugarcane), which are destined for industrial processing. Apart from basic post-harvest activities (e.g. drying), value-adding is mostly done overseas where capital-intensive processing is done. Price volatility is high in tropical commodity markets, resulting in substantial risk, especially in the case of perennial crops for which the long maturation period (5 to 10 years) reduces producers' ability to flexibly respond to price signals (Achterbosch, 2014). Tropical commodity sectors used to be highly regulated by the state in all sub-regions. Since the liberalization and privatization programs starting in the 1980s, the sectors opened up for private investment and market-based regulation. Yet, in many cases some state intervention remains, e.g. in the form of marketing boards, minority shares in privatized processing companies, or control over cooperatives and producer organizations (Swinnen et al., 2007). Public standards are less important but private sustainability standards are widespread in some sectors – e.g. between 30 and 45% of the global coffee acreage is certified – with the most important ones being Organic, Fairtrade, Roundtable on Sustainable Palm Oil (RSPO), Rainforest Alliance and UTZ (Lernoud et al., 2018).

Production and value chain characteristics vary with the crop. Coffee and cocoa are typically smallholder sectors with extensive, labor-intensive and low-yielding cultivation practices (Wessel & Quist-Wessel 2015; ICO 2015). Horizontal coordination, with coffee and cocoa farmers

organized in cooperatives or farmers' associations, is common, especially in Eastern and Western Africa (Tilahun, 2007; UNCTAD, 2016). Vertical coordination is limited; sales agreements between exporters and producer organizations are common but formal contract-farming schemes are rare (Minot & Sawyer 2016). On the one hand, good storability (after basic post-harvesting) and side-selling may limit vertical coordination. On the other hand, quality differentiation is very important – e.g. specialty coffee – creating possibilities for more direct transactions and long-term trading relations (Wilson & Wilson, 2014). Also tobacco and cotton are grown mainly by smallholder farmers in labor-intensive, low-yielding, rain-fed production systems. These crops require specific inputs (seeds, fertilizer, pesticides) and need careful attention to maintain quality, which explains tighter vertical coordination and widespread use of contract-farming schemes by tobacco leaf and cotton ginning companies (Abbot 2013). Tea, sugarcane and palm oil production includes large- and small-scale farmers. Due to the perishable nature of tea leaves and sugarcane stems, these GVC exhibit strong vertical coordination. Contract-farming schemes are common for tea while in the oil palm and sugarcane sector nucleus estates with outgrower schemes are common. Processing and exporting of tropical commodities is highly consolidated and often centered around a few companies. These oligopsony market structures put smallholders in a weak bargaining position and a price-taker's role (Porto et al. 2010). In general, tropical commodity value chains are largely export-oriented, with often very little domestic processing and consumption. When domestic consumption is important – e.g. coffee in Ethiopia, tea in Uganda – GVC and LVC are often differentiated by quality.

Cereals

Cereals are annual, bulky, homogenous crops with good storability, low intrinsic value and limited potential for quality-upgrading and value-adding (Maertens & Vande Velde 2017). Cereal

production in Africa includes small-, medium- and large-scale producers. Due to the nature of the crop, planting, spraying and harvesting is easier to mechanize, reducing the labor-intensity of cereal production. As cereal exports are mainly surplus from domestic production and quality differentiation is low, the value chains for cereal exports and domestic consumption are not differentiated and largely overlap. Domestic cereal markets in Africa have largely been liberalized but a high degree of state intervention – with sometimes unpredictable policies such as sudden export bans – remains for international cereal trade (Minot 2011; Baffes et al. 2019). Private investments in maize and wheat sectors are emerging but with a main focus on domestic markets (e.g. for local breweries, animal feed or other food processing industries). Cereal supply chains are often inefficient with a lack of coordination along the chain and mainly spot market exchange, substantial post-harvest losses and low quality (Bassey et al., 2018; Daly et al. 2016). In Zambia, an important regional maize supplier, maize is increasingly produced by medium-scale farmers (along-side large-scale commercial farms), resulting in tradable surpluses and entry of multinational grain trading companies (Jayne et al, 2016; Sitko et al., 2018a&b).

3 Conceptual discussion¹

The development of GVC can affect LVC both negatively and positively. Potential negative effects stem from trade-offs between GVC and LVC related to competition for land, labor, water, soil nutrients and other resources. Positive effects or synergies could occur through investment and consumption spillovers, technical and managerial spillovers, infrastructure spillovers and agglomeration benefits, and institutional spillovers. Some of these effects may play at the micro-

¹ The conceptual discussion is to some extent based on the literature on local value chain modernization (Reardon et al., 2018; Reardon et al., 2009; Qaim, 2017; Schipmann & Qaim, 2010), on the food versus cash crop debate (Govere & Jayne, 2003; Theriault & Tschirley, 2014), and on small versus large-scale farming (Duerr, 2016; Reardon & Barrett, 2000).

economic level, within firms, farms and households, while others are more pronounced at the regional and macro-economic level. Effects are summarized in Table 2.

3.1 Competition for land, labor and natural resources

The expansion and development of GVC may create competition with LVC for scarce resources, including land, labor, water, soil nutrients and other natural resources. Competition for land is likely less important for FFV exports because of a lower land-intensity of production, a relatively high return per hectare, and the possibility for seasonal rotation between export production of annual crops and production of food crops for the domestic market. Given the dominance of large-scale production, competition for land is more a regional and macro-economic issue. Competition for labor might be more important given the labor intensity of production and post-harvest handling, and also play at the micro-economic level in households' labor allocation between own production for the local market and employment in agro-industrial FFV companies. Yet, a confined export season related to demand for off-season vegetables in the EU and seasonality of some tropical fruits, may also limit competition for labor.

Competition for land and labor is likely more important in the case of tropical commodities, at the micro- and regional level, because of labor-intensive and low-yielding smallholder production systems. Yet, an important nuance is that some production systems include intercropping with domestic food crops, such as the typical coffee-banana systems in Eastern Africa, in which competition for land may be reduced and soil nutrient spillovers between crops realized. In addition, certain commodities are confined to specific agro-ecological zones – e.g. *Arabica* coffee that requires a specific altitude and rainfall pattern (Bunn et al. 2015) – which also limits competition for land. GVC for cereals likely do not create much competition for resources with LVC, given that production for the local and regional market overlap with mainly export of

surpluses. In general, competition for land between GVC and LVC may be stronger in Eastern and Western Africa, where population density is higher, while competition for labor may be more important in less densely populated countries in Northern and Southern Africa.

Competition for water (and other natural resources) between export and domestic food production, is a highly contentious issue. Agricultural export production is often blamed for overexploitation of water and soil nutrients (and for deforestation). Competition for water is likely low in the case of FFV because of the low water-intensity of specific crops and the use of specialized irrigations systems on agro-industrial farms. Tropical commodities are more water intensive while water use is likely less efficient on smallholder farms, creating higher competition for water with domestic food production.

3.2 Positive spillovers

Investment and consumption spillovers

Investment spillovers occur when revenues earned in GVC are invested in LVC. At the macro-economic level, agri-food exports can result in tax revenues that are invested in agricultural R&D for domestic crops or extension service for local farmers. This strongly depends on government policy. At the micro-economic level, agro-industrial (producer-)exporters may reinvest profits from export production in production and trade for the local market. There is scope for such effects in GVC for FFV while for tropical commodities this is not likely at all as GVC are mostly completely export oriented. For cereals this should be very common as the same players supply the export and domestic market. In addition, smallholder producers supplying GVC and employees in export agro-industries may reinvest their revenues and wages in farm inputs, livestock, equipment and machinery for food production for the local market – or increase consumption expenditure for locally-produced agri-food products. These household level effects might be very

important, given a high income elasticity of food demand and prevailing liquidity constraints among rural households in Africa.

Investment and consumption spillovers at the household level are most likely to occur for FFV exports. A high-value of produce, stable international market prices, a strong potential for product and quality differentiation, and efficient exchange through vertical coordination and regulation by standards all add to creating high returns in FFV export chains. Contract-farming with FFV export companies and formal employment in such companies has been observed to result in substantial income gains for rural households (Herrmann, 2017; Herrmann & Grote, 2015; Maertens and Swinnen, 2009; Maertens et al., 2011; Minten et al., 2009; Van den Broeck et al., 2017), which is a pre-condition for consumption and investment spillovers to occur. Because of a lower value, less stable prices and an oligopsony market structure with low bargaining power for farmers, the return to farmers is lower in tropical commodity chains. Yet participation in cooperatives and certification schemes is observed to improve farmers' income, especially for coffee farmers – as has been discussed extensively in Agricultural Economics in the last years – (Jayne et al., 2004; Jena et al., 2012; Verhofstadt & Maertens, 2014; Wollni & Zeller, 2007). Hence, household-level consumption and investment spillover effects are likely less strong but may depend on the coordination and governance in GVC.

Technical and managerial spillovers

Technical and managerial spillovers occur when production techniques and management methods used in GVC spread into LVC and increase productivity. This is most likely at the regional and micro-level, through several pathways. First, agro-industrial and smallholder farms may use advanced technologies and good agricultural practices that are required in export markets (e.g. in GlobalGAP certification) also for production of crops for the local market. This is probably more

likely for smallholder farmers who often produce for both GVC and LVC. Second, improved technologies and management practices may be transferred from agro-industrial (producer-) exporters to smallholder farmers through contract-farming and outgrower schemes. Contracts often entail the provision of inputs, credit and agronomic and managerial advice by the contractor company. This may benefit not only the production of export crops by contracted smallholders but also their production of food crops for the local market, through skills acquirement and unintended or intended input diverting. Third, technical and managerial spillovers may also happen through workers in agro-industrial export companies. These workers may acquire skills and knowledge on agronomic and management practices (e.g. through trainings, demonstrations and experience) that can benefit food production on their own farms. Fourth, new crop varieties, technologies and agronomic practices may spread among farmers in a broader region. Farmers supplying LVC may mimic certain visible agronomic practices (e.g. line-sowing, mulching, garden beds) or receive agronomic and management advice from their peers supplying GVC.

Such technical and managerial spillovers are less likely in cereal chains because of more capital-intensive mechanization on large- and medium-scale farms that does not easily spill over to capital-constrained smallholders. Spillovers from agro-industrial export companies to smallholders producing for the local market, either through contract-farming or employment, are likely for FFV export chains. There is a large distance in technical and managerial competence between agro-industrial and smallholder farms, creating scope for spillovers. In addition, some good agricultural practices used in GVC are less capital-intensive and easier to take up by smallholders. For tropical commodities, the potential for technical and managerial spillovers depends on crop and value chain characteristics. The adoption of private standards and certification schemes in coffee, cocoa and palm oil sectors induce agronomic and managerial changes on

smallholder farms that could spill over to food crop production on own and neighboring farms. Membership in cooperatives may also induce technical and managerial spillovers through experience and knowledge sharing among farmers. Smallholder tobacco and cotton production under contract may result in intensified food crop production if inputs provided under contract arrangements can be diverted to food crop production.

Infrastructure spillovers and agglomeration benefits

Infrastructure spillovers and subsequent agglomeration benefits at the regional level emerge from public and/or private investments that are linked to GVC. Private companies may invest in road infrastructure, large-scale irrigation schemes, electrification, telecommunication or marketing infrastructure; either because such investments are needed for their export operations or as a part of a corporate responsibility strategy or land-lease deal. Also governments may make such investments in order to attract foreign direct investment and promote large-scale export production in specific areas. Such investments not only decrease transaction and production costs of GVC operations but also reduce costs and improve efficiency in LVC. Improved infrastructure may attract further investments, which creates economies of scale external to individual firms and farms. When firms in related sectors cluster together, their production and transaction costs may decline. Although they may compete for the same products, advantages could arise because the cluster attracts more suppliers and customers than a single farm could achieve alone. Agglomeration can induce benefits resulting from lower transport costs, larger supply of labor, lower search costs, larger local markets, accumulation of knowledge and human capital for both firms and farms in GVC and in LVC (O'Flaherty, 2005; Venables, 2008).

Infrastructure spillovers are likely for FFV exports. A high degree of foreign direct investment might lead to significant infrastructure investments by agro-industrial companies.

Development of FFV export chains is often seen as pro-poor development strategy, which may result in infrastructure investments by governments to promote and facilitate FFV exports and attract foreign investors. Also for tropical commodities, infrastructure spillovers are likely but public investments may play a more important role. Given the historical role of the state in commodity sectors, governments may direct infrastructure investments to export commodity producing regions in order to increase the payoff of earlier investments through spurring the development process in these regions (Theriault & Tschirley, 2014). In addition, infrastructure spillovers may be more important in countries where commodity exports make up an important share of foreign exchange earnings and involve a large share of the population – which is the case for cocoa in Western Africa and coffee and tea in Eastern Africa. In this case, governments may be more inclined to direct infrastructure investment to export commodity producing areas. For cereals, the direction of infrastructure spillovers may be opposite. Private and government infrastructure investment may result in increased production and tradable surpluses.

Institutional spillovers

Institutional spillovers occur when innovations such as contract-farming and other vertical coordination mechanisms, the use of private standards, quality differentiation and controls, and other governance mechanisms that are used in GVC are transferred to LVC. On the one hand, such institutional spillovers may be more likely for FFV chains because of a larger institutional distance between GVC and LVC. Given that FFV export chains are strongly coordinated and regulated through standards, differences with LVC in terms of institutional structure and governance is strong, which creates a potential for spillover effects. On the other hand, a strong differentiation between GVC and LVC, with different players and structures, may limit institutional spillovers from FFV chains. For cereals, the degree of vertical coordination and institutional innovations in

GVC is limited, but the overlap between GVC and LVC may enhance the change for institutional upgrading of LVC. For tropical commodities, cooperatives and private standards may play an important role in institutional upgrading of LVC. Membership in commodity cooperatives might help smallholder farmers to better organize themselves for accessing input and output markets for food crop production and commercialization. Also, the use of private standards in GVC may result in a spillover to the domestic market.

4 Empirical review

To identify empirical studies on linkages between GVC and LVC, we conducted a broad keyword² search in the Web of Science database, and a more crop specific search in additional search engines and databases, such as AgEcon and Google Scholar. Our review includes 33 studies, systematically summarized in Table 3. Only a few studies deal with indirect and spillover effects of GVC in the main analysis. Most GVC studies report on linkages to LVC only in descriptive side notes while focusing on direct effects of GVC development.

4.1 Fresh fruits and vegetables

The rapid growth of FFV exports from Africa has attracted substantial attention from researchers, resulting in various papers focusing on direct development implications of GVC but only a few studies that analyse spillover effects to LVC as main issue – as the studies in Agricultural Economics by Maertens (2009) and Minten and co-authors (2007). Regarding competition for resources, the evidence points to rather limited trade-offs between GVC and LVC growth. At the macro-level, Van den Broeck and Maertens (2016) report, with descriptive evidence for six African countries, that expansion of FFV exports does not jeopardize domestic food production.

² Different combinations of the following keywords were used: spillovers, linkages, local, global, value chains, food crops, export crops, cash crops, contract-farming, foreign direct investments, large-scale agricultural investments.

In Ethiopia and Kenya, where one would expect some competition for land, domestic food production even accelerates with a boom in FFV exports. Many concerns have been raised on land-grabbing by multinational companies and on overexploitation of water in GVC. Yet, in a study on virtual water trade, Schwarz and co-authors (2015) document that expansion of FFV exports in Africa (and other developing regions) are beneficial from a regional water efficiency perspective because of the low water-intensity and high value of these crops. At the regional level, Yaro and co-authors (2017) report that regional land competition between pineapple and papaya export production and local food production in Ghana is low because of high yields and high values of these crops while for more land-intensive mango (and palm oil) production competition is higher.

At the micro-economic level, studies report that rural households engaging in export FFV production, either through contract-farming with export companies or through wage employment on large-scale agro-industrial farms and in processing units, combine this with food production for own consumption and the domestic market. Evidence from Ghana (Yaro et al., 2017) and Senegal (Maertens, 2009; Van den Broeck et al., 2018) shows that within these households there is little competition for labor between production for GVC and for LVC. For Senegal, this is explained by the compatibility between the export crop season determined by demand in EU markets (November to April) and the local crop season determined by the main rainy season (June-September). For Ghana, this is explained by flexible labor arrangements in GVC. Yet, Dolan (2001) comes to different conclusions and reports increased intra-household struggles over land and family labor as a result of export vegetable production in contract-farming schemes in Kenya. Vegetable production for local consumption by women comes under pressure because men claim horticultural land for export contract-farming, documenting competition for resources between export and food production at the micro-level. Concerning competition for water, Ulrich (2014)

and Zaehring et al. (2018) report that Kenyan farmers associate the expansion of FFV exports with increased water scarcity.

The literature includes some micro-economic evidence on positive spillover effects between GVC and LVC. First, investment and consumption spillovers are documented for the FFV export sector in Senegal. Maertens (2009) shows that rural households who take up employment in the FFV export agro-industry, partially invest their wages in land acquisition and input purchases to expand and intensify food crop production for the local market. Van den Broeck and co-authors (2018) find evidence of consumption spillovers as wages from the export agro-industry lead to an improved food security status of rural households and result in increased demand in LVC.

Second, there is evidence of technical and managerial spillovers on smallholder farms producing FFV under contract with export companies as well as crops for LVC. Minten et al. (2007) show, in a quantitative way, that farmers in Madagascar use the soil fertility management advice they receive from export companies within a vegetable contract-farming arrangement also on their rice fields, resulting in substantial increases in rice productivity. In the same vein, Bellemare (2012) documents that vegetable contract-farming increases the efficiency of livestock herding due to technical and managerial spillovers. Farmers in contract-farming schemes with export companies mention access to inputs and up-to-date agronomic advice, for both the contracted export crops and local crops, to be a main motivation to engage in export production (Masakure & Henson, 2005; Minten et al., 2007). Gema and co-authors (2018) provide descriptive evidence from Kenya suggesting that good agricultural practices, promoted in contract-farming schemes and private standards such as GlobalGAP, are used by contracted farmers also in the production of crops for the local market. Krishnan & Foster (2018) report more regional spillover effects from export-oriented mango and avocado farmers spreading the technical and management

advice received from export companies to other non-export oriented farmers through field demonstrations. Furthermore, Krishnan (2018) notes how the presence of the FFV export sector leads to product innovation and differentiation in LVC. Descriptive data shows how export varieties of avocado, originally only demanded by European consumers, gradually replaced local varieties due to superior quality attributes (e.g. less fibrous and longer shelf-life).

Third, very few studies explicitly mention infrastructure spillovers or agglomeration effects that benefit a whole region. In Ghana, export companies and the more capitalized export-oriented farms are observed to invest in road infrastructure (Yaro et al., 2017). In Senegal, agro-industrial export companies co-invest through private-public partnerships in road, electricity and irrigation infrastructure (Van den Broeck and Maertens, 2017). By contrast, in Kenya less than a third of the interviewed smallholder farmers confirmed that a nearby horticultural company had provided infrastructure to the community (Zaehring et al., 2018). Nevertheless, all three studies additionally document an increase in formal and informal economic activity in main FFV export regions, ranging from improved market opportunities for smallholders, small food and drink stalls at company gates to agro-chemical input suppliers.

Fourth, while institutional spillover effects may be important for FFV export chains, evidence on this is largely lacking. An example is the emergence of private standards in LVC that are benchmarked against international standards used in GVC. Tallontire et al. (2011) describe the development of KenyaGAP to tailor the stringent export requirements for FFV in GlobalGAP to local conditions and smallholders' needs. Studies on other institutional linkages are missing.

4.2 Tropical commodities

The evidence on competition for resources between tropical commodity exports and local food production is mixed and relates to an older debate on food versus cash crops. A well-known

statement in this debate is that the participation of countries, regions and farmers in cash crop production improves the entitlement to food and therefore enhances food security (Dreze & Sen, 1990). Yet, recent studies do point to competition for land and water. Brüntrup and co-authors (2018) observe that the establishment and expansion of sugarcane and tea nucleus outgrower schemes in Tanzania is associated with regional land redistribution to the disadvantage of smallholder farmers producing for the local market. For Ghana, a negative relation is found between expansion of smallholder cocoa and palm oil production for export and the food security situation of local households (Anderman et al., 2014; Yaro et al., 2017). The mechanism behind this observation is not completely clear but the authors suggest that competition for land drives up local food prices. Concerning competition for water, Schwarz and co-authors (2015) document that tropical commodity exports are associated with low water efficiency and large outflows of virtual water from Africa because of a relatively low value and high water-intensity of tropical commodities. Assessing competition for labor between export commodities and food production is difficult as both are often grown simultaneously on the same plots in smallholder systems.

Also the literature on tropical commodities documents positive spillover effects between GVC and LVC. First, investment and consumption spillovers exist. Scoones et al. (2018) point out that tobacco farmers in Zimbabwe generate surpluses that are reinvested in livestock, farm inputs, equipment and machinery. Yet, the wages of employees on tobacco fields are not large enough to create such investment effects. Chiputwa and Qaim (2016) and Meemken and co-authors (2017) find evidence of consumption spillovers related to the adoption of private standards among smallholder coffee farmers in Uganda. They point out that coffee certification results in higher incomes, higher food expenditures and more nutritious food specifically, which changes demand in LVC. In a study on sugarcane and tea outgrower schemes in Tanzania by Brüntrup and

co-authors (2018), it is stated that the observed rapid increase in food prices likely relates to increased demand from outgrowers and employees rather than reduced local food production.

Second, there is considerable evidence on technical and managerial spillovers from micro- and regional level studies. At the micro-economic level, studies point to a positive correlation between cotton production for export and cereal yields and productivity in Zimbabwe and Mozambique (Govere et al., 1999; Govere & Jayne, 2003), and between tobacco cultivation and adoption of hybrid maize varieties and fertilizer use (Orr, 2000). Authors link these positive spillovers to better access to inputs, credit and extension services as well as to a higher level of farm capital investments. More nuanced findings are reported by Govere and co-authors (1999) and Shumeta & D’Haese (2018) for coffee exports in Kenya and Ethiopia respectively. These studies show that the emergence and extent of spillover effects depends on the degree and type of horizontal coordination in GVC. In Kenya, the ability of coffee cooperative unions to create economies of scale in transport and to access input credit determines to what extent smallholder producers intensify food crop production. In Ethiopia, membership in multipurpose coffee cooperatives creates positive effects on production and yield of staple crops (maize and teff) through better access to inputs.

Also at the regional level, there is evidence of technical and managerial spillovers. Jayne and co-authors (2004) point out that Kenyan farmers participating in interlinked credit arrangements for tropical commodity production (tea, coffee and sugarcane) intensify the use of fertilizer for food crops. In addition, they show that the presence of tea and coffee cooperatives in Kenyan villages stimulates the use of fertilizer for food crops, among both cooperative and non-cooperative member farmers. Deininger and Xia (2016) show that the establishment of large-scale sugarcane agro-industries in Mozambique creates short-term positive effects on the agronomic practices

(line-sowing, crop-rotation, use of traction) and modern input use on smallholder farms producing for the local market – albeit not resulting in immediate yield gains. However, in a similar study on Malawi’s tobacco estate sector, results point to a complete absence of positive spillover effects to surrounding smallholders, neither in terms of technical or managerial innovations, nor through increased access to input or output markets (Deininger & Xia 2018). Brüntrup and co-authors (2018) note that participation in tea outgrower schemes in Tanzania results in improved ‘entrepreneurial spirit’ among farmers, which benefits food production.

Third, again the evidence on infrastructure spillovers and agglomeration benefits, and on institutional spillovers is scarce. In Ghana, public road and infrastructure investments in cocoa and palm oil producing regions are observed to result in attracting new investors (Wessel & Quist-Wessel 2015; Yaro et al. 2017). Scoones and co-authors (2018) observe that the expansion tobacco exports in Zimbabwe resulted in expansion of other economic activities, especially in real estate and trade, in the region. Theriault and Tschirley (2014) suggest that before structural adjustment, cotton marketing boards and parastatal companies in Western and Central Africa, created positive spillovers on local food crop production through investment of cotton revenues in regional infrastructure and extension services. Minten and co-authors (2019) describe how the coffee value chain in Ethiopia has evolved. Despite coffee being the country’s most important export crop, about half of the produced coffee is consumed locally, and there is no real differentiation between the export and the domestic coffee chain. Institutional innovations, such as the removal of vertical integration and the establishment of traceability strategies and quality controls, increased trust between buyers and sellers and improved the efficiency of exchange in GVC and LVC simultaneously.

4.3 Cereals

Given that exports of cereals from Africa are very limited, started to grow only recently and involve a small number of countries, the evidence on linkages between GVC and LVC for these crops is very limited. Competition effects are rarely documented. Studies on maize value chains in Zambia, an important regional supplier of maize, point to conflicts over land (Jayne et al. 2016; Matenga & Hichaambwa 2017). Land conflicts in this region predominantly arise from the difficulty in reconciling small-scale semi-subsistence agriculture and medium- to large-scale commercial agriculture. The latter drives up land prices and limits the potential for smallholders to expand. Yet it is hard to specifically link this consolidation of land to cereal exports.

Also evidence on spillover effects is rare. Studies point to technical and managerial spillovers between large- and small-scale cereal farms in Zambia. Given that maize exports from Zambia are largely driven by the expansion of small-scale farms into medium- and large-scale farms, these effects may point to spillovers between GVC and LVC. Matenga and Hichaambwa (2017) describe how smaller farmers in the vicinity of a large-scale grain farm in Zambia adopt new crops and technologies that are used by the large-scale player. Yet, Jayne and co-authors (2016) point out that land preparation technologies and the use of mechanization do not spread from medium- to small-scale farms in the same region, and that tractor-use by medium-scale farms does not result in the development of a regional tractor rental market.

Most of the evidence on cereal supply chains is on institutional innovations in LVC that were facilitated by increased opportunities in regional grain trade. In Zambia, the entry of multinational trading companies in the grain sector has resulted in an increase in producer prices (of 3 to 5%) and more efficient exchange with reduced farm-gate to wholesaler price margins (Sitko et al. 2018a&b). Increased (predominantly domestic) investment in large-scale grain production, along

with sustained growth in cereal demand in regional markets, has attracted large-scale multinational grain trading companies to the country. Apart from driving down price margins in the chain, these companies also created new opportunities for grain intensification through the provision of input credit and extension services – although biased to larger farms – and increase the level of professionalism and trustworthiness in transactions with farmers, e.g. by providing up-to-date market information and using more reliable scales.

Also Uganda and Rwanda experienced strong growth in maize production and milling, and exports of raw maize and maize flour to neighboring countries (especially Kenya). Daly and co-authors (2016) report increased vertical coordination in local maize chains in Uganda as private maize traders start working directly with farmers, setting-up long-term partnerships, and providing extension services and input loans. In both countries, warehouse receipt systems set up by the government to support the development of the maize value chain around larger commercial farms, are increasingly used by smallholder farmers. Warehouse receipts can be used by farmers to ease liquidity constraints that hold back further farm investments, and result in further expansion and development of LVC.

5 Conclusion

This paper is a first attempt to conceptualize the idea of linkages between GVC and LVC and systematize the evidence on such linkages, drawing from value chain studies in Africa published in Agricultural Economics and other journals in this discipline. Linkages can include competition for land, labor and other resources as well as different types of positive spillover effects. We need to be careful in drawing conclusions. The available evidence does not allow for making firm conclusions on how strong positive spillover effects are in different GVC or which value chain characteristics shape such spillover effects. Yet the evidence points in the direction of important

positive spillover effects for different types of GVC, with investment effects being more important for FFV chains, technical and managerial spillovers for tropical commodity chains, and institutional effects for cereal chains. This likely relates to differences in value chain characteristics such as quality and product differentiation, farm size and consolidation, and vertical and horizontal coordination.

An obvious conclusion from this review exercise is the scant empirical evidence on value chain linkages in the literature. While the empirical review in this paper includes a fair number of studies, most are qualitative and some provide only anecdotal evidence. All together, the evidence only provides a fragmentary view on linkages between GVC and LVC. This could be due to a limited potential for linkages between GVC and LVC (and the bias that exists in the literature towards positive outcomes and confirmed hypotheses) or due to a lack of research attention. Above all, this paper is a call for further research on the linkages between GVC and LVC.

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Figures

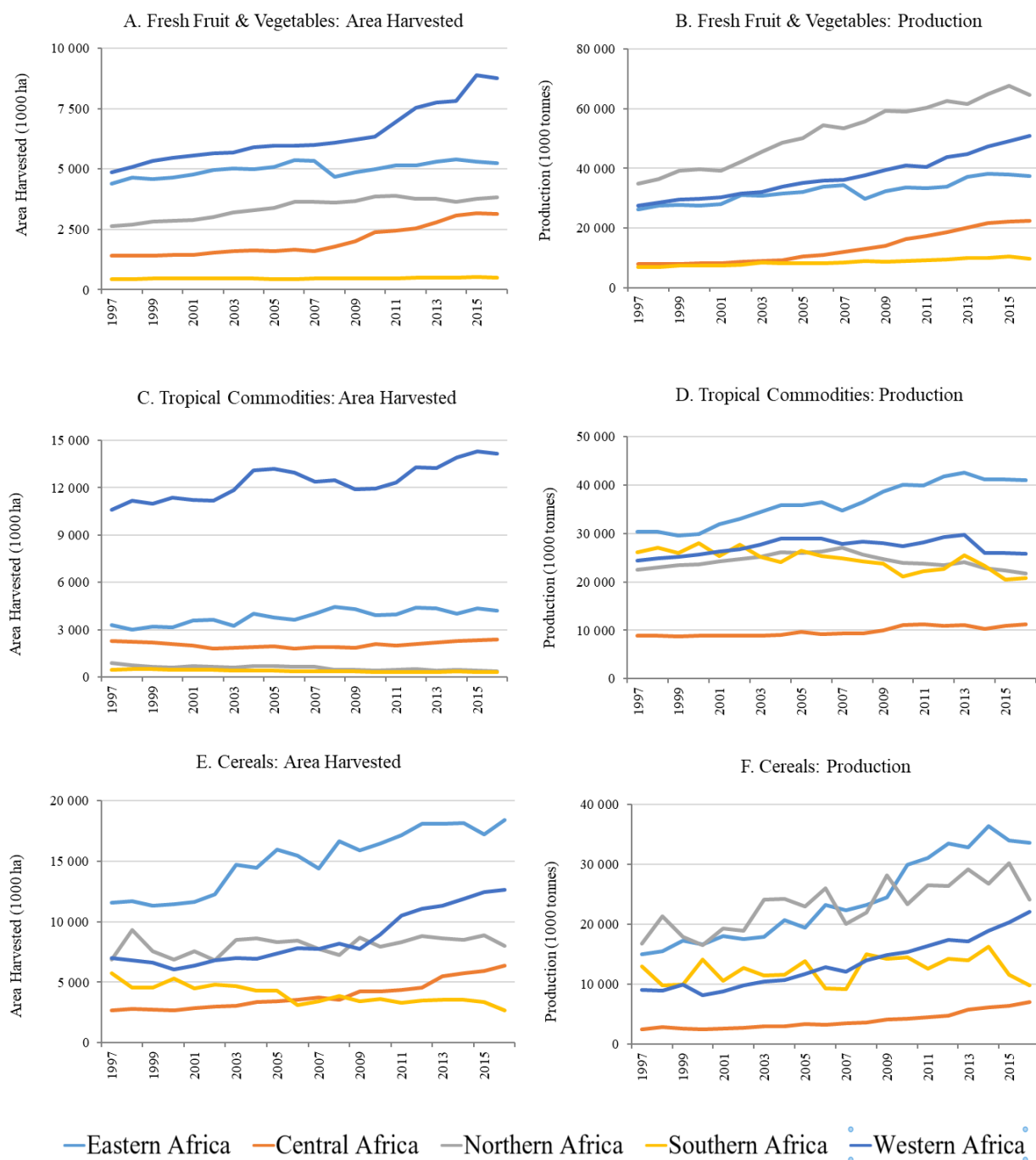


Fig. 1: Evolution of area harvested (1,000 ha) and production (1,000 tonnes) by crop category and sub-region over the period 1997-2016. *Source:* derived from FAOstat (accessed July 2019). Fresh fruit & vegetables include following FAOstat classification codes: 1728 fruits, primary; 1735 vegetables, primary. Tropical commodities include: 661 cocoa beans; 656 coffee, green; 667 tea; 257 oil, palm; 254 oil palm fruit; 256 palm kernels; 328 seed cotton; 767 cotton lint; 329 cotton seed; 156 sugar cane; 826 tobacco, unmanufactured. Cereals include: 56 maize; 15 wheat.

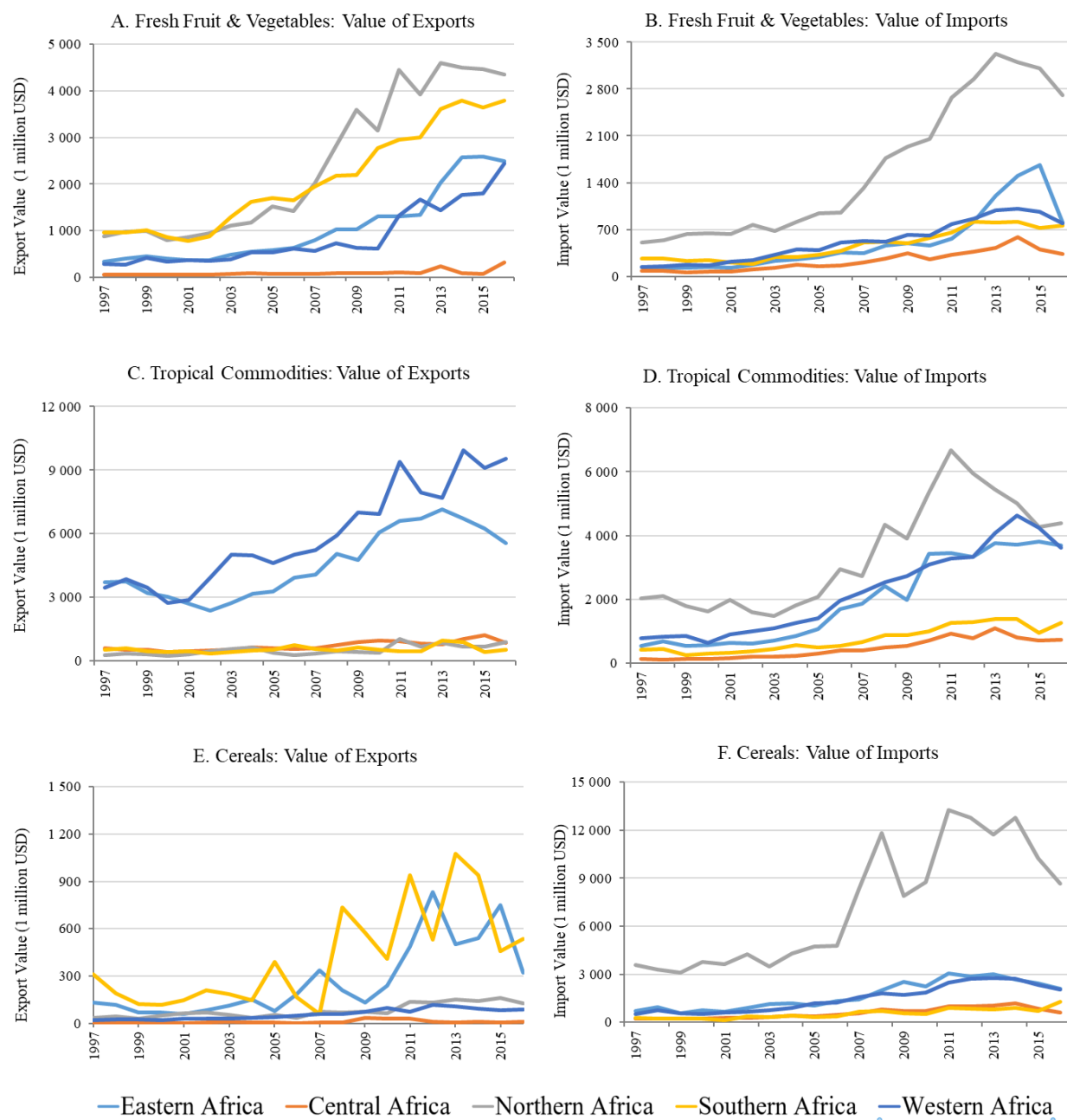


Fig. 2: Evolution of exports and imports in real value (1 million USD) by crop category and sub-region over the period 1997-2016. *Source:* derived from FAOstat (accessed July 2019). Fresh fruit & vegetables include following FAOstat classification codes: 1889 fruits & vegetables. Tropical commodities include: 661 cocoa beans, 664 cocoa butter, 662 cocoa paste, 665 cocoa power & cake; 656 coffee, green; 659 coffee,

Table 1: Summary of crop and value chain characteristics for different export crop categories

	Fresh fruit and vegetables	Tropical commodities	Cereals
Crop and production characteristics			
Value of produce	High value	Medium value (depending on the crop and level of processing)	Low value
Storability of produce	Low	Strongly depends on the level of processing	High
Type of crop	Annual crops (most vegetables) and perennial crops (most fruits)	Perennial crops (coffee, cocoa, tea, oil palm), grown as annual crops (cotton, tobacco, sugarcane)	Annual crops
Labor intensity	High	High	Low
Land intensity	Low	High	High
Type of producers	Mainly agro-industrial companies; some smallholder farmers	Smallholder producers (cocoa, coffee, tobacco, cotton); small- & large-scale producers (tea, sugarcane, palm oil)	Large, medium and small producers
Value chain characteristics			
Governance & state involvement	Liberalized and privatized	Partially liberalized with remains of state intervention (depending on the sub-region)	High degree of state intervention (depending on the sub-region)
Private & foreign direct investment	Widespread foreign direct investment	Widespread private sector investment	Emerging private sector investment
Regulation through standards	Strict regulation through both public and private standards	Less strict regulation; private sustainability standards are important	Limited regulation through standards
Degree of consolidation	Strong consolidation throughout the supply chain	Consolidation in processing & exporting	Large number of producers and traders, differentiated by size
Degree of coordination	Vertical integration in agro-industrial companies; vertical coordination through contract-farming schemes	Horizontal coordination among farmers; vertical coordination through outgrower and contract-farming schemes	Low levels of coordination; prevalence of spot market transactions
Product and quality differentiation	Strong product and quality differentiation; strong differentiation between GVC and LVC	Quality differentiation; mainly export chains.	Limited product and quality differentiation; limited differentiation between GVC and LVC

Table 2: Summary of competition and spillover effects between global and local value chains for different export crop categories

	Fresh fruit and vegetables	Tropical commodities	Cereals
Negative competition effects			
Land	Likely limited	Likely important at micro-, regional and macro-level	Likely limited
Labor	Likely important at micro- and regional level	Likely important at micro- and regional level	Likely limited
Water, soil nutrients & other natural resources	Likely limited	Likely important at regional level	Likely limited
Positive spillover effects			
Investment & consumption spillovers	Likely important at micro-economic level within firms and rural households	Importance depends on coordination and governance	Likely limited
Technical & managerial spillovers	Likely important at micro- and regional level	Likely important at micro- and regional level	Likely limited
Infrastructure spillovers & agglomeration effects	Likely important; resulting from private and public investment	Importance depends on the crop; public investment more important	Spillovers from LVC to GVC
Institutional spillovers	Likely important	Likely important	Likely important

Table 3: Summary of the available evidence on competition and spillover effects between global and local value chains

	Fresh fruits and vegetables	Tropical commodities	Cereals
Competition effects			
Land, labor & natural resource competition	Dolan (2001); Maertens (2009); Schwarz et al. (2015); Ulrich (2014); Van den Broeck et al. (2018); Van den Broeck & Maertens (2016); Yaro et al. (2017); Zaehring et al. (2018)	Anderman et al. (2014); Brüntrup et al. (2018); Yaro et al. (2017)	Jayne et al. (2016); Matenga & Hichaambwa (2017)
Spillover effects			
Investment & consumption spillovers	Maertens (2009); Van den Broeck et al. (2018)	Chiputwa and Qaim (2016); Meemken et al. (2017); Scoones et al. (2018)	
Technical & managerial spillovers	Bellemare (2012); Gema et al. (2018); Krishnan (2018); Krishnan & Foster (2018); Masakure & Henson (2005); Minten et al. (2007)	Brüntrup et al. (2018); Deiniger & Xia (2016); Govereh et al. (1999); Jayne et al. (2004); Govereh & Jayne (2003); Orr (2000); Shumeta & D'Haese (2018); Theriault & Tschirley (2014); Deininger & Xia (2018)	Jayne et al. (2016); Matenga & Hichaambwa (2017)
Infrastructure spillovers & agglomeration benefits	Van den Broeck and Maertens (2017); Yaro et al. (2017); Zaehring et al. (2018)	Scoones et al. (2018); Theriault & Tschirley (2014); Wessel & Quist-Wessel (2015); Yaro et al. (2017)	
Institutional spillovers	Tallontire et al. (2011)	Minten et al. (2019)	Daly et al. (2016); Sitko et al. (2018a); Sitko et al. (2018b)

Appendix A – Classification of sub-regions in Africa

Northern Africa: Algeria, Egypt, Libya, Morocco, Sudan, Tunisia, Western Sahara.

Eastern Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mayotte, Mauritius, Mozambique, Réunion, Rwanda, Seychelles, Somalia, South Sudan, Uganda, Tanzania, Zambia, Zimbabwe.

Western Africa: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Saint Helena, Ascension & Tristan de Cunha, Senegal, Sierra Leone, Togo.

Central Africa: Angola, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon, Sao Tome & Principe.

Southern Africa: Botswana, Eswatini, Lesotho, Namibia, South Africa.