

Barriers to trade in Sub-Saharan Africa food markets

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Abstract

This continent-wide review of studies on price transmission implemented for the global, regional cross-border, within-country urban and within-country rural market segments provides a broad overview of current conditions in Sub-Saharan Africa food markets and provides insights into how market development varies across regions and crops. The review focuses on barriers to trade, both those related to policy and those related to general market development. Observations in the reviewed studies show that there are several long-run and short-run factors that have inhibited, and currently inhibit, food trade in the analysed markets. The long-run factors are related to general market development, such as imperfect substitutability between imported and domestic produce and infrastructure deficiencies. Short-run factors include intermittent changes in trade and/or tax policy and changes in self-sufficiency status. In only a few cases were no barriers to trade identified, and these were for highly traded foods between markets within countries. Since tradability is an indicator of market development, greater policymaker and donor partner attention is needed to remove barriers to trade, especially for foods that are efficiently produced domestically but do not yet have a well-developed domestic or international market.

Key words: food prices; price transmission; transactions costs; Sub-Saharan Africa

1. Introduction

With only a few exceptions, the current state in Sub-Saharan African (SSA) food markets is one in which most countries are either self-sufficient or small country importers on global markets for the primary traded staple foods (maize, rice and wheat). Out of eight SSA case study countries examined by Baltzer (2015) in an assessment of linkages between SSA food markets and global food markets in relation to the main staple food crop in each country, only South Africa was designated as a “free trader”, in that its productivity and market development allowed it to compete on world maize markets. The remaining seven countries were described as either “importers” or “isolated”, and none were classified as an “exporting stabilizer” (Baltzer 2015). This means that there presently are few individual country success stories regarding agricultural modernisation and development among SSA countries when assessed in the global context. However, improvements in agricultural productivity and market development have allowed some countries to become “exporting stabilisers” at the regional level for some staple crops. For example, Davids *et al.* (2016) describe rapid growth in productivity among maize farmers in Malawi and Zambia in recent years and provide data that show that Zambia has emerged as a key regional exporter in all years but those with the most unfavourable weather.

The general picture of the current state of the staple food market connectivity in SSA on the global and regional cross-border scales is that countries are broadly only connected with global markets through imports, but there is evidence of increased regional market integration in some regions. Part of the explanation for the SSA food trade and marketing status quo lies with the generally low levels of public investment in agricultural research in most SSA countries over the past decades, which has

limited increases in yields compared to developing countries in Asia and Latin America (World Bank 2007; Benson *et al.* 2008). Moreover, there is evidence that the governments of many SSA countries have intervened in the trade and marketing of staple foods via trade and other marketing-related policies (Baffes & Gardner 2003).

Given the current context, it is somewhat surprising that recent papers have argued that SSA food markets are currently efficient, defined as being characterised as having no arbitrage opportunities after taking account of trade costs (Rashid & Minot 2010), as well as competitive, defined as traders not earning rents above trade costs and the absence of barriers to entry (Dillon & Dambro 2017). The implication of such studies is that, in many cases, it is not necessary to pay further researcher and policymaker attention to SSA food marketing. However, each of these studies states that its characterisation applies mainly to trade among large, urban wholesale markets within countries and across borders, and they only state in passing that such conditions do not apply for some market segments, especially the linkages between urban and rural markets.

In this paper, a more thorough description of the current conditions in SSA food markets is provided through a comprehensive, SSA-wide review of price transmission studies published from 1994 to 2017 on markets at the global, regional cross-border, within-country urban, and within-country rural segments. Special emphasis was placed on the identification of barriers to trade by the studies' authors. The information obtained from the review shows that there are several common long- and short-run factors that have inhibited food trade in SSA over the past decades, and that many remain relevant today, especially for certain market segments and crops. The long-run factors are those associated with general market development, such as infrastructure deficiencies and imperfect substitutability between imported and domestically produced foods. Short-run factors are those such as intermittent adjustments in trade and/or tax policy and changes in self-sufficiency status due to adjustments in growing conditions (to which the intermittent policy changes are commonly made in response). In a few studies no barriers to trade were identified, and these were for the crops that are most widely traded within the analysed countries.

2. Barriers to trade

The main types of barriers to trade are official government policies (e.g. tariffs or other trade-distorting taxes) and general market development factors, which include high transactions costs, for example due to infrastructure deficiencies (Baquedano *et al.* 2011). Transactions costs, which are defined as resources needed to facilitate trade over time (Rousseau *et al.* 2015), are commonly described as high in SSA food markets. There are many reasons for high transactions costs, but three main ones are emphasised. First, transportation costs are substantially higher in SSA than in other parts of the world, although there is variation in the levels of these costs in different regions (Porteous 2015). In addition, frequent adjustments in trade policy and poorly developed regulatory institutions create uncertainty among market participants, which gives rise to trade facilitation more difficult and costlier than it would be under a system with better market information (Dillon & Dambro 2017). Lastly, the land tenancy structure in many SSA countries, in which there are many smallholder farmers dispersed on small plots across wide areas, makes the co-ordination of aggregating supply for trade costlier than would be the case if there were fewer, larger farms (Rousseau *et al.* 2015). Trader operating costs are also higher under poor credit markets because traders are limited in the sizes of grain purchases, such that per unit trade costs are higher in the absence of credit facilities (Tostão & Brorsen 2005). Thus, SSA trader firms are presently structured to implement business activities in the context of high transaction costs.¹

¹ The issue of high trade facilitation costs in SSA food markets is not new. For example, in an evaluation of food market conditions in the 1960s, Jones (1972) argued that the observed margins obtained by traders were equivalent to trade costs, and hence markets were competitive.

One potential outcome of a high transaction cost environment is greater market concentration among firms that facilitate trade, especially when credit markets are poorly developed, which is the case in many SSA countries today (World Bank 2013). Indeed, Barrett (1996) argued that rural markets are predisposed toward a natural monopoly, since economies of scale in trade facilitation are at present only available in urban markets. The market structure regarding the organisation of firms that facilitate trade and marketing activities can hence inhibit market development and reduce trade and marketing efficiency (Getnet *et al.* 2005).

Consider, for example, firms that import rice from global markets into Nigeria. Data from the Rice Importers, Millers, and Distributors Association of Nigeria (RIMIDAN) show that, for 2012/2013, five firms controlled close to 75% of all rice imports (RIMIDAN 2014). The USDA estimated that rice imports into Nigeria for the 2012/2013 marketing year were 2.8 million metric tons (MT) (United States Department of Agriculture 2017). The average global rice price over this period, as reported by the World Bank (2017), was 534 USD/MT (World Bank 2017). Thus, such imports cost the importing firms over USD 1 billion for rice alone, not accounting for other import- and marketing-related costs. Since such purchases require substantial liquidity, especially in a poor credit market context, it is plausibly the case that there are prerequisites for participation in some market segments that are more prohibitive than they would be in a lower cost environment.

A key implication of the generally high business costs and poorly developed credit markets is that SSA markets are more isolated from global and other continental markets than would be the case if such factors were less relevant. Therefore, if these stylised facts apply across the continent at least to some degree, then generally poor price transmission is expected. This review of price transmission studies undertaken in this paper provides insights into the extent to which the types of barriers to trade, policy and/or general market development exist in the different regions of SSA and across crops, as well as how they have evolved over the past few decades.² Since price data are more readily available than those on trade flows, especially for cross-border and internal trade within SSA, such studies are argued as providing the best, while notably not definitive, information on existing trade patterns.

3. Estimation of empirical price transmission

In the economics literature, Fackler and Goodwin (2001) provide a thorough review of the logic, merits and drawbacks of the econometric approaches that have been applied in price transmission studies like those reviewed in this paper. The most popular approach has been cointegration regression estimation, which was initially proposed by Engle and Granger (1987) as a valid method to estimate the strength of the relationship between two time-series variables that are individually non-stationary but that move together in the long run.³ The earliest version of such an estimation was two-stage, with the estimation of a first-stage-levels model that estimated the degree to which the variables move together in the long run. The residuals from this first-stage regression, the stationarity of which implies cointegration, are then included in a second-stage error-correction mechanism model (commonly referred to simply as the error correction model (ECM)) to estimate the extent of short-run variable co-movements while still accounting for the long-run relationship (Engle & Granger 1987). Several variants of cointegration analysis have subsequently been developed, and most of these involve adjustments to the base levels and/or ECM model parameters to account for phenomena relating to market structural factors, such as a tendency for there to be “sticky prices”, which leads to asymmetric price transmission so that prices move together upward to a greater extent than downward (e.g. Abdulai 2000).

² The earliest observation year in the reviewed studies was 1970 and the most recent was 2016.

³ Baffes (1991) provides a thorough discussion of relevant statistical issues associated with estimation using non-stationary variables within a cointegration framework.

Cointegration analysis and its successive modified approaches are popular in the price transmission literature because they are consistent with the theory of the Law of One Price (Ardeni 1989). In the price transmission literature, the two (or more) variables of focus are prices in spatially separated markets, which are expected to move together in the long run, such that any short-run change in one variable is followed by a reversion back toward the other variable, due to trade arbitrage. For instance, a local event in one market area, such as a production shortfall due to poor growing conditions, can cause a spike in the local price and temporary divergence in that price from prices in linked markets. If markets are well developed and there are no barriers to trade like those described above, then prices will eventually converge on each other. Convergence may be delayed or might not occur if there are barriers to trade.

4. Barriers to trade identified in SSA food price transmission studies

The information presented in the tables below was obtained from a review of 41 price transmission studies on SSA food markets published from 1994 through 2017. Preference was given to peer-reviewed journal articles, although some working and conference papers were included if they were cited in other peer-reviewed articles and/or were analyses of unique regions and/or crops. Studies that included a wide variety of developing countries, of which only a subset were in SSA – such as that by Ceballos *et al.* (2017) – were excluded from the review, since their main aims were to compare results for developing country regions, such as SSA versus Latin America. Furthermore, studies that focused on North African countries such as Egypt (e.g. Rapsomanikis *et al.* 2006) were also excluded because of the substantial difference in growing and market conditions in those countries compared to other SSA countries, especially in relation to staple food crops.

The evidence from the reviewed analyses is presented in sequence, from larger to smaller market scopes: world, cross-border regional, within-country urban/wholesale, and within-country rural market segments, and is demarcated according to the Southern, Eastern and West African regions. The reported information emphasises: the focus countries, periods of observation in years, crops examined, empirical methods employed, and identified barriers to trade and/or marketing. Each table lists the studies for each region in chronological order – from the earliest to most recent in terms of analysis period.

Table 1 below lists the studies that have analysed the relationship between world and Southern and Eastern African country food prices. The studies for the Southern Africa country set found that changes in self-sufficiency commonly inhibit trade, specifically during years when countries no longer require imports to meet consumption needs. Since changes in self-sufficiency can also encourage trade, such as when there is a production shortfall and imports are needed, this is a short-run factor, observed intermittently in most countries for at least some crops. High transport costs were mentioned as inhibiting trade in nearly all studies described in Table 1. Export bans in the Malawi case were the main examples of trade policy barriers in the Southern African set. Similar trends were generally observed for the Eastern African set, which included a wider variety of countries and crops. High transport costs were commonly cited as inhibiting trade, and export bans were observed in several countries. One factor that was similar across the Southern and Eastern African countries was imperfect substitutability between food imported from global markets and domestically produced food.

Table 1: World to Southern and Eastern Africa food price transmission studies

Authors (year)	Countries	Analysis period	Crops	Empirical method	Barriers to trade
<i>Southern Africa</i>					
Minot (2011)	Malawi	1994-2008	maize	VECM*	<ul style="list-style-type: none"> • Changes in self-sufficiency • Export bans • Restrictions on private sales • High transport costs
	Mozambique	2003-2008	rice		<ul style="list-style-type: none"> • Changes in self-sufficiency status over time • High transport costs
	South Africa	1994-2008	maize		<ul style="list-style-type: none"> • Changes in self-sufficiency • High transport costs
Abidoye & Labuschagne (2014)	South Africa	2000-2010	maize	Threshold cointegration	<ul style="list-style-type: none"> • Trade policy of importing from neighbour countries • High transport costs
Abbott & Borot de Battisti (2011)	Malawi	2005-2010	maize; rice	Price transmission regression	<ul style="list-style-type: none"> • Export bans (maize) • Imports imperfect substitute for domestic produce
<i>Eastern Africa</i>					
Conforti (2004)	Ethiopia	1969-2001	maize; sorghum; wheat	Cointegration	<ul style="list-style-type: none"> • Imports imperfect substitute for domestic produce
Baffes & Gardner (2003)	Madagascar	1970-1991	rice	ECM*	<ul style="list-style-type: none"> • Export taxes
Benson <i>et al.</i> (2008)	Uganda	2000-2008	various	Correlation estimates	<ul style="list-style-type: none"> • Changes in self-sufficiency • Imports imperfect substitute for domestic produce • High transport costs
Dillon & Barrett (2016)	Ethiopia	2000-2012	maize	Asymmetric ECM	<ul style="list-style-type: none"> • High transport costs
	Kenya; Tanzania; Uganda;				<ul style="list-style-type: none"> • Imports imperfect substitute for domestic produce • High transport costs (fuel)
Baffes <i>et al.</i> (2017)	Tanzania	2002-2014	maize	ECM	<ul style="list-style-type: none"> • Export bans
Minot (2011)	Kenya	2003-2008	maize	VECM	<ul style="list-style-type: none"> • Intermittent tariffs • High transport costs
	Tanzania		maize; rice; sorghum		<ul style="list-style-type: none"> • Export bans (maize) • High transport costs
	Uganda		maize		<ul style="list-style-type: none"> • High transport costs
Abbott & Borot de Battisti (2011)	Ethiopia	2005-2010	maize; sorghum; wheat	Price transmission regression	<ul style="list-style-type: none"> • Export bans (maize)
	Rwanda		maize; rice		<ul style="list-style-type: none"> • Imports imperfect substitute for domestic produce
	Uganda		maize; rice		<ul style="list-style-type: none"> • Imports imperfect substitute for domestic produce
	Kenya		maize		<ul style="list-style-type: none"> • Export bans (maize)

* Note: The acronyms in the table are Vector Error Correction Model (VECM) and Error Correction Model (ECM)

The studies included in Table 2 below analysed the relationships between world and domestic prices in West African countries. While maize and rice were frequently studied, as was the case for Southern and Eastern Africa, there were generally a wider variety of crops analysed in the West Africa set. Similar to the studies of Eastern Africa, it was frequently cited that imperfect substitutability between imported and domestically produced food and high trade costs inhibited trade. Trade policy was identified as a factor in a few studies, but more frequently the trade policy mechanism was tariffs rather than export bans. One differentiating factor of the West African set from the other SSA regions

was that a few studies identified the domestic market structure of firms engaged in importing or exporting in global markets as an important factor inhibiting trade.

Table 2: World to West Africa food price transmission studies

Authors (year)	Countries	Analysis period	Crops	Empirical method	Barriers to trade
Baffes & Gardner (2003)	Ghana	1970-1995	maize; rice	ECM*	<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
Conforti (2004)	Senegal	1990-2001	maize; rice	Cointegration	<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
Tankari (2012)	Senegal	1998-2011	groundnuts	Asymmetric ECM	<ul style="list-style-type: none"> Market structure of exporting firms Imports imperfect substitute for domestic produce
Baquedano <i>et al.</i> (2011)	Mali	1998-2008	rice	Generalised ECM	<ul style="list-style-type: none"> Tariffs Imports imperfect substitute for domestic produce (premium on imports)
Hatzenbuehler <i>et al.</i> (2017)	Nigeria	2001-2010	cassava; maize; rice	Cointegration	<ul style="list-style-type: none"> Tariffs (maize and rice) Imports imperfect substitute for domestic produce Market structure of importing firms (rice, maize)
Minot (2011)	Ghana	2004-2007	rice	VECM*	<ul style="list-style-type: none"> Export bans Changes in self-sufficiency
Abbott & Borot de Battisti (2011)	Senegal	2005-2010	rice; sorghum	Price transmission regression	<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
	Burkina Faso		rice; sorghum		<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
	Nigeria		maize; sorghum		<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce High trade costs
	Ghana		maize; rice		<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce High trade costs
	Mali		rice; sorghum		<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
	Niger		maize; rice; sorghum		<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce
Zakari <i>et al.</i> (2014)	Niger	2006-2012	rice	ECM	<ul style="list-style-type: none"> Trade restrictions by neighbouring countries

* Note: The acronyms in the table are Vector Error Correction Model (VECM) and Error Correction Model (ECM)

Inferences from the studies that examined the relationships in prices between neighbouring countries in Southern and Eastern Africa are included in Table 3 below. A clear difference between the world-to-Southern and Eastern Africa price relationship studies in Table 1 is that many more studies have been done examining cross-border price transmission in Southern Africa than that with world markets, and the opposite applies for Eastern Africa. Notably, all of the examined studies in Table 3 focused at least in part on maize. Changes in self-sufficiency were frequently identified as inhibiting trade, but local market infrastructure and policy factors were also common. Both trade and domestic fiscal policies (e.g. VAT tax) were cited as inhibiting trade. High transport costs were acknowledged as a key trade barrier, which was relatively more commonly in the Eastern African than in the Southern African dataset.

Table 3: Cross-border food price transmission studies in the Southern and Eastern Africa regions

Authors (year)	Countries	Analysis period	Crops	Empirical method	Barriers to trade
<i>Southern Africa</i>					
Myers & Jayne (2012)	South Africa; Zambia	1994-2009	maize	Regime specific TAR*	<ul style="list-style-type: none"> • Changes in self-sufficiency • Transport capacity constraints • Government importation
Traub <i>et al.</i> (2010)	South Africa; Mozambique	1997-2009	maize; maize meal	ECM*	<ul style="list-style-type: none"> • Changes in self-sufficiency • High transport costs • Market structure and tax policy for milling industry (Mozambique)
Acosta (2012)	South Africa; Mozambique	2000-2001	maize	Asymmetric ECM	<ul style="list-style-type: none"> • Tariffs • VAT tax policy
Mokumako & Baliyan (2016)	South Africa; Botswana	2000-2013	maize	VECM*	<ul style="list-style-type: none"> • Changes in self-sufficiency • Marketing board activities
Baffes <i>et al.</i> (2017)	Tanzania; Kenya; South Africa;	2002-2014	maize	ECM	<ul style="list-style-type: none"> • Changes in self-sufficiency • Export bans
Burke & Myers (2014)	Democratic Republic of the Congo; Mozambique; Malawi; Zambia;	2004-2010	maize	Multiple-Regime ECM	<ul style="list-style-type: none"> • High transport costs (capital and labour) • Informal taxes at borders
Davids <i>et al.</i> (2017)	Zambia; Zimbabwe	2005-2016	maize	ECM	<ul style="list-style-type: none"> • Export bans (Zambia) • Imports imperfect substitute for domestic produce
Davids <i>et al.</i> (2016)	Zambia; Zimbabwe; Malawi; Mozambique; South Africa	2011-2015	maize	Cointegration	<ul style="list-style-type: none"> • Export bans
<i>Eastern Africa</i>					
Benson <i>et al.</i> (2008)	Uganda; Kenya	2000-2008	maize	Correlation estimates	<ul style="list-style-type: none"> • Self-sufficiency changes in Kenya • High transport costs
Ihle <i>et al.</i> (2011)	Kenya; Tanzania; Uganda	2000-2008	maize	VECM	<ul style="list-style-type: none"> • Tariffs and poor infrastructure in Tanzania
Dillon & Barrett (2016)	Ethiopia; Kenya; Tanzania; Uganda	2000-2012	maize	Asymmetric ECM	<ul style="list-style-type: none"> • High transport costs (fuel)

* Note: The acronyms in the table are: Threshold Autoregression (TAR), Error Correction Model (ECM), and Vector Error Correction Model (VECM)

Information obtained from the price transmission studies that analysed the relationships between prices in neighbouring countries in West Africa is included in Table 4 below. Similar to the East African set, there have been relatively few studies that have examined the relationships among prices in the region. The West African set is unique from the other regions, however, in that more crops were analysed. While changes in self-sufficiency, high trade costs and informal border taxes were identified as limiting cross-border trade, as was the case in the other regions, changes in exchange rate and in the market structure of trading firms were factors that differentiated the West African set from the other regions.

Table 4: Cross-border food price transmission studies done within West Africa

Hatzenbuehler <i>et al.</i> (2017)	Nigeria; Niger; Benin; Ghana	2001-2010	cassava; cowpeas; maize; rice; yams	Cointegration	<ul style="list-style-type: none"> Imports imperfect substitute for domestic produce Market structure of firms importing on world markets High trade costs
Zakari <i>et al.</i> (2014)	Niger; Nigeria; Mali	2006-2012	maize; rice; sorghum	ECM*	<ul style="list-style-type: none"> Self-sufficiency changes Exchange rate changes Trade policy changes
Amikuzuno & Donkoh (2012)	Burkina Faso; Ghana	2008-2010	tomatoes	Regime switching ECM	<ul style="list-style-type: none"> Informal taxes at border High trade costs

* Note: The acronym in the table is Error Correction Model (ECM)

Observations made in the studies that analysed price relationships in urban markets within SSA countries are listed in Table 5 below. Fewer studies have been conducted for East Africa than for South and West Africa, and those that have been undertaken analysed Ethiopian markets. The Southern African set is somewhat more diverse but limited to only Mozambique and Tanzania. The Western Africa set includes more countries than the other sets, but is similarly somewhat narrow regarding the assessed crops. For the Southern Africa set, natural topography and infrastructure deficiencies were identified as inhibiting cross-country trade in Tanzania. High transport costs and changes in self-sufficiency status were relatively more important in Mozambique. The East African set stands out in that one of the studies did not list any barriers to trade, while others identified the market structure of trading firms and poor market information as inhibiting trade in teff (the local staple). Few factors inhibiting cross-country urban market trade were found in the West African set. However, within-country regional adjustments in self-sufficiency status were again commonly identified as intermittently inhibiting trade.

Table 5: Sub-Saharan Africa within-country urban food price transmission studies

Authors (year)	Countries	Analysis period	Crops	Empirical method	Barriers to trade
<i>Southern Africa</i>					
Van Campenhout (2007)	Tanzania	1989-2000	maize	TAR*	<ul style="list-style-type: none"> High transport costs Informal taxes along transport corridors Natural topography Infrastructure deficiencies
Penzhorn & Arndt (2002)	Mozambique	1993-1998	maize	PBM*	<ul style="list-style-type: none"> Changes in self-sufficiency
Asche <i>et al.</i> (2012)	Tanzania	1993-2002	sorghum	VECM*	<ul style="list-style-type: none"> Natural topography Infrastructure deficiencies
Cirera & Arndt (2008)	Mozambique	1993-2008	maize	Time-dependent PBM	<ul style="list-style-type: none"> High transport costs (fuel)
Tostão & Brorsen (2005)	Mozambique	1994-2001	maize	PBM	<ul style="list-style-type: none"> Infrastructure deficiencies (poor road quality) Changes in self-sufficiency High trade costs (especially capital)
<i>Eastern Africa</i>					
Dercon (1995)	Ethiopia	1987-1993	teff	Cointegration	<ul style="list-style-type: none"> Internal trade restrictions
Getnet (2007)	Ethiopia	1996-2000	wheat	Cointegration	<ul style="list-style-type: none"> None
Getnet <i>et al.</i> (2005)	Ethiopia	1996-2000	teff	Cointegration	<ul style="list-style-type: none"> Market structure of firms that organise wholesale trade
Wondemu (2015)	Ethiopia	2008-2012	teff; maize	Threshold VECM	<ul style="list-style-type: none"> Poor market information (teff)

<i>West Africa</i>					
Abdulai (2000)	Ghana	1980-1997	maize	Threshold cointegration	<ul style="list-style-type: none"> • Imbalances between demand in coastal areas and supply inland
Kuiper <i>et al.</i> (1999)	Benin	1988-1989	maize	VECM	<ul style="list-style-type: none"> • Changes in self-sufficiency
Lutz <i>et al.</i> (2007)	Benin	1998-2001	maize	Cointegration	<ul style="list-style-type: none"> • Infrastructure deficiencies • Changes in self-sufficiency
Tankari (2012)	Senegal	1998-2011	groundnuts	Asymmetric ECM*	<ul style="list-style-type: none"> • None
Hatzenbuehler <i>et al.</i> (2017)	Nigeria	2001-2010	cassava; cowpeas; maize; rice; yams	Cointegration	<ul style="list-style-type: none"> • Changes in self-sufficiency

* Note: Acronyms in the table are Threshold Autoregression (TAR), Parity Bounds Model (PBM), Vector Error Correction Model (VECM), and Error Correction Model (ECM)

Evidence from the final set of studies, which analysed the relationship between urban and rural food prices in SSA countries, are listed in Table 6 below. Many of the same factors apply to this scope of analysis as to the others, but it was more commonly the case that the studies did not identify any substantial barriers to trade. Most of the listed factors related to general market development, so that the market structure and market information factors were determined as limiting trade in some cases. These market development issues apply mainly to the foods that are produced and consumed locally but that are rarely traded either between urban centres in countries or internationally, such as cassava, cowpea, plantains and yams in the West Africa set.

Table 6: Sub-Saharan Africa within-country rural food price transmission studies

Authors (year)	Countries	Analysis Period	Crops	Empirical method	Barriers to trade
<i>Southern Africa</i>					
Goletti & Babu (1994)	Malawi	1984-1992	maize	Cointegration	<ul style="list-style-type: none"> • High transport costs • Infrastructure deficiencies
Moser <i>et al.</i> (2009)	Madagascar	2001	rice	Adjusted PBM*	<ul style="list-style-type: none"> • High marketing costs • Market structure of firms that do cross-country trade
Myers (2013)	Malawi	2001-2008	maize	TAR*	<ul style="list-style-type: none"> • None
<i>Eastern Africa</i>					
Negassa & Myers (2007)	Ethiopia	1996-2002	maize; wheat	Extended PBM	<ul style="list-style-type: none"> • Market structure such that wheat-importing firms are larger than those for maize
Rashid (2004)	Uganda	1999-2001	maize	Cointegration	<ul style="list-style-type: none"> • Regional conflict • Changes in self-sufficiency
<i>West Africa</i>					
Oladapo & Momoh (2008)	Nigeria	1994-2001	cassava; maize; yams	ECM*	<ul style="list-style-type: none"> • None, but maize market more developed than that of cassava and yams
Nkendah & Nzouessin (2006)	Cameroon	1993-2000	plantains	VECM*	<ul style="list-style-type: none"> • Infrastructure deficiencies (road quality) • Poor market information
Hatzenbuehler <i>et al.</i> (2017)	Nigeria	2007-2010	cassava; cowpeas; maize; rice; yams	Cointegration	<ul style="list-style-type: none"> • None, but maize and rice markets more developed than those of cassava, cowpeas and yams

* Note: Acronyms in the table are Parity Bounds Model (PBM), Threshold Autoregression (TAR), Error Correction Model (ECM) and Vector Error Correction Model (VECM)

5. Conclusions

Several themes were observed in this review of price transmission studies conducted on SSA food markets over the publication period of 1994 to 2017. First, both long- and short-term barriers to trade were commonly observed, and many still exist in SSA food markets today. In only a few instances were no barriers to trade identified. It was most common that there were no barriers to trade for the most highly traded food crops in domestic markets.

Long-term inhibitors to trade identified in the reviewed studies include infrastructure deficiencies, the associated high transport costs, and general market development factors, including poor market information networks and the structural market composition of trade-facilitating firms. Short-term barriers to trade included intermittent changes in self-sufficiency, and the commonly associated adjustments in trade and/or tax policy.

Imperfect substitutability between imported and domestically produced foods was frequently cited as a barrier to trade among world and SSA markets. Notably, this issue applies to all SSA regions and to most countries within each region. This implies that it would be worthwhile to invest in more research on individual crop segments to determine whether, from an economic welfare standpoint, such market segmentation is preferable (for example, imported produce is used for animal feed and domestic produce is used for food), or if further research and market development-related investments are needed to enhance substitutability.

Another discovery from this review is that some crops (e.g. maize) have received far greater research attention than others (e.g. cassava), and that these research efforts are positively correlated with market development. This suggests that increased investments are needed for research on and development of markets for locally produced and culturally important crops that are not yet widely traded within countries or internationally.

Nearly all the reviewed studies cited intermittent changes in self-sufficiency status as a relevant factor influencing trade patterns. This implies that improved market information, such as more accurate and timely official production estimate, and improved storage and processing infrastructure, continue to be needed for many market segments and crops. Such investments would help achieve more consistent supply-use balances, and thus make intermittent changes in self-sufficiency status less likely to inhibit trade and spur trade-distorting policy responses.

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