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AGRICULTURAL COMMERCIALIZATION IN ETHIOPIA:

A Review Of Warehouse Receipts In The Maize, Wheat, Sorghum And Tef Value Chains

August 2017

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Agricultural Commercialization in Ethiopia: A Review of Warehouse Receipts in the Maize, Wheat, Sorghum and Tef Value Chains

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ACRONYMS

ACC	Agricultural Commercialization Clusters
ACE	Agricultural Commodity Exchange for Africa
AGP-AMDe	Agricultural Growth Program-Agribusiness and Market Development
ATI	Africa Trade Insurance
ATA	Agricultural Transformation Agency
CBE	Commercial Bank of Ethiopia
CRDB	Community Rural Development Bank (Tanzania)
CRS	Community Warehouse Receipt System
CSP	Cooperative Storage Plan
DFIs	Development Finance Institutions
EABC	Ethiopian Agricultural Business Corporation (former Agricultural Input Supply Enterprise and the former Ethiopian Seed Enterprise)
EACWSE	Ethiopia Agricultural Commodities Warehouse Services Enterprise
ECAs	Export Credit Agencies
ECEA	Ethiopian Commodities Exchange Authority
ECX WRS	Ethiopia Commodity Exchange Warehouse Receipts System
ECX	Ethiopia Commodity Exchange
EDRI	Ethiopian Development Research Institute
EGTE	Ethiopian Grain Trade Enterprise
EIB	European Investment Bank
EIIDE	Ethiopian Industrial Inputs Development Enterprise (former Merchandise Wholesale & Import Trade Enterprise)
ETB	Ethiopian Birr
ETBC	Ethiopian Trading Business Corporation (former Ethiopian Trading Enterprise, EGTE, ETFruit)
FAO	Food and Agriculture Organization
FCU	Farmer Cooperative Union
GRN	Goods Received Note
GTP II	Growth and Transformation Plan II
IAIPs	Integrated Agro-Industrial Parks
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
LMP	Livestock Master Plan
MFI	Micro Finance Institute
NBM	National Bank of Malawi
NDRMC	National Disaster Risk Management Commission
PC	Primary Cooperative
PO	Primary Organization
RIA	Research ICT Africa
RUSACOs	Rural Saving and Credit Cooperatives
SFRA	Strategic Food Reserve Agency (former Ethiopian Food Security Reserve Administration)
SHF	Small Holder Farmer
SIP	Storage Investment Plan
USAID	United States Agency for International Development
WR	Warehouse Receipt
WRF	Warehouse Receipt Financing
WRICO	Warehouse Receipts and Inventory Collateral Office
WRS	Warehouse Receipt System

EXECUTIVE SUMMARY

Ethiopia's agricultural sector has reported considerable growth rates over the past decade as the result of an estimated doubling in the use of modern farm inputs, rapid expansion of arable land, increased labor productivity, government investments in the extension system and an improved road network. The second phase of Ethiopia's Growth and Transformation Plan (GTP II) aims to maintain current high levels of agricultural GDP growth over the 2015–2020 period. Several of the Agricultural Transformation Agenda Deliverables for the commercial orientation pillar of GTP II can be directly addressed or strengthened through an efficient Warehouse Receipt System (WRS), including provision of market services and infrastructure, promoting aggregation and storage use and availability, and fostering agro-processing, value addition and exports.

It is expected that the Transformation Agenda Deliverables be operationalized in the Government of Ethiopia's Agricultural Commercialization Clusters (ACCs), which aim to provide a strategic and commercially viable platform for the development of priority agricultural commodity value chains through a geographically focused approach. It is proposed that the platforms will enable the implementation of multiple priority interventions for agricultural transformation-led growth and rural transformation. The primary goal of the ACCs is the commercialization of smallholder agriculture and agro-industrial development, offering a strategic entry point for private sector engagement.

Ethiopia is considered as one of the pioneers of the Warehouse Receipt System (WRS) in Africa, having first enacted a Proclamation for the Ministry of Trade to implement and regulate such a system in 2003. The Ethiopia Commodity Exchange (ECX) was established in 2008 and was assigned the responsibility of managing the WRS. By insuring against operational risks the ECX helped regain confidence from the banks to finance receipts. In 2014 a new regulation led to the establishment of the Ethiopian Agricultural Commodities Warehousing Service Enterprise (EACWSE), to provide warehouse management services. It was recently announced that the EACWSE would be merged with its mother organization the ECX by 1 July 2017, ostensibly due to the weak performance of the warehouse

service provision under EACWSE management. This restructuring of the ECX provides an ideal opportunity to take stock and revisit the question of whether the WRS linked to Warehouse Receipt Finance (WRF) can expedite agricultural commercialization in Ethiopia, particularly within priority commodity value chains for tef, barley, maize and wheat. Maize and wheat are already eligible for warehouse receipting on the ECX.

With one of the core objectives of the ACCs to promote an integrated platform to implement multiple priority interventions across value chains and across sectors, there are several benefits to introducing the WRS to the ACCs. First, the WRS assures quality of produce and same-standard commodities. Second, the WRS promotes market linkages through a common marketable instrument, the WR. Third, value addition can be improved through increasing finance availability in the value chain through Warehouse Receipt Financing (WRF). Finally, the WRS facilitates aggregation.

A marketable surplus is a prerequisite for a functioning WRS, however there are three further important requirements for success: first, the storability of the underlying commodity should be high so as to ensure that all the parties have trust that the value of the product is preserved over time; second, the expected seasonal price differential, i.e. the gap between the trough and peak prices, should be sufficient to cover the cost of storage and financing; and third, the price should follow a predictable curve over the course of the season as any deviation from the normal seasonal pattern imparts major risk to the parties involved. For these reasons, this review of whether the WRS can expedite agricultural commercialization in Ethiopia assesses the storability and historical seasonal price patterns of prioritized commodities.

Warehouse Receipt Financing can benefit several actors in agricultural value chains: By storing and accessing credit, producers can avoid forced selling of commodities shortly after harvest when prices tend to be suppressed; commodity traders engaging in temporal arbitrage can access finance to cover operational, storage and other costs, in addition to overcoming the problem of large opportunity costs associated with financial capital locked up in stored

commodities; and agro-processors can enter into repurchase agreements with banks or forward contracts using a standardized Warehouse Receipt (WR) as approved collateral.

Despite various proclamations and extensive investment in the exchange, the WRS has still not truly taken off in Ethiopia. The lack of participation by producers, traders and financial institutions is evident when looking at the actual utilization of the WRS: To date only sesame and pea beans have been financed using the WRS, and only during 2011 and 2012. The success of WRS elsewhere, such as in South Africa and Malawi, lies in their expansion of warehouse operations to all potential actors—including primary cooperatives, cooperative unions, private sector actors such as malt plants and feed lots, traders, aid organizations and investors. Increased participation brings about economies of scope and scale, making insurance, finance and storage costs more affordable.

Following an extensive review of the issues and challenges, this study proposes the adoption of a multi-tiered WRS for Ethiopia—starting from producers at ground level, followed by primary organizations (POs), then farmer cooperative unions (FCU), and eventually end users, such as traders, exporters, government agencies and aid organizations. The ACCs already embrace all of these levels, and hence a formalized and extended WRS will contribute to the objectives of the ACCs. However, building capacity will be crucial for the successful roll out of the WRS. Prerequisite skills include warehouse management, financing or marketing, grading of commodities and quality assurance. Financiers will require capacity in carrying out collateral inspections and should be encouraged to increase liquidity between the different levels. The complexity of products offered should gradually evolve from the producer- to end-market level: Insurance companies can offer different types of insurance instruments appropriate to the level of the system; and costly fidelity insurance becomes feasible if the risk is spread across the entire system. Ownership of the system at each level should reflect the primary users at that particular level. The PO should become a market 'one-stop-shop' for producers to receive market information, store produce, purchase inputs and access loans. Cohesion throughout the entire system should be brought about by a robust warehouse management oversight enterprise made up of all the market actors.

Once the EACWSE reunites with the ECX it should be a priority of the Exchange to reconsider the WRS. The following recommendations are made:

1. SCOPE

Expand the focus of the WRS from exported crops to maize, wheat, tef and barley. Include all market actors in the WRS. Expand warehouse operators to include private companies and cooperative unions. Investigate a potential sliding scale for the ETB 1 million of capital requirement for warehouse operators, and publish clear directives for registration of cooperatives as warehouse operators.

2. CAPACITY

Conduct a capacity audit of all market actors, followed by capacity building plan with ongoing training and sensitization at all levels. Publication of a simple storage operator handbook accessible to all levels.

3. GRADING

Align grade standards for all traded commodities across all sectors, tiers, ACCs.

4. INVESTMENT

Create a Storage Investment Plan alongside the ATA's planned National Storage Strategy to first analyze constraints and thereafter mobilize investment. Provide incentives for WRS investment such as tax breaks and rebates for WR trade volumes. Address financing constraints such as commercial bank bond purchase requirement.

5. OVERSIGHT

Include members of all tiers in the WRS management and oversight body / Ethiopian Commodities Exchange Authority (ECEA). Review existing legislation with the objective of creating a robust regulatory organ that can restore the integrity of the WRS.

6. ICT

Seek evolution of the national telecommunications provider to include services such as mobile money. Promote infrastructure investment of telecommunications to increase rural accessibility.

1. INTRODUCTION

Ethiopia's agricultural sector has reported considerable growth rates over the past decade as the result of an estimated doubling in the use of modern farm inputs, rapid expansion of arable land, increased labor productivity, government investments in the extension system and an improved road network. The second phase of Ethiopia's Growth and Transformation Plan (GTP II) aims to maintain current high levels of agricultural GDP growth over the 2015–2020 period. Several of the Agricultural Transformation Agenda Deliverables for the commercial orientation pillar of GTP II are directly addressed or strengthened through an efficient Warehouse Receipt System (WRS), including provision of market services and infrastructure, promoting aggregation and storage use and availability, and fostering agro-processing, value addition and exports.

It is expected that the Transformation Agenda Deliverables be operationalized in the Government of Ethiopia's Agricultural Commercialization Clusters (ACCs), which provide a strategic and commercially viable platform for the development of priority agricultural commodity value chains through a geographically focused approach. The platforms enable the implementation of multiple priority interventions for agricultural transformation-led growth and rural transformation. The primary goal of the ACCs is the commercialization of smallholder agriculture and agro-industrial development, offering a strategic entry point for private sector engagement.

The proposed restructuring of the Ethiopia Commodity Exchange (ECX) provides an ideal opportunity to take stock and revisit the question of whether the Warehouse Receipt System (WRS) linked to Warehouse Receipt Finance (WRF) can expedite agricultural commercialization in Ethiopia, specifically in the context of the establishment of four Agricultural Commercialization Clusters (ACCs) and the Agricultural Transformation Agency's (ATA) Cooperative Storage Plan (CSP). This study assesses whether the WRS—through the provision of credit, the reduction of post-harvest losses, and by linking producers, cooperatives and traders to agricultural value chains—can contribute to the fast-tracking of agricultural commercialization and transformation in the sector, as envisioned under the second Growth and Transformation Plan (GTP II). The analysis focuses on tef, maize, wheat and barley

value chains, of which the latter three commodities are currently eligible for warehouse receipting on the ECX.

Specific questions to be addressed in this study are:

- a) Which of the ACC focus commodities are physically suitable for medium term storage?
- b) Is the historical seasonal price curve of these commodities favorable for medium term finance?
- c) Are there financial institutions with an appetite for WRF of these specific commodities?
- d) What are the alternatives to increase access to agricultural trade finance?

A warehouse receipt (WR) is a document that provides proof of ownership of a specific volume of a commodity, with specific characteristics, that is stored in a specific warehouse (Varangis and Larson, 1996). The commodity is graded by an accredited authority and then stored according to the standards, rules and regulations of the warehousing authority in order to maintain quality and minimize post-harvest losses. Once issued, a WR can be used as collateral for accessing loans or for delivery against financial instruments such as forward contracts or futures contracts (Jayne et al. 2014). A well-functioning WRS can: (i) reduce post-harvest losses; (ii) reduce transaction costs; (iii) create awareness of and/or raise quality standards; (iv) permit the aggregation of commodities; (v) empower value chain agents to negotiate for better prices; and (vi) facilitate access to credit for all value chain actors, allowing them to build up a credit history.

Various studies have identified lack of access to credit as a major constraint to agricultural productivity in Ethiopia and elsewhere. For example, Tilahun, D. (2015) found that two-thirds of Ethiopian rural households are credit constrained. Despite rapid growth in the banking sector and Micro Finance Institutions (MFIs), demand far outweighs the supply of credit. Although agriculture accounted for almost 17.3 % of bank lending in the 2014/15 financial year (NBE annual report 2014/15), the majority of the finance is raised against fixed

assets, which means many smallholders are excluded. Furthermore, the majority of the agricultural lending is directed towards export facilities rather than domestic production and distribution (Agrifinfacility, 2012). By not exploiting the use of agricultural commodities as collateral, the sector is possibly missing out on a major opportunity to address its credit constraints.

Warehouse Receipt Finance can empower and benefit many actors in agricultural value chains: By storing and accessing credit, *producers* can avoid forced selling of commodities shortly after harvest when prices tend to be suppressed; commodity *traders* engaging in temporal arbitrage can access finance to cover operational, storage and other costs—in addition to overcoming the problem of large opportunity costs associated with financial capital locked up in stored commodities; and *agro-processors* can enter into repurchase agreements with banks or forward contracts using standardized WR as approved collateral (as explained in detail later in this study).

There are three important prerequisites to the success of a WRS and WRF. First, the storability of the underlying commodity should be of a high standard so as to ensure that the all parties have trust that the value of the product is preserved over time. Second, the expected seasonal price differential, i.e. the gap

between the trough and peak prices, should be sufficient to cover the cost of storage and financing. And third, the price should follow a predictable curve over the course of the season, as any deviation from the normal seasonal pattern imparts major risk to the parties involved. To assess the viability of scaling up the WRS in Ethiopia it is therefore necessary to assess the storability and the historical seasonal price patterns of commodities prioritized under the ACC.

This study begins with a review of the recent literature evaluating the performance of the WRS in Ethiopia, including the Agriculture Growth Program-Agribusiness and Market Development (AGP-AMDe) review that made several recommendations on how the WRS could be strengthened. The literature review is complemented by information gathered through a series of interviews with key stakeholders to obtain their perspectives on commodity finance and storage issues, challenges in the Ethiopian context, as well as the evolution of the WRS (Section 2). An analysis of production and market statistics is then conducted to better understand market trends and seasonal price curves, with the objective of assessing the viability of WRF in the current market context (Section 3). On the basis of these findings several recommendations are made in a concluding chapter (Section 4).

2. ETHIOPIA'S WAREHOUSE RECEIPT SYSTEM AND THE SUPPORTING ENVIRONMENT

2.1 Establishment of the WRS, ECX, and EACWSE

Ethiopia was one of the pioneering African countries to investigate the potential of a Warehouse Receipt System (WRS), resulting in the Warehouse Receipt Financing Proclamation No. 372/2003. The Ministry of Trade was identified as the implementing institution and was tasked with regulating the WRS. The Proclamation was enacted with a view to increase access to finance, protect producers from price shocks, and promote efficient marketing of standardized agricultural products (USAID, 2014a). The Ethiopian Grain Trade Enterprise (EGTE) was appointed as the warehouse operator and the Warehouse Receipts and Inventory Collateral Office (WRICO) was the implementation and overseeing agency.

Unfortunately this pilot WRS was unsuccessful: Despite an awareness campaign, only two deposits were made and no receipts were financed (USAID, 2014a). The limited experience of the primary stakeholders, as well as challenges imposed through the WRS Proclamation, were cited as the cause. Implementation issues included: the resistance of EGTE employees to accept the system due to unanswered questions regarding storage and handling losses; the lack of commitment from the banking sector; the grade standards imposed at the warehouse door, which were unattainable by many smallholders; and the relatively high grain prices soon after the harvest, which discouraged producers to store their grains as prices were satisfactory to sell stocks (USAID, 2014a).

The Ethiopia Commodity Exchange (ECX) was established in 2008 in accordance with the Ethiopia Commodity Exchange Proclamation 550/2007 to provide an organized market place where stored commodities could be traded. The WRS was then moved under the wing of the ECX, who regained the confidence of hesitant banks by insuring against operational risks.¹ In September 2015 the Exchange, under an initiative of the Ministry of Trade through the Council of Ministers Regulation No. 331/2014, established the Ethiopian Agricultural Commodities Warehousing Service Enterprise (EACWSE) with a mission to provide an 'innovative warehouse management service to customers and stakeholders through the application of best practices and available technologies' (Regulation 331/2014).² Despite various proclamations and extensive investment in the exchange, the WRS has still not truly taken off. Perhaps in recognition of this failure—particularly in the coffee value chain that has been dogged by issues of quality and traceability of coffee under the EACWSE's management—it was recently announced that the EACWSE would be merged with its mother organization, the ECX, by 1 July 2017.

¹ One of the main advantages of the WRS operating under the ECX umbrella is that the system instills confidence that any seller offering a product through the exchange has already deposited a specified quantity of their commodity, with specified quality characteristics, in a specified warehouse. Moreover, any commodity in an exchange-accredited warehouse would be preserved in line with prevailing industry requirements; with the warehouse operator (i.e. the issuer of the WR) guaranteeing the quantity, quality and presence of the commodity. This significantly reduces the risk faced by buyers or potential financiers (Pauw, 2015, Mimeo).

² The EACWSE is governed by Public Enterprise Proclamation No.25/1992 and the Warehouse Receipt System Proclamation 372/2003 - ECX webpage, 2015.

2.2 WRS utilization and performance

The objective of Ethiopia's WRS is to: provide a controlled storage space where producers can safely store their produce and reclaim their produce upon presentation of the WR issued at the time of deposit; increase access to finance through the use of the WR as collateral; provide a secure environment where buyers and sellers can trade their commodities by transferring the WR; and protect producers from price shocks by promoting efficient marketing of standardized products and financial activities (Proclamation No. 372/2003). Currently coffee, sesame, white pea beans, red kidney beans, mung beans, maize and wheat are eligible for warehouse receipting, with the exchange considering extending the list to include chick peas and sorghum. Coffee, sesame and pulses are mandated for trading solely on the ECX; The rationale for mandating these particular commodities is to discourage illegal trading in cross-border areas and to provide market information dissemination to the producers (The Capital, 15 Jan 2016).

Evaluations show that the WRS has faced challenges from the outset. High storage standards discouraged smallholder farmers and traders to participate (USAID, 2014a). Incidences of poor communication between the ECX members and their clients further eroded trust in the system. On the financing side, banks have not fully participated when requested to provide finance for WRs, despite agreeing to do so in principle. Various other constraints have also been noted, such as: the time-lag between the application for funds and the loan approval, during which time the market often moved significantly; liquidity limitations in rural areas; unattractive loan amounts (usually 60% of the value of the underlying commodity); storage duration at the warehouse; and the government bond purchase requirement (financial institutions are directed to procure central bank bills to the value of 27% of their loans and advances, see section 2.7) (USAID, 2014a).

In terms of the WRS' current provisions, coffee and sesame can only be stored in an ECX warehouse for 20 and 30 days, respectively, before being exported. The maize storage limit is 90 days, while storage periods for wheat and red kidney beans are not specified. The cap on storage times effectively undermines WRF, particularly for coffee and sesame. Even for maize, the limited storage time prevents owners of WRs from

presenting their stored commodity as collateral to access finance, or at least benefitting from seasonal price movements to cover storage costs and engage in temporal arbitrage.³ The storage limit appears to have been introduced as a deterrent to market speculation by traders, with full knowledge that this would likely curtail financing opportunities, as is evident from this 2016 interview with the Chief Executive Officer of the EACWSE:



"An elongated storage time also has its own risks. Sometimes, commodity suppliers get involved in price speculation and hold off from selling their commodity for a long time, but at times prices react to the contrary; and suppliers would sustain huge losses. So, we decided that the traders should sell their commodities within twenty days [in the case of coffee], which would in turn encourage export and minimize contract defaults. Hence, implementing a warehouse financing system in our context is a bit problematic. This has restricted financiers' enthusiasm to engage in the system. For credit providers to make a profit there needs to be sufficient lending time."

(The Reporter, 2016)

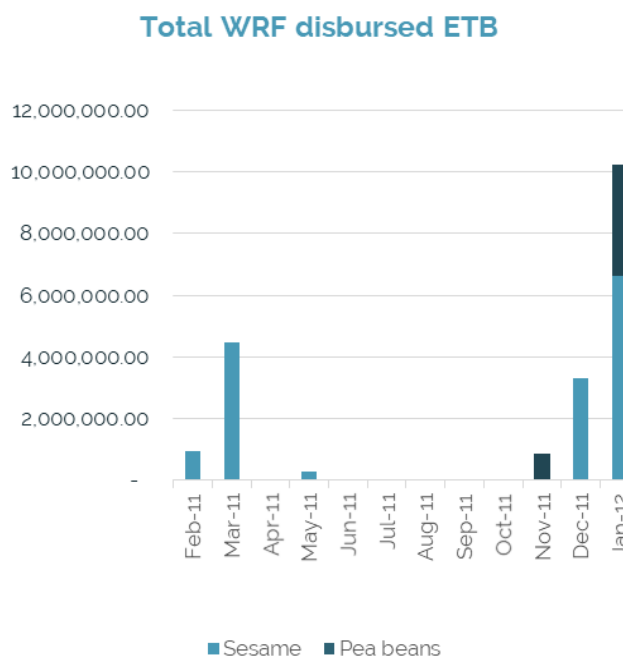
The lack of participation by producers, traders and financial institutions is evident when looking at the actual utilization of the WRS. To date only sesame and pea beans have been financed on the WRS, and only during 2011 and 2012. During this period 42 borrowers pledged 122 WRs in total, and a total of ETB 25 million of finance was disbursed. Sesame receipts made up 1,820 metric tons (mt) while the remaining 982mt was for

³ Temporal arbitrage refers to the tendency of traders to store goods from one time period to a later period whenever the expected increase in price between the two time periods is large enough to cover the full cost of storage, including a normal profit and risk premium.

white pea beans (Figure 1). In value terms, the average percentage gain by storing was a meager 1.3 % over the course of a season, while 38% of WRs actually lost value (Thomas, 2012). The market analysis in Section 3.2 reflects further on the potential to benefit from seasonal price differentials.

The lack of participation in the WRS does not appear to be linked to storage capacity constraints: evidence suggests that ECX warehouse capacity seems to be sufficient, and utilization rates at wheat and maize facilities are actually quite low. But if WRF is to be revived, and storage periods for commodities increased, the adequacy of storage facilities will need to be reassessed. Also, as discussed further below, the ECX should consider the possibility of accrediting privately owned facilities to participate in the WRS.

Figure 1. Warehouse receipt finance disbursements (ETB): 2011-2012



Source: ATA (2017)

2.3 The AGP-AMDe roadmap: recommendations pertaining to the WRS

Following a review of the Ethiopian WRS in 2014, the Agricultural Growth Program-Agribusiness and Market Development (AGP-AMDe), funded by USAID, made several recommendations on how the WRS could be strengthened. It has been three years since these recommendations were made, and in light of the momentum of the ACC's, and relevant initiatives such as the Cooperative Storage Plan (CSP), it is useful to revisit the recommendations and assess the progress made since:

2.3.1 AGP-AMDe Recommendation: Expansion of the WRS operated by ECX to cover more commodities and stakeholders

It is evident that current utilization of the WRS is well below par, especially considering the past investment in the system. The general association of the ECX with export crops has left behind the advancement of financing modalities for traditional food crops, such as

maize, wheat and tef.⁴ For the WRS to achieve its goals of increased access to finance, protecting producers from price shocks and promoting efficient marketing of standardized agricultural products (Proclamation 372/2003), information about the benefits of the WRS and WRF needs to permeate actors at every stage of the various commodity value chains. An aggressive sensitization program from the ECX could address this.

Looking at examples from South Africa and Malawi, the successes of both their WRS lie in expanding warehouse operations to all potential actors; including primary cooperatives, cooperative unions, private sector actors such as malt plants and feed lots, traders, aid organizations and investors. Increased participation brings about economies of scale, making insurance, finance and storage costs more affordable. Furthermore it leads to exchange market liquidity,⁵ which in turn encourages market stability (Pirrong, 2014).

⁴ International Finance Corporation (IFC) first year operational review recommends focus to be shifted to wheat and maize, Thomas 2012

⁵ A market is considered to be liquid if stock can be bought or sold rapidly with minimal impact on the price of the stock. A liquid market is more attractive to financiers as they can enter or exit the market with ease. A liquid market also encourages the use of the market as not only a tool to trade commodity, but to hedge risk.

During the initial stages of the Ethiopian WRS (2003) there was apparently no capacity or interest from private warehouse operators to join the system. A number of traders and warehouse owners—mainly operating in the coffee, sesame, maize and haricot value chains—were consulted and trained, but none showed particular interest in active participation. A likely reason, stated at the time, was fear that the WRS may not be as lucrative as expected due to low liquidity. In the pilot phase of the WRS (2003-2008), the EGTE, being a government parastatal, was subsequently selected as warehouse operator. Thereafter during the ECX phase (2008-2015) there was no intention to involve the private sector as service providers and the ECX system only permitted the use of warehouses under its own management.

Under the Warehouse Receipt System Proclamation 372/2003 *'A share company, a private limited company or a public enterprise complying with the requirementsmay apply to the Ministry or to a regulatory organ delegated for this purpose by the Ministry to be registered in (the) commercial register as (a) warehouse operator.'* One of the requirements to be fulfilled is a minimum capital requirement of 1 million Ethiopian Birr. This has been and continues to be an obstacle for the smaller warehouse operators. If the capital requirement could follow a sliding scale, by which the storage volume of the warehouse determines the capital requirement, the proclamation would be more inclusive and it would encourage more storage owners to join the WRS.

The WRS Proclamation furthermore states that *'The Ministry shall determine by directives the criteria which cooperative societies shall meet to register and operate a Warehousing business.'* Participation from the cooperatives will build trust in the system from the bottom up. Clear guidelines for cooperatives to join the system might increase their participation in the WRS. If cooperative storage space is accredited to issue warehouse receipts, then the cooperatives can become a 'one-stop-shop' for producers. Producers can purchase inputs, access market information, deliver grains for storage, access loans, sell grains, and negotiate with transporters.

Currently there are 29 Cooperative Union Members on the exchange, which is less than 10 % of the

total membership. These cooperatives can trade on the exchange but their warehouses are not accredited to issue ECX warehouse receipts. Discounted membership seats or rebates for trade volume could incentivize union participation. Tax rebates for grains traded on the WRS or for infrastructural investments in storage could further encourage participation. Unions could bulk producers' WR and offer these on the exchange, thereby attracting better prices through aggregation. These developments call for strong producer organizations with robust leadership.

2.3.2 AGP-AMDe Recommendation: Review, update and implement the proclamation that mandates the Ministry of Trade to implement and regulate the WRS, creating a strong licensing and regulatory body

There has been no review of the Proclamation since this recommendation in 2014. In early 2017 the ATA was tasked with the responsibility of reinstating the Proclamation, but at present the Ministry of Trade have requested ATA deprioritize this activity. A review of some of the chapters of the Proclamation No 372/2003 is important, so as to reflect the economic and business environment more than a decade after the Proclamation was first issued in 2003. In fact some of the articles, such as the performance bond mentioned above, have been debated for many years but need to be formally re-examined.

The articles relating to the specification standards of agricultural products, inventory management systems, the management capacity of storage operators, the inspection of storage facilities and licensing of storage facilities were implemented in 2015—when the ECX decided to separate operations between trade and warehouse operations. The government of Ethiopia established the EACWSE by Regulation 331/2014 to undertake the warehouse and quality operation. EACWSE became operational in October 2015 with a mission to provide an 'innovative warehouse management service to customers and stakeholders through the application of best practices and available technologies'.

Recently it has been decided that the EACWSE remerge with the ECX, effective 1 July 2017. This follows the dissatisfaction of market actors with the EACWSE's services. Traders specifically mentioned the decline of quality and quantity of products and services (The Capital, 17 April 2017). There have been no further details as to how the warehousing operations would function again within the ECX. If the ECX and EACWSE remerge as predicted in July, the void in warehouse management regulation and oversight remains to be addressed. The current situation begs for a joint review of all the proclamations⁶ with the

⁶ The Warehouse Receipt Proclamation No 372/2003; The Exchange Authority Proclamation No. 551/2007; EACWSE Regulation 331/2014; Investment Proclamation No. 769/2012; Public Enterprises Proclamation No.25/1992

objective of creating a robust regulatory organ that can restore the integrity of the WRS. An investigation into any incompetence or misconduct at the EACWSE also needs to be made public so that the ECX can address issues and rebuild trust in the WRS.

2.3.3 AGP-AMDe Recommendation: Capacity development of WRS actors and stakeholders

The principle stakeholders in the WRS are depositors/borrowers, warehouse operators, financial institutions and the Exchange itself (USAID, 2014 (a)). Each of these stakeholder groups have specific capacity development needs in order to effectively carry out their duties as they pertain to the WRS and WRF, and these needs have to be clearly defined. The AGP-AMDe review (USAID, 2014 (a)) lists the following general capacity requirements: contracts and arbitration, warehouse operation and collateral management, commodity handling and grading, warehouse receipting, warehouse regulation, exchanges, clearing and settlement.

Depositors: These include clients that deposit commodities at designated warehouses. It could include smallholder farmers, cooperatives, unions, traders, private sector processors, or exporters. The following capacity requirements are applicable: financial literacy, market information understanding, grading standards, communication systems, client rights, arbitration, and compliance.

Warehouse operators: Operators require capacity building in compliance to quality standards, best practices for grading and storing grains, WR issuance, inventory management, structural compliance, insurance, and compliance with exchange rules and regulations.

Financial institutions: These include banks, MFIs, Rural Saving and Credit Cooperatives (RUSACOs) and possibly private investment funds. Capacity indicators for this

group include: innovations in finance, accessibility to clients, 'know-your-customer' laws, and directives governing the sector, compliance, ICT innovations and financial reporting. This sector also includes Clearing Banks who need capacity building in compliance, risk management, financial reporting, money laundering and legislation.

Exchange: This institution requires capacity building in trading, compliance, risk management, marketing, ICT, market information dissemination, arbitration, product innovation, training, financial reporting and legal capacity. Its members in turn require capacity in: financial service delivery, compliance, improved communication with clients, risk management, financial reporting, and legislation governing the sector.

Capacity building should be an ongoing activity. Individual group trainings as well as larger stakeholder meetings are necessary. There should be a platform where market actors can make recommendations and voice concerns. Participation from all sectors builds trust and committed cooperation.

2.3.4 AGP-AMDe Recommendation: Stock-taking of the number, quality and capacity of warehouses in surplus production areas for strategic planning and capacity intervention

Table 1 confirms that most grains continue to be stored on-farm. If the WRS is to be sustainable some of the 89% of on-farm storage needs to move to formalized storage. Sensitization at smallholder farmer-level should focus on the benefits of credit and post-harvest loss reduction, as well as increased bargaining power through community aggregation.

Prior to launching the Cooperative Storage Plan (CSP), see details below (Section 2.4), the ATA did not undertake an extensive assessment of existing storage facilities. Apparently there was also no storage capacity

Table 1. Assessed storage capacity in Ethiopia, by storage owner

	National Storage Capacity ('000 tons)	Share of Total Capacity (%)
Ethiopian Grain Trade Enterprise (EGTE)	820	3
Emergency Food Security Reserve Administration (EFSRA)	322	1
Private traders	300	1
Primary cooperative	1,705	6
Cooperative unions	187	1
Farmers	25,950	89
Total	29,284	100

Source: Minot et al. 2015

assessment conducted prior to the selection of the ACC *woredas*. Stock-taking of the storage availability and analysis of crop production, and, importantly, the volumes traded is necessary in order to have a better understanding of storage needs (or even potential needs) as the agricultural sector becomes more commercialized.

2.3.5 AGP-AMDe Recommendation: The Government should treat WRS as a priority and promote private sector investments in a warehouse receipts infrastructure

Several of the Ethiopian Agricultural Transformation Agenda deliverables for the commercial orientation pillar of GTP II are directly addressed (or will be strengthened) through an efficient WRS. They include: provision of market services and infrastructure; promoting aggregation and storage use and availability; and fostering agro-processing, value addition and exports. The private sector is expected to be pivotal in the transformation from subsistence to commercial farming (ATA, 2017).

WRS infrastructure refers to several possible areas of investment engagement; including actual warehouses,

warehouse management, transport infrastructure, and warehouse grading and measuring equipment. It also refers to WRF infrastructure, including investments by banks and MFIs to increase their (rural) footprint.

Article 39 of the WR Proclamation refers to the Investment Proclamation: *'Tax Holiday and Other Investment Benefits: ... domestic and foreign investors engaged in the business of providing warehousing services for agricultural products may avail themselves of the benefits due to investors engaged in pioneer investment activities in accordance with the relevant provisions of the Investment Proclamation.'* The Investment proclamation was amended in 2014 to include the *'industrial development zone'*. In the Investment Proclamation it is not clearly outlined what a 'tax holiday' would equate to, but it would be worth revisiting tax breaks for investors—not only in infrastructure but in warehousing and financial services too. Clear directives on tax breaks, export restrictions and foreign exchange controls are needed. An Ethiopian storage investment plan similar to that undertaken in Malawi (see Box 1) could incentivize private sector investment in warehouse infrastructure.

Box 1. The Agricultural Storage and Investment Facility in Malawi

Scaling up WRS through investment in storage infrastructure

The Agricultural Commodity Exchange for Africa (ACE) in Malawi identified an opportunity to scale up the WRS through investment in storage infrastructure, and with the technical support of the USAID Southern African Trade and Investment Hub (SATIH) the Agricultural Storage Investment Facility was launched. Multiple Development Finance Institutions (DFIs) showed keen interest when the concept was pitched, leading to two parallel investments being developed with a respective focus on commercial and rural warehousing. The commercial warehousing investments have been facilitated and the risks taken on fully without the requirement of donor funding. The European Investment Bank (EIB) has engaged with the National Bank of Malawi (NBM) to establish a US\$35 million facility for the development of storage infrastructure. This has now been signed, and disbursements are understood to be imminent. Each investment is capped at \$5 million, at a fixed interest rate of 7.5% for a seven year period. Investment is made on the condition that new infrastructure is fully integrated into the WRS and that all storage facilities are open to third party depositors.

Key elements:

- Keen interest from private sector to invest in both rural and urban storage infrastructure
- Bottleneck is limited access to finance; credit limits were absorbed by operational expenditure, urban facility development and investment in processing equipment
- Private sector willing to allow third party depositors to access the new infrastructure, and thus the WRS, if ACE were able to facilitate access to competitive finance
- ACE received technical assistance from the USAID Southern African Trade and Investment Hub
- ACE worked with SATIH, and latterly the USAID Feed the Future Programme, Agricultural Diversification (AgDiv) to work end-to-end in setting up the investments: needs assessment; investment analysis; pipeline development; financier solicitation; product structuring; due diligence support; and post-signature administration

Source: EIB (2016)

2.4 Agricultural Commercialization Clusters and the WRS

The Transformation Agenda Deliverables are due to be operationalized in the Government of Ethiopia's ACCs, an 'Anchor Initiative' which provides a strategic and commercially viable platform for the development of priority agricultural commodity value chains through a geographically focused approach. The platforms enable the implementation of multiple priority interventions for agricultural transformation-led growth and rural transformation. The primary goal of the ACCs is the commercialization of smallholder agriculture and agro-industrial development, offering a strategic entry point for private sector engagement. During the first stages of GTP II the ATA will support these clusters in two major areas: increasing crop production and productivity, and enhancing market linkages. The ACC provides a mechanism for aligning various donor and government interventions and engaging smallholder farmers in a coordinated manner (see Figures 6-9 in the Appendix).

With a focus on ten major commodities, the ACCs *'aim to develop integrated, end-to-end, geographic value chains supported by vibrant stakeholder alliances to enhance commercially driven output production and processing of high-value crops, thereby offering a consistent supply of sufficient quality, raw materials for processing and value addition'* (ATA, 2017). Specific objectives are to: (i) drive specialization, diversification and commercialization of smallholder agriculture in priority value chains; (ii) enhance production and productivity, quality outputs, aggregation, value addition and market linkages; (iii) promote an integrated platform to implement multiple priority interventions across the value chain and across sectors; and (iv) improve focus and coordination among public sector, private sector, donors and NGOs (ATA, 2017).

During the first phase of GTP II the focus will be on seven of the ten commodities. ACCs have now been created in four regions. In Oromia the initial focus of the ACC initiative included nine clusters, with the focus on four of the key commodities: maize, wheat, tef and barley (Figure 6). In Amhara there are 16 clusters (Figure 7) and in the first wave of the pilot project six clusters received support from the ATA. These six clusters include seven of the key commodities: wheat, tef, barley, sesame, horticulture, honey and dairy. Tigray includes four major commodity clusters: wheat, tef, sesame and horticulture (Figure 8). Finally in the SNNP region, six clusters have been identified with five

primary commodities. In the past year four of these commodities were supported by the ATA: wheat, tef, haricot and apiculture (Figure 9). In this study relating to the WRS the focus is on four cereal crops, namely maize, wheat, tef and barley. These are prominent in all four clusters. Although these crops are primarily grown for own consumption, or possibly the domestic market as opposed to the export market, the ACCs are integrated with other geographically focused initiatives, such as the integrated agro-industrial parks (IAIPs) and the Livestock Master Plan (LMP) (see Figure 2); and as such these crops can become more prominent in value-addition activities and/or in the export market. There are several benefits to introducing the WRS to the ACCs. First, WRS assures quality of produce and same-standard commodities. Second, the WRS promotes market linkages through a common marketable instrument, the WR. Third, value addition can be improved through increasing finance availability in the value chain through WRF. Finally, the WRS facilitates aggregation. It is envisioned that the IAIPs will create demand sinks for the ACCs: Off-taker agreements with IAIP-linked processors can serve as guarantees to the banks for providing WRF to producers (See section 2.7.) The WRS also fosters aggregation of same standard commodity. The LMP will link to the ACCs through supply of beef and dairy and also commodities for feeds-inputs.

The ACCs are also linked to another ATA initiative, the Cooperative Storage Plan (CSP). The pilot phase of the CSP aims to increase storage capacity of four Farmer Cooperative Unions (FCUs) by supplying each with a 3,000MT warehouse. These four warehouses are to be served by 40 Primary Cooperatives (PCs) warehouses with a capacity of 500MT each. The selection of the sites was based on various criteria, including that it should serve at least one AGP or ACC *woreda*, and should focus on tef, maize and wheat output marketing. With newly built warehouses that adhere to physical and managerial standards it is an apt time to introduce WRs to the cooperatives. Only 12.7% of grain produced by smallholders is currently marketed, and only 10% of the marketed maize is sold through cooperatives (ATA, 2017). A profitability model for each warehouse would assist cooperatives and unions to make key decisions regarding storage rates and marketing. A further suggestion would be to link a credit supplier (MFI or bank) to each store.

Figure 2. ACC integration with IAIPs and the LMP

	Agricultural Commercialization Clusters (ACC)	Integrated Agro Industrial Parks (IAIP)	Livestock Master Plan (LMP)
Background	<ul style="list-style-type: none"> Designed to strengthen prioritization and focus, and provide strategic platform to effectively execute multiple integrated interventions for commercializing agriculture 	<ul style="list-style-type: none"> Adapts food park and industrial zone concepts to catalyze large investment in industries for processing and value addition of agricultural inputs 	<ul style="list-style-type: none"> Defines vision and strategy for sector through three 5-year development plans for key value chains and production systems: Red Meat, Chicken Meat, Milk, Eggs and Feeds
Approach and main features	<ul style="list-style-type: none"> Clustering of woredas to support rapid enhancement of priority crops, horticulture and livestock and value chain through proximity of actors Ultimate focus on processing and value addition to ensure specialization, diversification and sustained growth Staged approach to value chain development 	<ul style="list-style-type: none"> Heavy focus on provision of basic and agro-processing infrastructure development, shared services, and investment incentives Rural Transformation Centers (RTC) surrounding Parks ensure minimum level of input aggregation and primary processing, while providing services to farmers 	<ul style="list-style-type: none"> Driven by agro-ecology and crop-livestock zone typology Clustering around: feedlots around sugar and large-scale crop and oilseed processing, feed production from milling and agro-industries, milk sheds (ie. high production area with processing/ market hub), forage production, and livestock processing plants
Size and funding required	<ul style="list-style-type: none"> 25 Clusters of 5-15 woredas Limited public sector funds needed ~\$100M from private sector investment in first 5 years 	<ul style="list-style-type: none"> Four 500 acre parks w/ ~25 RTCs Secured funding from Italy, UNIDO Very large public and private investment required 	<ul style="list-style-type: none"> Size varies by end-product ~\$200M investment from public sector, ~\$165M from private sector in first 5 years

Source: ATA (2017)

2.5 Community WRS: Successes and challenges

The Community Warehouse Receipt System (CRS) was initiated by the AGP-AMDe – in collaboration with the ATA – as a WRS for the first level of the value-chain. As such the CRS pilot was designed with only one group of beneficiaries in mind, smallholder farmers. Through storing their grains the farmers could pledge a Goods Received Note (GRN) and access bank loans. This would enable them to access much-needed funds shortly after harvest time without having to sell their produce when the market was at its lowest point (USAID, 2014a). The system addressed many of the shortfalls of the Ethiopia Commodity Exchange Warehouse Receipts System (ECX WRS), such as the loan duration, cost of loans, proximity of farmers to storage facilities and quota restrictions at the aggregation points.

The strength of the CRS lies in its community ownership. Community officials and cooperative promotion agencies regulate, certify and inspect the system, and

grievances are addressed at community level. By bringing the system to the *woreda* or community-level, accessibility by smallholders is greatly enhanced. Successes include solving institutional deficiencies and ensuring financial inclusion. The CRS furthermore provided a marketplace with a transparent pricing mechanism for both buyer and seller (USAID, 2014b). Insufficient warehouse space has been noted as a constraint in the CRS pilot however, and, as mentioned earlier (section 2.3.4), a detailed nationwide study of available storage—regardless of ownership—is much needed at the initial levels of the value chain. This would better inform initiatives such as the CSP, or a storage investment plan (see 2.3.5 Box 1), as to where to tap into markets where a storage deficit exists.

With rice production in the Fogera *woreda* (Amhara region) increasing consistently, a recent feasibility study for another community warehouse receipt pilot aims to draw on the successes of the CRS (Tilahun, F.

2015). According to the feasibility study, a survey of local producers suggests that local traders aggregate 80% of the total rice produced, 10% is sold directly to processors and only 1% is aggregated by cooperatives. A CRS could empower these producers to hold onto their rice longer or to enter into a forward contract (see 2.7 Box 2) with a rice miller. It will be important that the proposed pilot does not exclude traders from the system: Traders are familiar with the market and have effectively been aggregating rice in the region. Rather than exclude traders, empower them by allowing them to store commodity on WR and also access finance to purchase more rice. And simultaneously empower producers by keeping them informed of market prices. Operational matters such as bagging and re-bagging,

independent scale calibration and moisture loss at different warehouses need to be addressed in fine detail; and need to be communicated to all the actors in the chain prior to launching such a pilot. Incentives such as post-harvest loss reduction and access to finance could promote storage at community warehouses, provided that actors have been well briefed prior to the launch.

The ECX has, over time, developed a sophisticated system for managing WR trade, settlement and stock management. This system could remain useful for a CRS for maize, wheat, tef and barley but would need to be refined to include operational particulars for different levels of depositors and storage operators.

2.6 Information Communication Technology (ICT) requirements

A vital element of a successful WRS is the development of reliable ICT systems. The ECX has state-of-the-art market information, trading and settlement systems. Market information is being disseminated to 12 ticker machines in major towns. To include smallholders in rural areas into the system, the market information needs to reach them daily. Systems for real-time dissemination of trade data through mobile phones have been successfully implemented in other developing countries, such as Kenya. More cellular towers and the development of mobile money applications is a necessary evolution for the WRS to reach all actors in Ethiopia. Disbursing large amounts of cash in rural areas is too risky and too time-consuming. Buy-in from the national telecommunications provider will unlock market potential for rural traders. Innovations such as solar panels and satellite connections could also be investigated. The number of sim-cards sold in Ethiopia is ten times lower than in neighboring Kenya. In a 2011 Research ICT Africa survey it was reported that only 18.3% of the population over 15 years of age owned a mobile phone compared to 74% in Kenya (Calandro et al, 2012).

ICT furthermore has an important role to play in accountability of market actors. Farmers can send their sell-orders to the FCU or broker via a mobile phone application. This leaves an audit trail and brokers are held accountable. ICT applications can also track and monitor WRs in real-time. Banks can make use of such a platform to evaluate risk of financed receipts. Applications for loans through the mobile network can radically reduce the turnover time between loan application and loan approval. Last but not least, the application of ICT in warehouse operations is paramount to successful storage operations. All of these applications can be customized to meet the needs of the various actors in the value chain.

Although all the actors in the WRS should be interconnected through the ICT platform, they should have their access limited to the functionalities of the ICT system relevant to them: Having technologically complex clearing systems at the warehouse door will serve no purpose, just as a store managers' timesheet will have no relevance at the clearing bank.

2.7 Financial institutions and WRF

The financial sector in Ethiopia is highly regulated: The sector is closed for foreign companies out of concern that such banks might dominate the sector. This closure results in limited competition in the Ethiopian banking sector and it also curbs much needed capital inflow and foreign exchange access. The closure of the financial sector to foreign banks has further impeded capacity building in banking technology and skills (Zwedu, 2014).

Although banks are becoming increasingly risk-averse, managing production and supply risk is central to arrangements such as contract farming or the provision of upfront loans for inputs. Marketing and price risk pertains more to the off-takers. Government policies, particularly those relating to directives on export restrictions, stabilizing and fixed prices controls, and foreign exchange controls, are also potential risk factors. Natural disasters, such as the recent and ongoing droughts in many regions of Ethiopia, also increases finance risk. Ethiopian banks are also perceived to be especially averse to agriculture finance risk due to their lack of expertise in agriculture finance (Abebe, 2016).

In terms of settlement (the process whereby a buyer makes a payment and receives the agreed-upon commodity), the ECX has established successful relations with eleven banks, while for WRF the ECX has signed agreements with six commercial banks (one government and five private banks). However, due to various restrictions WRF has not taken off. Only the Commercial Bank of Ethiopia (CBE) has entered the WRF business so far.

First and foremost is the challenge of the government's debilitating bond purchase requirement. The bond purchase requirement stipulates that private commercial banks (this excludes CBE) and MFIs have to purchase central bank bills to the value of 27% of their loans and advances. These bills yield 3% and maturity is five years. If this requirement could be exempted for WRF it would likely increase banks' willingness to invest in the WRS (Thomas, 2012).

A second issue regarding agriculture finance is the law that a cooperative chairman or director cannot apply for a bank loan of more than ETB 100,000 without calling a general assembly and getting express permission from the members to do so. This constraint could be remedied by bulking FCU member loans: The bank would then make a single disbursement to the FCU and the disbursement is electronically attached to each of the individual WRs. The FCU would thereby relieve the bank of the cumbersome management of many

individual loans and enable the FCU to facilitate finance to their members. This model will also increase trust in the system as smallholders deal with a known entity, the FCU. The bank would validate the existence of each WR through the online WRS prior to disbursing the funds to the FCU. Throughout the process the bank can monitor payments online through the ICT platform. This system could also be applied to bridging finance for MFIs: The bank could supply bridging finance to the MFI based on the existing WRs already in storage. This eases liquidity issues for MFIs and strengthens marketing options for FCUs. At grassroots level it is important that banks' and MFIs' loan officers understand the instruments that their institutions are offering, and facilitate financial literacy training to FCUs and smallholders.

Non-compliance and lack of insurance are notable challenges in agricultural finance in developing countries. This is where Export Credit Agencies (ECAs) can fill gaps in the provision of finance. In Africa there are currently three ECAs operational. One of the three, the Africa Trade Insurance Agency (ATI) was established in 2001 and is headquartered in Kenya. In 2016 the African Development Bank financed Ethiopia's membership to the ATI (ATI, 2016). The World Bank supports the ATI and it is a fully-fledged underwriting insurance company. ATI can serve the Ethiopian market by underwriting trade credit, facilitating finance for trade and investment and reinsuring local insurance companies for special categories of risk (ATI, 2016).

A further issue in agricultural finance in Ethiopia has been the time delay between the application and approval of a loan, which has contributed to losses incurred in WRF. The average delay is six days and in 38% of cases of WRF the borrower incurred a loss (Thomas, 2012). The application-to-approval lag attributed largely to this loss. Initially the CBE required 12 different documents prior to loan approval, but this has been reduced to ten. It is understandable that banks want to attempt to mitigate risk and as such the market will need to be patient. The process will become more streamlined as the system evolves. In the meantime FCUs and PCs can assist banks by providing or collecting all the necessary documents from potential borrowers prior to the harvest (Loan facility application before the harvest season in November was a recommendation in the IFC first year operational review of the ECX).

A notable factor in agriculture finance in Ethiopia is that the focus has been on export crops; therefore finance instruments have been developed around export

facilitation and not around the key cereals investigated in this study. Building banks' capacity in the agriculture finance division, and creating finance products within a holistic value chain finance approach and application of ICT innovations, can allay banks' reluctance to venture into new products.

CRDB Bank in Tanzania managed to cut the interest rates for its warehouse receipt finance product to just 4%, according to Bohay Nicomed, senior manager agribusiness and syndications. It does this by wrapping it inside a wider value chain finance solution under which it uses letters of credit to finance the purchase of farmer inputs from suppliers in Europe. These suppliers offer six months of credit at very low rates, allowing CRDB to effectively 'import' Europe's low interest rate environment into Africa, he says. Introducing electronic payment solutions for farmers has also helped to reduce the bank's costs.
(Castell, 2014).

Ethiopian banks have not yet aggressively extended their coverage in the agriculture sector. It was reported that commercial banks were mostly lending to existing customers: 80% of the loans that CBE disbursed against WRs were made to existing clients (Thomas, 2012). Banks could increase business by tapping into many other financing needs of value chain businesses beyond credit supply. Diversifying financial products to include crop, weather and even health insurance could spread risk across many value chains and producers (Rutten et al., 2014). Financial institutions need to examine the value chain relationships and make decisions based on third party agreements, such as the Repurchase Agreement or Forward Contract (Rutten et al, 2014) (see Box 2).

One of the benefits of a WRS is that it potentially reduces market risk by ensuring that the market is trading standardized commodities, thereby increasing market liquidity. If markets are liquid, that is, large volumes are being traded, it allows participants to buy and sell with ease, while individual traders are less able to contribute to price volatility by trading at above (or below) market prices. This makes for more stable markets (Pirrong, 2014). If the value chain—from the producer to the end-user—uses the WRS, then banks can offer innovative products and services tailored to the needs of each stage, resting assured that the entire chain is based on the same underlying secure instrument.

Some financial institutions require third party collateral managers to oversee storage facilities where the financier has exposure. The high cost of such third party managers has to be absorbed in the finance cost and this diminishes the potential profit of the receipt owner. This hurdle could be overcome by allowing chain partners to take on due diligence, monitoring and enforcement (Isuekebhor, 2014). A suggestion to reduce collateral management costs would be that the inspection of warehouses is overseen by community officers in the first tier of the WRS, which is at Primary Organization (PO) level, and thereafter the local branch of the financing bank or MFI, at FCU level, and lastly when it comes to the larger aggregation centers (ECX, Food Security Agencies, Cooperative Storage Program, private sector processors), third party collateral managers could be introduced. In this way finance can become part of a holistic value-chain approach based on the WR as underlying instrument.

Box 2. Forward contracts

What is a forward contract?

A forward contract is a non-standardized agreement between two parties to buy or to sell an asset—in this case, an agricultural commodity—at a specified time in the future and at a price agreed upon today. The forward price is typically calculated by adding the financing, handling and storage cost to the spot price, that is, the price at the present time when the forward contract is agreed to. Forward contracts in Malawi have been successfully entered into between producers and processors in the soya bean and maize markets. Forward contracting provides an added layer of security to lenders through an off-taker agreement signed between the processor and the end-buyer. Processors can provide timely management of their inventory and hedge their price risk, while creating a market for smallholder producers that links them into an organized value chain and allows them the option to benefit from deferring the sale.

2.8 Private sector

Currently international private companies are not members of the ECX and are not trading on the ECX platform (ECX website). Should these investors be allowed to become members and should the WRS include the commodities that are processed by these companies, it would add much needed volume and liquidity to the market. Interviews with private sector investors have made it clear that a well-functioning WRS would be beneficial for procurement of standardized commodities. It could increase liquidity and thereby stabilize the market. Purchasing standardized commodities from accredited warehouses where stock is graded and insured would reduce operational risk for these private sector players. A concern however is the potential cost of this benefit. Furthermore (as with financial institutions) these companies are concerned with government policies—particularly relating to directives on export restrictions, taxes, price stabilization and foreign exchange controls—which are a hindrance to investing in agriculture in Ethiopia. If these constraints could be addressed, private sector would be supportive of a WRS that would enable them to secure produce and hedge market risk.

As an example, a multinational brewery has had great success in Ethiopia in introducing seed and increasing productivity of barley producers, alongside government extension programs (Confidential personal communication, 27 May 2017). The capacity of Ethiopia's malting plants, however, is proving the

chief constraint to increased production of beer. A potential modality for increased investment in the malting plant—and hence increased malting capacity—would be to register malting factories as accredited warehouse operators (see Box 3). This would address credit constraints of malting facilities and free up credit lines to increase malting capacity. The risk would be overseeing the collateral management. There is a high risk of the malting factory malting the barley prior to the ownership being transferred. This risk could be mitigated by the double lock system. Malting factories could be included in a storage investment plan (see Box 1). Malting factories would also be under pressure to address the alleged inefficiencies in order to be considered into the WRS. This could benefit the barley sector greatly.

A second example is a leading poultry producer that processes 3000MT of grains per month and is planning to increase feed production (Confidential personal communication, 1 June 2017). Of this tonnage 60% is maize, 25% is soya cake and the remainder is made up of wheat bran and fillers. The above forward contract procedure could be applied to the poultry industry with an off-taker agreement between the poultry producer and the poultry buyer as a guarantee presented to the financing bank. A forward contract system could benefit private sector participation in the WRS and unlock finance to suppliers.

Malting Factory Example

1. The malting factory will provide an acceptable guarantee of payment for contracted amount to the financing bank. The bank has to approve this guarantee. The guarantee will vary depending on the credit assessment of the brewery
2. The Exchange will facilitate the calculation of a forward price which will be based on the spot purchase price:
Forward price= Spot price+Storage cost+Finance cost+ECX commission
3. If the depositor opts to sell to the forward market (to get the best price) they will receive a WR and forward contract
4. The ECX can then 'lock' the receipt (i.e. flag it as untradeable) in the system and issue the forward contract between the supplier and the malting plant. The WR number will be noted on the forward contract and the receipt will not be valid for trade as it has been 'locked'
5. The depositor can now request finance with the receipt, forward contract and payment guarantee from the processor as security
6. Thus instead of 60% of collateral financing (as the bank has financed sesame and pea beans in the past) the bank can now finance up to a 100% (discount the contract). The amount the depositor can receive will be:
Discounted price=Forward Contract price-Storage cost-Finance cost-ECX commission
7. The seller may also choose not to take full financing and thus save on the finance cost
8. The ECX can supply the forward contract and corresponding WR to the financing bank and the bank can issue payment to the depositor on the day the forward contract is signed between the supplier and the processor
9. When settlement date arrives (i.e. the forward contract maturity date):
 - a) The Brewer will deposit the full forward price into the ECX Settlement account
 - b) ECX will pay the malt factory for storage charges incurred
 - c) ECX will settle outstanding finance to the financing bank
 - d) ECX will hold back its commission at the rate agreed upfront
 - e) If depositor took full finance the balance on the WR will be zero
 - f) If depositor took part-finance the balance will be disbursed to the depositor
 - g) Finally ownership of the WR will be transferred to the brewer
10. The financing bank may inspect the storage facilities at any time to audit the stock which has been financed

Note that interest on this transaction should be fixed upon disbursement

3. PRIORITY COMMODITY MARKET ANALYSIS

3.1 Technical assessment of storability

In many countries throughout the world maize, wheat and barley are successfully stored. In Ethiopia tef is stored successfully throughout the season due to its low moisture content, which is an important factor for storability (Minten et al., 2016). All four of these commodities are known to be successfully stored for at least one season and the technical capabilities required are attainable.

Sesame, one of the ECX mandated commodities, is however more complex to store due to difficulty in airing the small seeds. Storage longevity can vary from 6–20 months depending on the air temperature and the relative humidity, both factors that influence moisture content. If the seed is too moist it can heat up and become spoilt. It is therefore important that seeds be dried before storing (Kumar et al., 2016). Haricot beans, like other dry beans, can be naturally dried as long as the relative humidity is at an optimal level. Over-drying increases the chance of cracking and handling damage; if it is dried too slowly the risk of mold and insect invasion increases (Alberta Pulse Growers, undated).

Should the WRS be extended to include beef, dairy and horticulture, a detailed study of physical storage

sites as well as the management capacity required is recommended.

Training of warehouse staff in basic warehouse management techniques at primary cooperative (PC) level will be necessary, and intensive training of producers to understand factors such as moisture loss calculations and quality specifications will ease problems at delivery time.

In order for a WRS to be successful storage operators not only require training, but ongoing monitoring of their operations is essential. It is important to weigh the cost of training and monitoring warehouse operators against allowing international collateral managers, some of whom are already active in Africa⁷, into the system. This is where a tiered approach could become more feasible, meaning a WRS comprising of different levels. More basic services and capacities are needed at lower tiers such a POs and more complex services and capacities at the end-user level (See Figure 5).

3.2 Price trends and seasonality ⁸

The price analysis is conducted using weekly wholesale price data for maize, tef and wheat for the period July 2011–March 2017. The database used is that maintained by the Ethiopian Development Research Institute (EDRI). For the purpose of the analysis data is aggregated at monthly level. Monthly wholesale barley prices were obtained from the Ethiopian Grain Trade Enterprise (EGTE) for the same period. Prices are recorded for about 20 markets across Ethiopia (see Table 2 in the

Appendix); including the Addis Ababa and Dire Dawa markets, fifteen markets in Oromia, six markets in Amhara, and one market each in Tigray (Mekele) and SNNPR (Hoseana). Not all price series are complete for these markets. As a rule of thumb, markets for which less than two-thirds of price observations were recorded (i.e. fewer than 46 out of 69 months) were dropped (see markets marked "X" in Table 2). Out of the 20 markets, 16 were retained for the maize market analysis, 17 for tef,

⁷ DRUM, Vallis Commodities and CMI have been successful in operating collateral management subsidiaries in many African countries

⁸ The author thanks Zewdu Abera (AKLDP) for data collection and cleaning as well as Karl Pauw (FAO) for the technical analysis in this section.

15 for wheat, and 8 for barley. Regional average market prices, e.g. for Amhara, Oromia 'West' or Oromia 'South', were computed.

3.2.1 Market correlation coefficients

Given the complexity of analyzing price movements in 20 markets across four crops, the first consideration was the extent to which markets in Ethiopia are integrated. If market prices are highly correlated within or across regions it is justifiable to conduct an analysis on the basis of regional or even national average market prices. A simple price correlation analysis was therefore undertaken by calculating correlation coefficients for various market pairs. The analysis started by considering market pairs within specific regions or sub-regions, i.e. (i) Oromia South, (ii) Oromia West (including SNNPR), and (iii) Amhara and Tigray. It then considered correlations at national level (iv) between regional market average prices and those of major markets such as Addis Ababa. Results are displayed in Table 3 in the Appendix. Correlation coefficients are not displayed for market pairs where either one or both markets have been omitted from the analysis (i.e. as per Table 2).

The results suggest that markets are generally well integrated within the sub-regions considered, with strongly positive correlation coefficients for all crops, particularly for tef, and to a lesser extent wheat. Maize market prices are less well correlated within sub-regions, possibly because the crop is grown primarily as a food crop for own consumption and is therefore less traded; except between markets that are in close proximity to one another (e.g. Debre Markos, Bahir Dar and Gondar in Amhara). Given the large number of missing observations for barley, there are very few market pairs that can be studied at sub-regional level, and hence no conclusions about market price correlation can be drawn.

At national level, Addis Ababa maize prices are highly correlated—particularly with those in Oromia, to some extent with those in Amhara and Dire Dawa, and less so for markets that are further away, such as Mekele or Hoseana. As expected, tef markets, and to a lesser extent wheat markets are well integrated nationally. Barley market prices are slightly better correlated with one another compared to maize, which perhaps reflects the more commercial nature of this crop. In summary, although this analysis is simplistic in nature—more sophisticated econometric methods for studying market co-integration are considered to fall beyond the scope of this study—it provides a useful overview of how market prices move together in Ethiopia. In terms of studying price trends and seasonality, it is evident that the national tef and wheat markets are reasonably well integrated, justifying further analysis based on national average prices only. Correlation coefficients are somewhat lower for maize and barley markets, but even

here trend analysis of national average prices would provide a reasonable indication of the kind of market trends that can be expected also at regional level.

3.2.2 Analysis of market price trends

Price volatility considerations lie at the heart of demand for storage. Prices of staple grains are typically low shortly after harvest and rise progressively throughout the selling season. Access to storage offers an opportunity to engage in so-called temporal arbitrage, i.e. procuring and storing grain when prices are low with the intent of releasing stocks again in the market when prices are high. The demand for storage will depend on the extent to which the seasonal price gain is sufficient to cover storage costs (including physical storage costs and operational costs of the trader), and the opportunity cost of capital (e.g. interest rates). As long as excess profits can be made through engaging in temporal arbitrage, demand for storage will increase; thus reducing the seasonal price spread by raising demand (and prices) during the immediate post-harvest season and raising supply (and lowering prices) towards the end of the marketing season. In a perfect market setting a breakeven point is reached once the marginal cost of storage (and finance) equals the (expected) temporal price spread (Brennan, 1958).

All crops considered in this analysis, i.e. maize, tef, wheat and barley, tend to be harvested around November to December each year, albeit with some variation depending on the particular season or the agro-economic zone in which the crop is grown. For simplicity it is assumed that the marketing season runs from January to December each year for all crops. Price data is available for five complete years (2012–2016). For all crops a price index is created for each year (January = 100) as well as an average price index, where each index value represents the average index price across the five years for any particular month. This allows for a simple visual comparison across years to see whether prices tend to follow a similar seasonal price path each year, and particularly whether there is consistency in terms of when prices tend to peak. Note that the indexes are created using nominal price data, i.e. no adjustment is made to account for inflation within a particular year.

The price indexes for maize are shown in Figure 3 (left panel). With the exception of 2012 and 2014, prices tend to stay relatively flat in real terms for the first four to six months of the year, and thereafter they tend to rise gradually. The year 2013 saw the greatest price rise, with September prices peaking at 36.5% (in nominal terms) above the January price. In most years the prices peak in September, although in 2014 and 2015 they peaked in July and June, respectively. In fact 2014 was an anomalous year, with prices dropping by almost 15% by the end of the year compared to the harvest season price. On average (see dashed line), prices peak in

September at about 13.5% above the January price in nominal terms, i.e. over a period of about nine months.

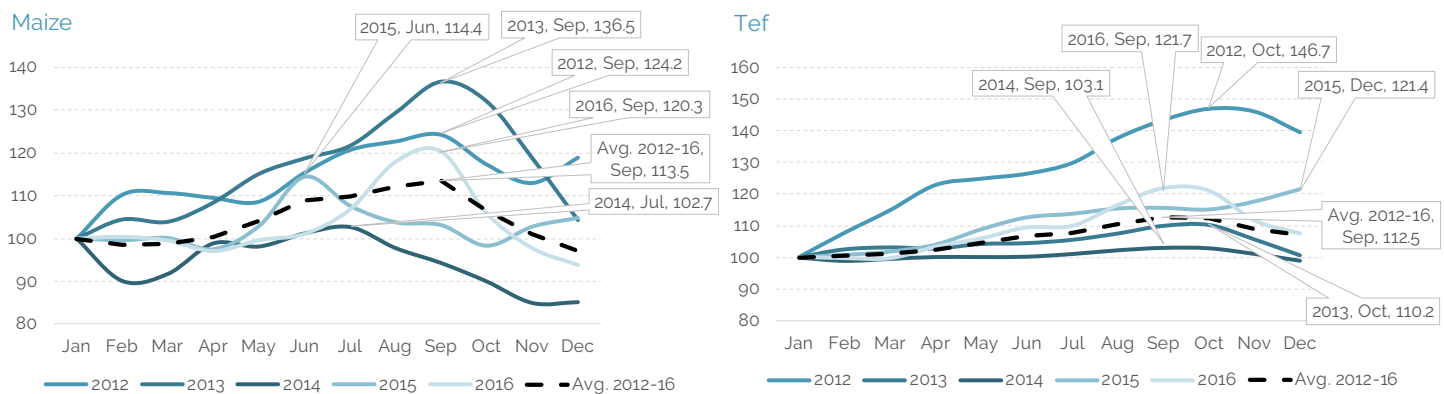
The seasonal price patterns for tef appear to be more stable than those for maize (Figure 3, right panel). The year 2012 was an anomalous year, with prices peaking in October at 46.7 % above the January price of that year. In other years the price peak, generally in September or October, ranged from 3.1 to 21.7 %, with an average over 2012–2016 of 12.5 % (September).

The wheat price indexes tend to be much more dispersed over time (Figure 4, left panel): in 2014 the price peaked in October at 36.7 % above the January price, while in 2016 the price never increased above the January index price of 100, instead declining to

reach a low of 80.6 in November that year. On average, however, wheat follows a similar expected path to that of other cereals, with a peak of around 14.2 % in September.

As is the case for maize, barley price paths are somewhat erratic from one year to the next, with peak prices reached anywhere between July and October of the 2012–2016 period (Figure 4, right panel). In several years prices also stay relatively flat for the first four months, while the average expected price gain is 10.7 % by September. The best performing year from a storage perspective was 2014 (27.23 % gain), although in some years (2013 and 2016) prices ended the year below the January price.

Figure 3. Price index of national maize and tef prices, 2012–2016



Source: Authors calculations based on EDRI/ETGE datasets

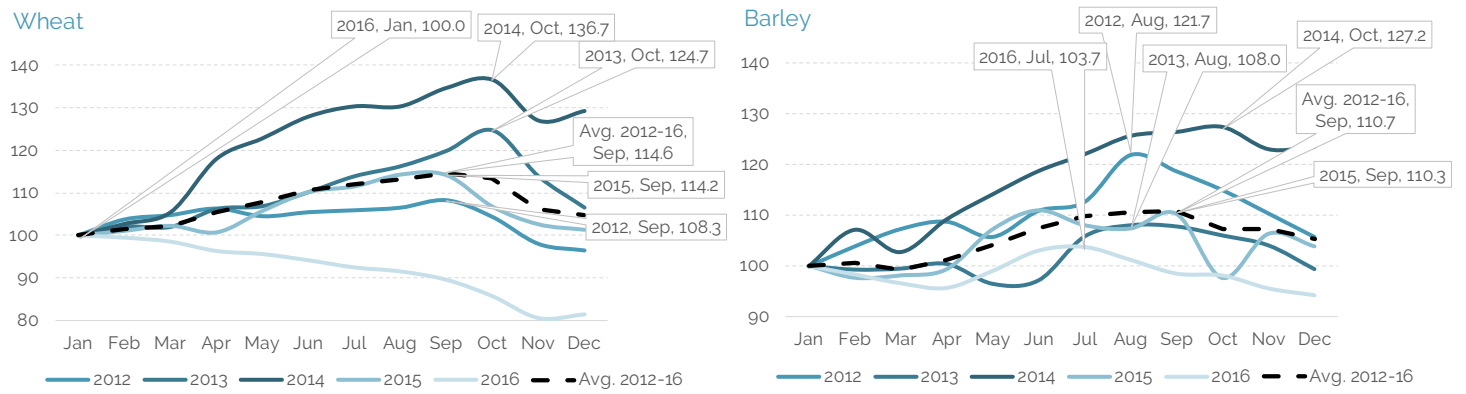
The above analysis reveals Ethiopia's major cereals tend to exhibit seasonal price patterns, with prices generally peaking around September each year; but at 11–15 % the average gain over a nine-month period is not very substantial, considering storage and financing costs as well as the eroding effect of inflation (Ethiopia's annual inflation rate has averaged 15.9 % during 2010–2015).

A more sophisticated analysis of price trends and seasonality, detailed results of which are omitted here for space considerations, largely validates the above findings.⁹ This analysis reveals that maize prices

typically peak in September at 15.2 % above their seasonal low, with a 95 % confidence lower bound of 4.1 % and upper bound of 26.4 %. The interpretation is that in approximately 1 out of 20 years the price change will fall outside of that price band, i.e. there is a fair degree of certainty that prices will fall within the price band. Tef prices, in turn, peak in October at 17.8 [9.2, 26.3] %; wheat in September at 12.1 [-0.1, 24.2] %; and barley in August at 11.7 [4.4, 19.1] %. The fairly wide confidence intervals suggest that those engaging in temporal arbitrage face a relatively high degree of price risk.

⁹ This analysis assumes that the commodity price at time t (x_t) consists of three components, namely a long-term trend component (m_t), a seasonal component (s_t) and an unpredictable component (y_t): $x_t = m_t + s_t + y_t$. Under the so-called "small trend assumption", the annual average price is assumed to be an unbiased estimator of m_t . The seasonal component (s_t) is calculated as the average seasonal price change in the "detrended" price series over the five years for which we have price observations. The unpredictable component (y_t), computed as a residual by deducting the imputed trend and seasonal components from the observed price, reveals the extent to which prices tend to deviate from their expected trend and seasonal patterns. This represents the potential risk faced by those engaging in temporal arbitrage, and can also be used to construct confidence intervals around the expected seasonal price path.

Figure 4. Price index of national wheat and barley prices, 2012–2016



Source: Authors calculations based on EDRI/ETGE datasets

4 CONCLUSIONS AND RECOMMENDATIONS

In reviewing the utilization and performance of the current WRS, this study found that Ethiopian smallholders are currently excluded from the benefits of a WRS and WRF by factors such as minimum required lot sizes, illiquid credit supply, debilitating interest rates, lack of (quality) storage infrastructure and financial illiteracy. Private warehouses are not accredited by the exchange to issue WRs and are therefore excluded from the system; public warehouses have been criticized for quality and quantity deterioration; and the Exchange cannot hedge lending against the security of future crop production. If, however, all these systems are included in the same overarching WRS, risk is spread across all actors, transaction costs decline, liquidity increases, and prices become more stable.

The study also revisited the recommendations made in the Agriculture Growth Program-Agribusiness and Market Development (AGP-AMDe) review of the Ethiopian WRS and found that most of these remain to be addressed. One of the recommendations is stocktaking of the storage capacity in surplus areas as well as prioritizing private sector investment in WRS infrastructure. These two recommendations go hand in hand. Beyond constructing actual warehouses, WRS infrastructure refers to several additional areas of investment, including warehouse management, transport infrastructure, and warehouse grading and measuring equipment. It also refers to WRF infrastructure, including investments by banks and MFIs to increase their (rural) footprint. A national storage investment plan could provide a vision for the development of warehouse infrastructure.

A further recommendation of the AGP-AMDe review of the Ethiopian WRS was that Government should treat WRS as a priority and should promote private sector investments in WR infrastructure. Interviews with private sector investors undertaken as part of this study suggest that a well-functioning WRS would be beneficial for procurement of standardized commodities, and it could increase liquidity and thereby stabilize the market. Purchasing standardized commodities from accredited warehouses, where stock is graded and insured, would reduce operational risk for these private sector players. A concern is the potential cost of this benefit. Furthermore these companies are

ever concerned with government policies, particularly relating to directives on export restrictions, taxes, price stabilization, and foreign exchange controls as some of the greatest hindrances to investing in agriculture in Ethiopia. If these constraints could be addressed the private sector would be supportive of a WRS that enabled them to secure produce and hedge market risk.

In reviewing the Community Receipt System (CRS) it is clear that its strength lies in its community ownership. Community officials and cooperative promotion agencies regulate, certify and inspect the system, and grievances are addressed at community level. By bringing the system to the *woreda* or community-level, accessibility by smallholders is greatly enhanced. Successes have included solving institutional deficiencies and ensuring financial inclusion. The CRS furthermore provides a marketplace with a transparent pricing mechanism for both buyer and seller. This modality could be replicated in the lower tiers of the WRS.

A vital element for a successful WRS is the development of reliable ICT systems. The ECX has state of the art market information, trading and settlement systems, but without buy-in and support from the national telecommunications provider the majority of the rural population remain disconnected. Rural Ethiopia remains disconnected and as such the saturation of market information is low.

A further major constraint in the WRS is the lack of buy-in from the financial sector. The financial sector in Ethiopia is highly regulated and closed for foreign companies out of concern that foreign banks might dominate the sector. This closure results in limited competition in the sector. It also naturally curbs much-needed capital inflow and foreign exchange access. Constraints such as the government bond purchase requirement leaves private banks unable to participate in WRF. Banks are weary of price risk and market risk. A notable factor in agriculture finance in Ethiopia is that the focus has been on export crops; therefore financial instruments have been developed around export facilitation and not around the key cereals investigated in this study. Building banks' capacity in the agriculture

finance division and creating finance products within a holistic value chain finance approach, and application of ICT innovations, could allay banks' reluctance to venture into new products.

And lastly the study assessed the physical storability and the seasonality of the four key cereals. In many countries throughout the world maize, wheat and barley are successfully stored. In Ethiopia tef is stored successfully throughout the season due to its low moisture content, which is an important factor for storability. All four of these commodities are known to be successfully stored for at least one

season and the technical capabilities required are attainable. Consequently, of greater importance from a storage demand perspective is the price behavior of commodities. An analysis of the wholesale prices reveals that Ethiopia's major cereals tend to exhibit seasonal price patterns, with prices generally peaking around September each year; but at 11–15% above the seasonal low in January, the average gain over a nine-month period is not substantial, especially considering storage and financing costs as well as the eroding effect of inflation, estimated to be around 15.9% per annum during 2010–2015.

Recommendations

First and foremost a spatially disaggregated price analyses of market price behavior across various commodities should to be undertaken as this is a crucial determinant of demand for storage. The preliminary crude assessment undertaken in this study seems to suggest that the seasonal price differential may not be sufficient to encourage temporal arbitrage.

A recent study entitled 'Appropriate Warehousing and Collateral Management Systems in Sub-Saharan Africa' identifies four types of commodity finance systems: community inventory credit, private warehouses, public warehouses and lending against security of current or future production. These methods of finance complement each other in many ways (J Coulter Consulting et al, 2014). With a core objective of the ACCs being to promote an integrated platform to implement multiple priority interventions across value chains and across sectors, based on the analysis in this study it is recommended that a more inclusive WRS could provide the framework for such integration. The ACCs can provide market linkages between the tiers of the WRS and between the value chains within each ACC.

Figure 5 elaborates on a proposed structure for the overall system. The ECX remains the implementing agency¹⁰, however all players can apply to become warehouse operators and issue warehouse receipts. Institutional structures take years to develop and refine. An institution such as the ECX, although not without its own shortcomings and faced with significant political challenges, remains the most suitable organization to host and manage the WRS. Regular restructuring is

counterproductive; instead emphasis should be placed on improved management and transparency and increased accountability for economic performance of the ECX.

The WRS model offers a tool for strengthening vertical integration within value chains, a central objective of ACCs. This model has had proven success in the case of ACE in Malawi. The ECX will be responsible for inspecting and accrediting storage operators. At the primary level, producers, typically smallholder farmers (SHFs), deliver grains to the primary organization (PO). The SHF then receives a standardized WR, issued by the PO. The SHF then has the option to take out a loan against the WR as collateral. If no loan is taken, the producer may, with marketing assistance from the PO, sell the WR by offering it electronically on the ECX platform, at a time when he deems the price sufficient. The proceeds of the sale will be deposited into an ECX settlement account from where storage and handling charges as well as commission (if any) will be paid to the PO, and the remaining proceeds will be paid to the producer. If a loan is issued against the WR, then proceeds of the sale will be deposited in the ECX Settlement account from where the loan and interest expense will be paid to the bank; storage and handling costs will be paid to the storage operator, ECX commission will be deducted and the remainder, the profit, will be paid to the seller. The finer details of where the producer will collect the payment would need to be determined at each level.

This process will be repeated at each level. Farmer Cooperative Unions (FCUs) can, in turn, purchase

¹⁰ The EACWSE will merge with the ECX

grains from the PO, or alternatively, the PO can store commodity at the FCU on a WR on their own behalf or on behalf of PO members. End-users purchase from FCUs, but they may also purchase directly from the SHF or the PO if they have the required rural outreach. End users include processors (such as millers, malt plants, or brewers), development partners or aid organizations, NGOs, government agencies (such as the NDRMC, SFRA, ETBC, EIIDE, or EABC), traders and exporters.

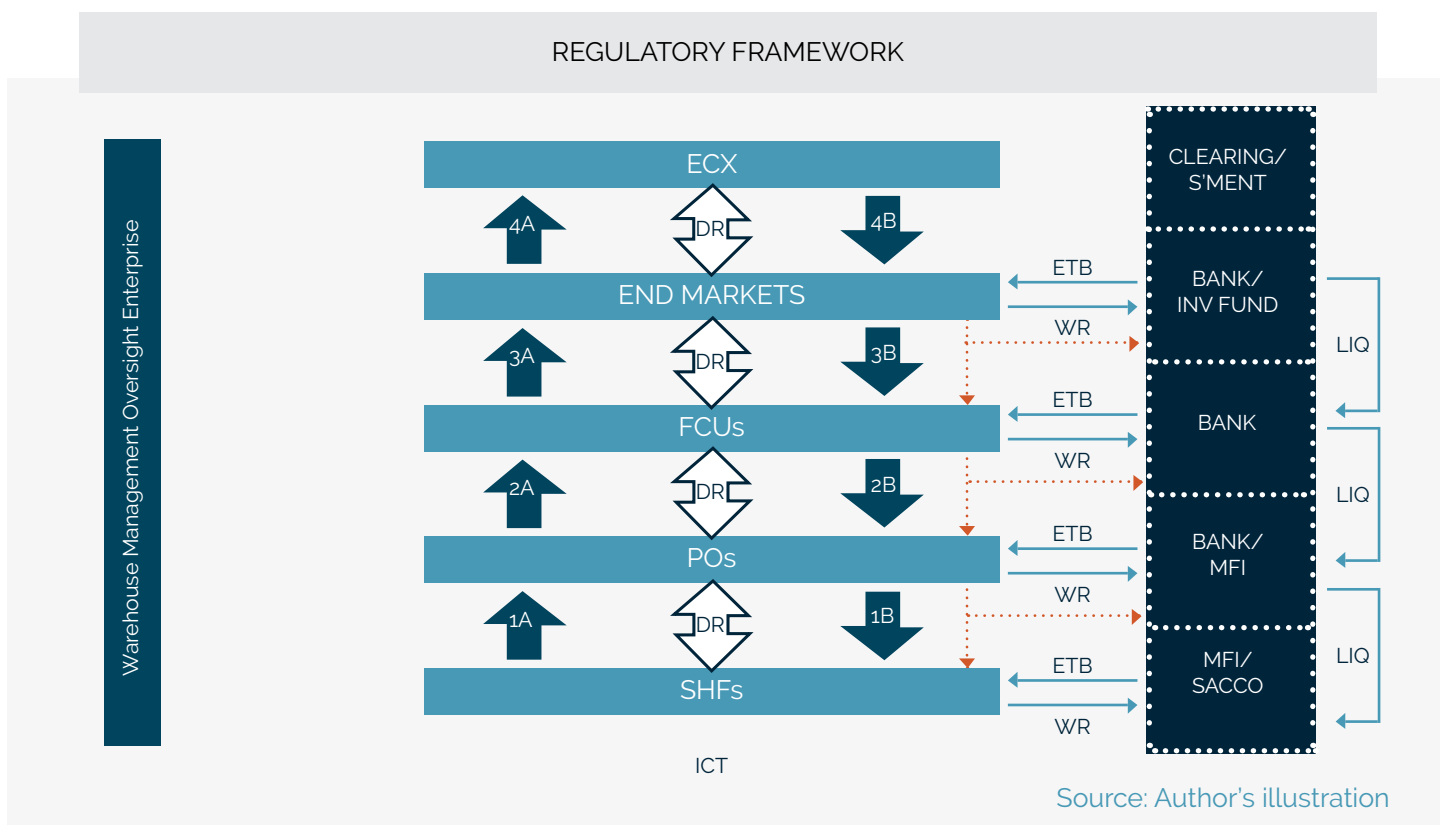
At each level the management capacity requirements of warehouse operators increases. It is of cardinal importance that the grading of commodities be uniform and quality be maintained at each level. The warehouse operators at the PO level are PO members trained by the EACWSE or a warehouse enterprise within the ECX. The PO level is overseen by the FCU level who carry out warehouse inspections. At the FCU level the FCU members are professional warehouse operators, and the Exchange provides the oversight. At the end user level, the Exchange also provides oversight, with possible increased security added by an international third party collateral manager. At any level financiers are encouraged to do random inspections of storage sites

where they have issued credit. Financiers will be trained in collateral inspection. Financiers are encouraged to increase liquidity between the different levels. The complexity of products will evolve from the SHF level to the end-market level. Insurance companies can offer different levels of insurance for the various levels of the system. Costly fidelity insurance becomes feasible if the risk is spread across the entire system.

Ownership of the system at each level should reflect the users at that level. Dispute resolution is managed at the level where it occurs. This empowers suppliers to voice concerns as they have an existing relationship with the PO. If it is not resolved it will be referred to the Exchange, which oversees the entire system. The PO should become a market one-stop-shop for producers to receive market information, store produce, purchase inputs and access loans. Throughout the entire system the thread that holds it all together is a robust warehouse management oversight enterprise made up of all the market actors.

ICT infrastructure and related innovations need to evolve across the board. Increased rural network

Figure 5. Schematic representation of an integrated WRS in Ethiopia



Source: Author's illustration

Notes: DR: Dispute Resolution. ETB: Cash flow. WR: Warehouse Receipt. a) Delivery of grains between tiers b) WR issued. Orange line: cash flow, SHF: Smallholder farmer, PO: Primary organization, MFI: Micro Finance Institute, SACCO: Saving and Credit Cooperatives, INV FUND: Investment fund, ECX: Ethiopia Commodity Exchange

coverage will make market information accessible to all actors, and ICT products such as mobile money will streamline financing operations. Within the WRS, ICT needs to effectively link the entire market. At any given moment any actor in the market should be able to access current market prices, current market positions, and current credit exposure. In terms of monitoring transactions and stock management the system relies on a stable (mobile) Internet network.

Before such an inclusive and integrated WRS can become functional, a capacity audit of all actors is required. Financial literacy of SHFs, particularly with respect to their level of understanding of storage losses and costs, is required. Also, POs and FCUs require skills in warehouse management, financial reporting, marketing, and dispute resolution. End users, in turn, need to have an understanding of warehouse management, marketing, and hedging. Finally, it is of utmost importance that commodity-grading standards are understood and regularly discussed between all players and that there is alignment of grades prior to implementation of the system. In order for financial institutions to buy into the system they will also need assistance in mapping the value chain so that they understand the finance needs of each actor. It is important that financiers understand market linkages in the system in order to create innovative financial instruments that are cost-effective and applicable to each level.

A Storage Investment Plan could address bottlenecks in storage capacity. An audit of existing infrastructure should be included in the plan. Should the remaining six ACC priority commodities be included in the WRS, an intensive review of storage requirements for these products will need to be undertaken.

For the overall system to flourish there is need for institutional support from the government of Ethiopia. Predictable and consistent implementation of government policies is a crucial pillar in any WRS. In the financial sector, issues such as the bond requirement for commercial banks and taxes on WR trades should be addressed; this was also a recommendation in the first year operational review of the Exchange undertaken by the IFC. Concessions such as a special Central Bank discount window for low interest intermediation for WR-based instruments could improve banks' enthusiasm to join the system (see J. Coulter et al, 2014).

As for government agencies, donor organizations and NGOs, the WRS can assist in assessing the national stock position. Furthermore it can improve the emergency purchase procedures by ensuring that stock has already been graded. WR can also be traded between different regions instead of physically moving stock.

As a final recommendation, the possibility of trading warehouse receipts across the region can be investigated in the future. Once the Ethiopian WRS has proven to be a stable and effective tool for the commercialization of agriculture, it could be expanded to include neighboring countries.

It is recommended that the following steps be undertaken:

1. SCOPE

Expand the focus of the WRS from exported crops to maize, wheat, tef and barley. However further analyses of market price behavior in these value chains should be undertaken. Include all market actors in the WRS. Expand warehouse operators to include private companies and cooperative unions. Investigate a potential sliding scale for the ETB 1 million requirement of capital for warehouse operators and publish clear directives for registration of cooperatives as warehouse operators.

2. CAPACITY

Conduct a capacity audit of all market actors, followed by a capacity building plan with ongoing training and sensitization at all levels. Publish a simple storage operator handbook accessible to all levels.

3. GRADING

Align grade standards for all traded commodities across all sectors, tiers, ACCs.

4. INVESTMENT

Create a Storage Investment Plan alongside the ATA's planned National Storage Strategy to first analyze constraints and thereafter mobilize investment. Provide incentives for WRS investment such as tax breaks and rebates for WR trade volumes. Address financing constraints such as commercial bank bond purchase requirements.

5. OVERSIGHT

Include members of all tiers in the WRS management and oversight body / ECEA. Review existing legislation with the objective of creating a robust regulatory organ that can restore the integrity of the WRS.

6. ICT

Seek evolution of the national telecommunications provider to include services such as mobile money. Promote infrastructure investment of telecommunications to increase rural accessibility.

5. REFERENCES

- Abebe, F. 2016. Agricultural Financing by Banks of Ethiopia the Case of Commercial Bank of Ethiopia
- African Trade Insurance Agency <http://www.ati-aca.org/index.php/newsroom/press-releases-75247/2016-press-releases/381-ati-officially-open-for-business-in-ethiopia-and-zimbabwe-looks-to-ease-investors-concerns> Last accessed 4 June 2017
- Agricultural Commodity Exchange for Africa. 2012. ACE overview: A holistic approach to agricultural marketing. August 2012. Lilongwe, Malawi: ACE. Available at <http://www.aceafrica.org/> Last accessed 20 May 2017
- Agricultural Transformation Agency. 2017. Annual Report 2015-2016.
- AgriFinFacility. Technical Brief. 2012. www.agrifinfacility.org/resource/enabling-environment-access-financial-services-ethiopia Last accessed 12 June 2017
- Alberta Pulse Growers <http://pulse.ab.ca/producers/varieties-management/dry-beans/storage/> Last accessed 4 June 2017
- Brennan, M.J. 1958. The supply of storage. The American Economic Review, 48 (1): 50-72
- Calandro, E. Stork, C. and Gillwald, A. 2012. Internet Going Mobile Internet access and usage in 11 African countries. RIA Policy Brief No 2 2012
- Castell, H. 2014. Finding real scale with warehouse receipt finance. Revolutionizing Agricultural Finance: A post Fin4Ag Conference Special report
- Central Statistical Agency of the Federal Democratic Republic of Ethiopia. Agricultural Sample Survey time series data for national & regional level from 1995/96 (1988 E.C) – 2014/15 (2007 E.C) report on area and production of crops (private peasant holdings, Meher season) Addis Ababa
- Central Statistical Agency of the Federal Democratic Republic of Ethiopia Agricultural Sample Survey 2015/2016 (2008 E.C.) September – January 2015/2016: Volume VII. Report on crop and livestock product utilization (Private Peasant Holdings, Meher Season) Addis Ababa. July, 2016
- Ethiopia Agricultural Warehousing Services Enterprise <https://chilot.files.wordpress.com/2017/04/regulation-no-331-2014-ethiopian-agricultural-commodities-warehousing-service-enterprise-establishment.pdf> Last accessed 20 May 2017
- Ethiopia Commodity Exchange Authority Proclamation <http://www.mot.gov.et/documents/27281/0/Proc+No.551-2007+Ethiopia+Commodity+Exchange.pdf/1a0467d4-8b4e-40d7-8c4e-3cag1dd71eebjsessionid=FAgC67013AF47780C4FE766C328C830F?version=1.1> Last accessed 10 June 2017
- Ethiopia Commodity Exchange Proclamation <http://www.ecx.com.et/downloads/rules/ecexproclamation.pdf>
- Ethiopia Warehouse Receipt System Proclamation <https://chilot.me/2011/08/02/proclamation-no-3722003-proclamation-to-provide-for-a-warehouse-receipts-system/>
- Ethiopia Commodity Exchange, 2015. ECX Spins-Off Warehouse and Quality Operations, Revolutionizes Trading Through ECX Online Platform. Available at <http://www.ecx.com.et/NewsAndEvents.aspx>. Last accessed 12 June 2017

Ethiopia Commodity Exchange. Membership list. Available at <http://www.ecx.com.et/Membership.aspx> Last accessed 12 June 2017

Ethiopia Investment Proclamation amendment [http://www.investethiopia.gov.et/images/pdf/Investment_\(Amendment\)_Proclamation_No769-2012.pdf](http://www.investethiopia.gov.et/images/pdf/Investment_(Amendment)_Proclamation_No769-2012.pdf) Last accessed 10 June 2017

Ethiopia Investment Proclamation <http://www.mot.gov.et/documents/27281/0/Reg+No.270-2012-Investment+Incentive+and+Investment+Areas+Reserved+for+Domestic+Investors.pdf> Last accessed 10 June 2017

European Investment Bank <http://www.eib.org/infocentre/press/releases/all/2016/2016-237-eu-bank-supports-agricultural-sector-in-malawi.htm> Last accessed 10 June 2017

Isuekebhor, G. 2014. Alternative and Innovative Financing in Agriculture in Africa Agriculture Sector Dialogue Phase III CABRI Seminar

J Coulter Consulting Ltd. and Sullivan & Worcester UK LLP. 2014. Study on appropriate warehousing and collateral management systems in Sub-Saharan Africa: Volume I – key findings (Prepared for Agence Française de Développement (AFD); Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) & International Fund for Agricultural Development (IFAD)

J Coulter Consulting Ltd. and Sullivan & Worcester UK LLP. 2014. Study on appropriate warehousing and collateral management systems in Sub-Saharan Africa: Volume 2 – Technical Country reports (Prepared for Agence Française de Développement (AFD); Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) & International Fund for Agricultural Development (IFAD)

Jayne, T.S., Kopicki, R. Sitko, N. and Sturgess, C. 2014. Agricultural Commodity Exchanges and the Development of Grain Markets and Trade in Africa: A Review of Recent Experience. Working Paper 88. Indaba Agricultural Policy Research Institute (IAPRI)

Kumar, P., Parhoha, M.S., Mishra, R. P. 2016. Assessment of Storage Dependent Physiological Parameters of Sesamum indicum seeds

Minot, N. and Mekonnen, D. 2012. Role of Agricultural Cooperatives and Storage in Rural Ethiopia: Results of two surveys. International Food Policy Research Institute. Washington, DC

Minot, N. Warner, J., Lemma, S., Kassa, L., Gashaw, A., and Rashid, S. 2015. The Wheat Supply Chain in Ethiopia: Patterns, trends and policy options. Research for Ethiopia's Agricultural Policy. International Food Policy Research Institute. Washington, DC

Minten, B., Engida, E. and Tamruet, S. 2016. How big are post-harvest losses in Ethiopia? Evidence from tef. ESSP II Working Paper

National Bank of Ethiopia 2014/15 annual report

Pauw, S. 2015. Unpublished report submitted to CTA

Pirrong, C. 2014. The Economics of Commodity Trading Firms

Rutten, L. and Boto, I. 2014. Brussels Rural Development Briefings: A series of meetings on ACP-EU development issues. Revolutionizing Finance for Agri-Value Chains

The Capital, 15 January 2016. ECX Mandate extended <http://capitalethiopia.com/2016/01/15/red-kidney-green-mung-beans-to-join-ecx-mandated-market/#.WTWRPmiGPbo> Last accessed 10 June 2017

The Reporter, 15 October 2016. Warehousing Services: The Fundamentals. <http://www.thereporterethiopia.com/content/warehousing-services-fundamentals> Last accessed 20 August 2017

The Capital. 17 April 2017. <http://capitalethiopia.com/2017/04/17/warehousing-enterprise-re-merge-ecx/>

Thomas, K. 2012. Draft report: ECX warehouse Receipt Finance Program 1st year operational review

Tilahun, D. 2015. Access to Credit and the Impact of Credit constraints on Agricultural Productivity in Ethiopia: Evidence from Selected Zones of Rural Amhara

Tilahun, F. 2015 Draft report, May 2015: Establishing a Pilot Warehouse Receipt Financing Scheme for Smallholder Production of Rice in the Fogera District, Amhara Region, Ethiopia

USAID Ethiopia. 2014. (a) AGP-AMDe- Ethiopia Community Warehouse Receipt System Pilot Project Report

USAID Ethiopia. 2014. (b) AGP-AMDe- Ethiopia Warehouse Receipt System and Regulation: A Case for Expansion

Varangis, P. and D. Larson. 1996. "How Warehouse Receipts Help Commodity Trading and Financing". World Bank brief.

Zwedu, G.A. (2014). Financial inclusion, regulation and inclusive growth in Ethiopia

6. APPENDIX

Figure 6. ACCs in Oromia

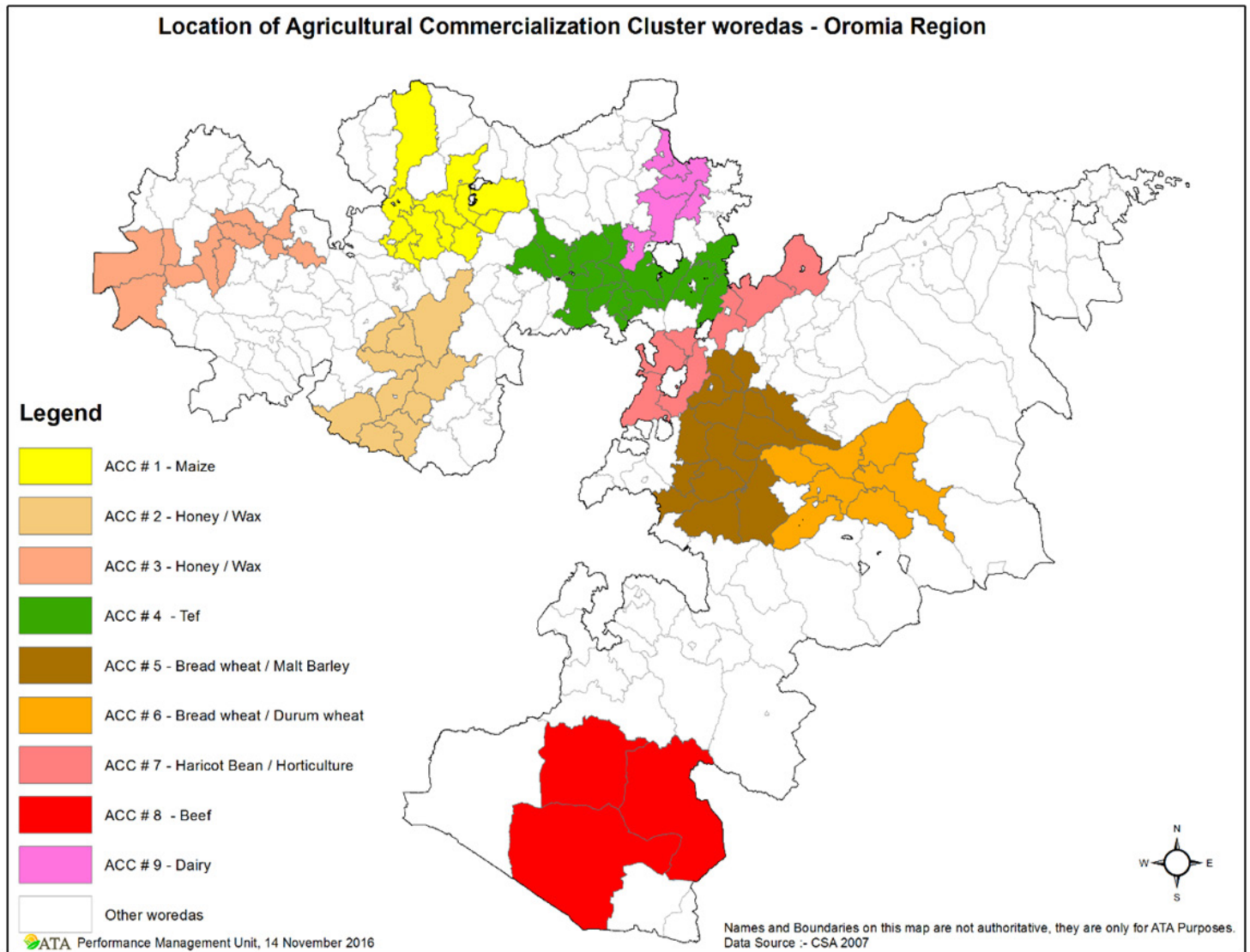


Figure 7. ACCs in Amhara

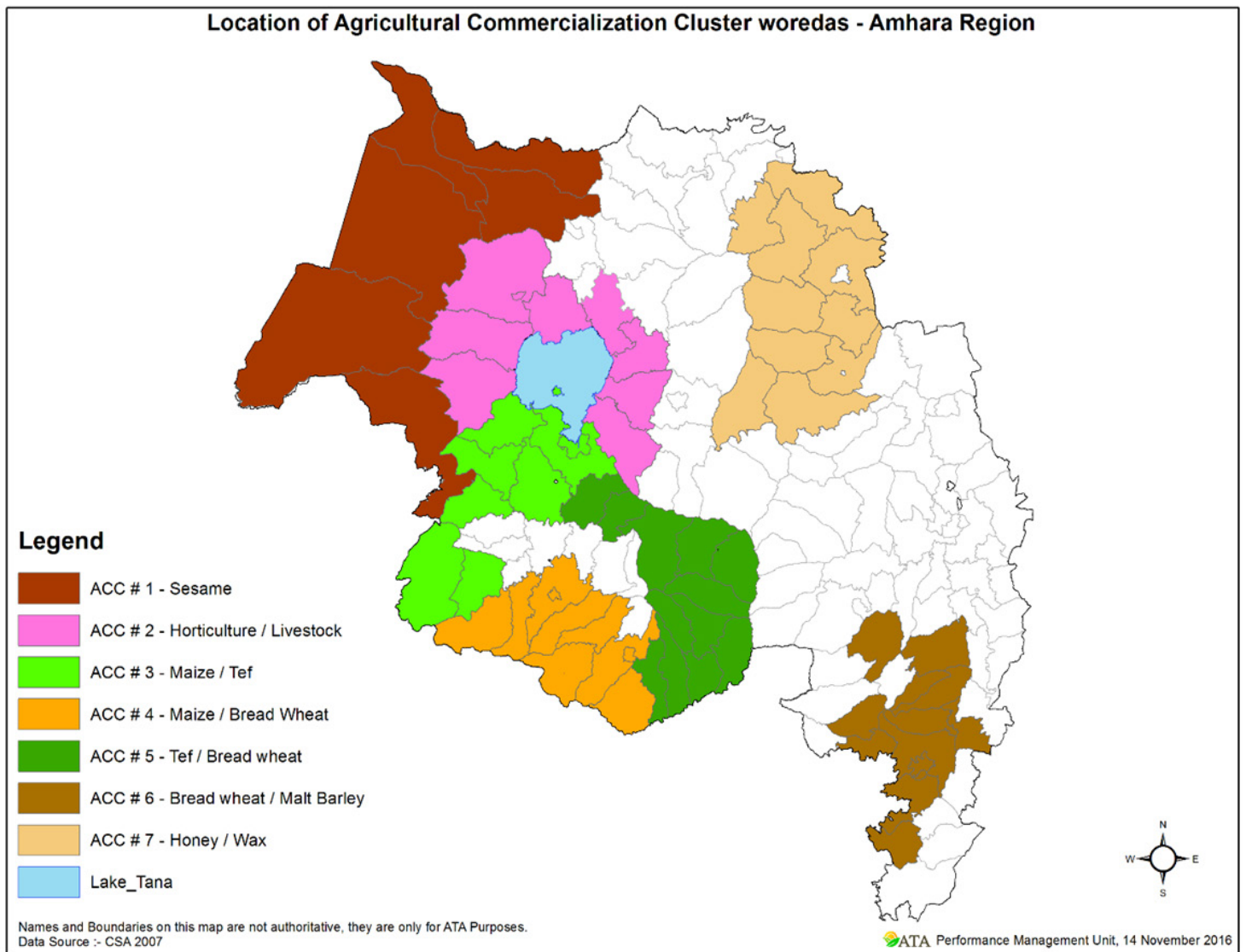


Figure 8. ACCs in Tigray

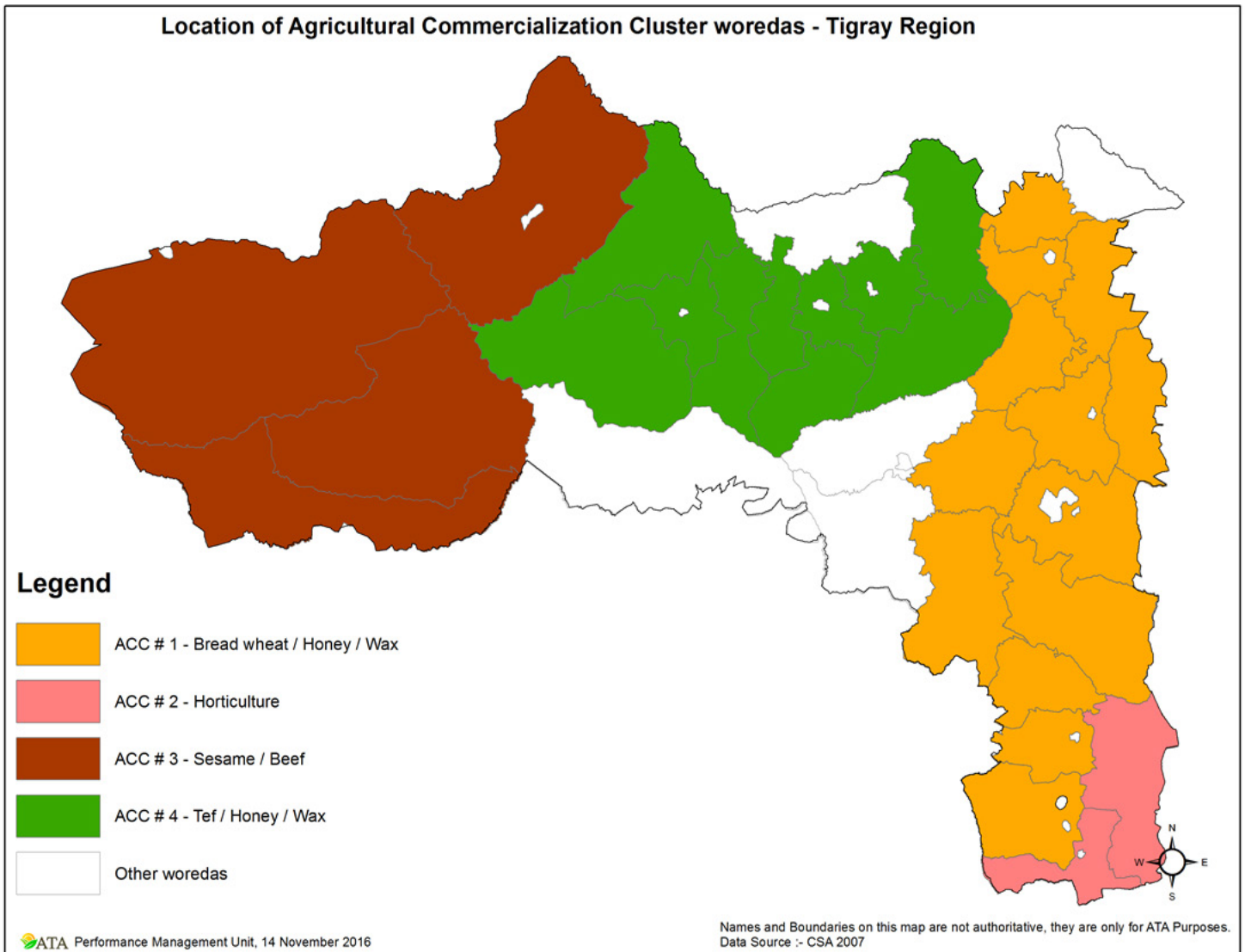


Figure 9. ACCs in SNNP

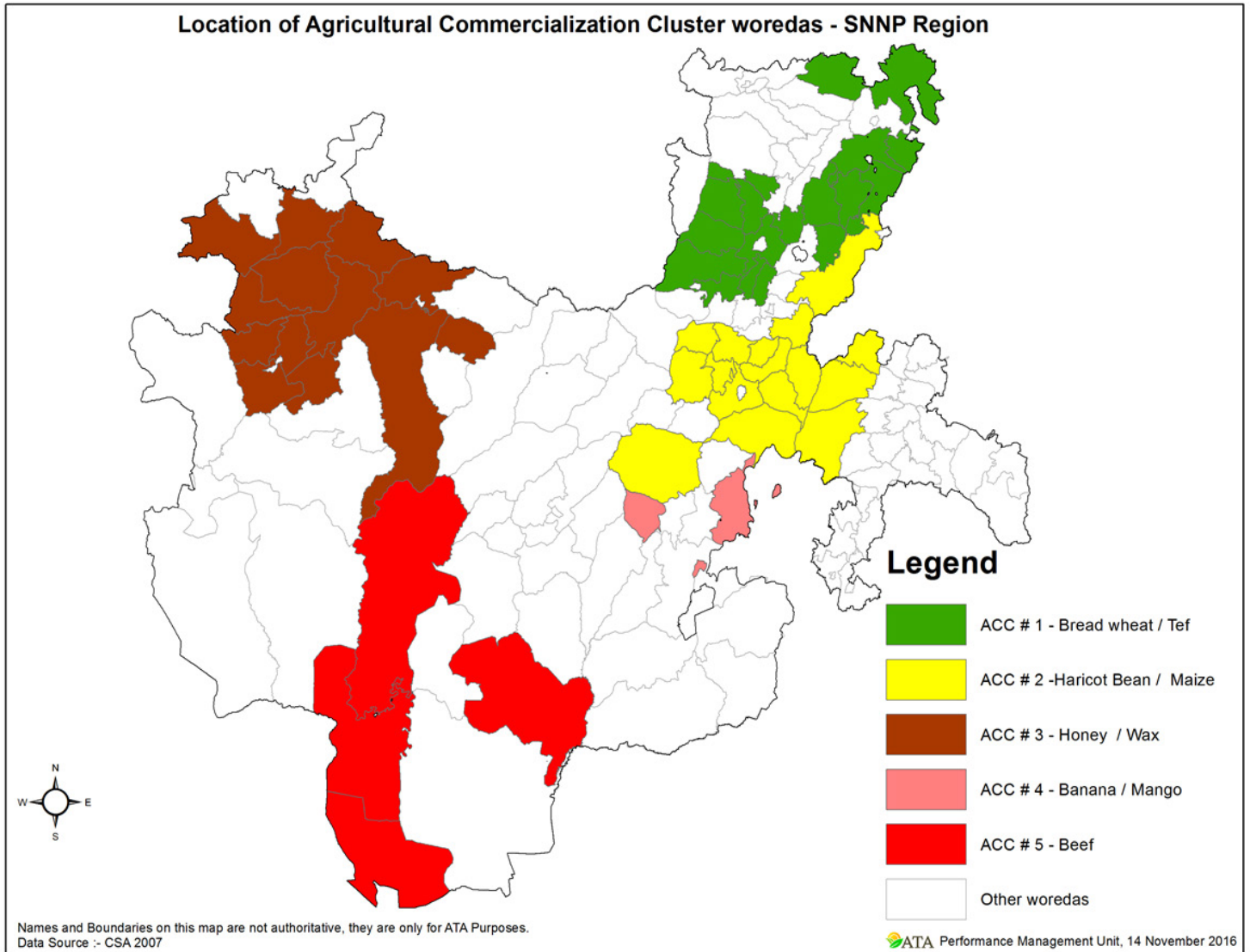


Table 2. Markets selected for price analysis

	Maize	Tef	Wheat	Barley
Addis Ababa	O	O	O	O
Dire Dawa	O	O	O	O
Oromia South	A	A	A	A
Assela	X	O	O	X
Bale Robe	X	X	O	X
Nazareth	O	O	O	O
Shashemene	O	O	O	O
Ziway	O	O	O	X
Oromia West	A	A	A	A
Ambo	O	O	O	O
Jimma	O	O	O	O
Metu	X	X	X	X
Nekempt	O	O	X	X
Woliso	O	O	O	X
Amhara	A	A	A	A
Bahir Dar	O	O	O	O
Debre Birhan	O	O	O	X
Dessie	O	O	X	X
Jiga	X	X	X	X
Debre Markos	O	O	O	X
Gondar	O	O	X	X
Mekele (Tigray)	O	O	O	O
Hoseana (SNNPR)	O	O	O	X

Notes: X = markets dropped from analysis; O = observed prices; A = calculated average regional prices

Table 3. Correlation coefficients between market pairs, 2011–2017

		Maize	Tef	Wheat	Barley
(i) Oromia South					
Assela	Bale Robe	N/A	N/A	0.91	N/A
Assela	Nazareth	N/A	0.97	0.90	N/A
Assela	Shashemene	N/A	0.94	0.95	N/A
Assela	Ziway	N/A	0.90	0.87	N/A
Bale Robe	Nazareth	N/A	N/A	0.82	N/A
Bale Robe	Shashemene	N/A	N/A	0.87	N/A
Bale Robe	Ziway	N/A	N/A	0.79	N/A
Nazareth	Shashemene	0.71	0.92	0.86	0.76
Nazareth	Ziway	0.62	0.92	0.81	N/A
Shashemene	Ziway	0.61	0.92	0.94	N/A
(ii) Oromia West & SNNPR					
Ambo	Jimma	0.69	0.97	0.80	0.71
Ambo	Nekempt	0.67	0.95	N/A	N/A
Ambo	Woliso	0.74	0.98	0.93	N/A
Ambo	Hoseana	0.56	0.95	0.89	N/A
Jimma	Nekempt	0.44	0.94	N/A	N/A
Jimma	Woliso	0.61	0.96	0.70	N/A
Jimma	Hoseana	0.59	0.94	0.65	N/A
Nekempt	Woliso	0.66	0.95	N/A	N/A
Nekempt	Hoseana	0.51	0.94	N/A	N/A
Woliso	Hoseana	0.65	0.95	0.94	N/A
(iii) Amhara & Tigray					
Bahir Dar	Debre Birhan	0.21	0.95	0.81	N/A
Bahir Dar	Dessie	0.84	0.96	N/A	N/A
Bahir Dar	Debre Markos	0.93	0.94	0.61	N/A
Bahir Dar	Gondar	0.90	0.95	N/A	N/A
Bahir Dar	Mekele	0.74	0.94	N/A	N/A
Debre Birhan	Dessie	0.38	0.98	N/A	N/A
Debre Birhan	Debre Markos	0.22	0.98	0.88	N/A
Debre Birhan	Gondar	0.21	0.95	N/A	N/A
Debre Birhan	Mekele	0.28	0.97	N/A	N/A
Dessie	Debre Markos	0.83	0.97	N/A	N/A
Dessie	Gondar	0.83	0.96	N/A	N/A
Dessie	Mekele	0.74	0.97	N/A	N/A
Debre Markos	Gondar	0.86	0.93	N/A	N/A
Debre Markos	Mekele	0.74	0.95	0.38	N/A
Gondar	Mekele	0.80	0.93	0.56	N/A

Table 3. Correlation coefficients between market pairs, 2011–2017 (continued)

		Maize	Tef	Wheat	Barley
(iv) Nationally					
Addis Ababa	Dire Dawa	0.60	0.95	0.89	0.80
Addis Ababa	Oromia South	0.73	0.97	0.92	0.83
Addis Ababa	Oromia West	0.75	0.98	0.93	0.83
Addis Ababa	Amhara	0.60	0.97	0.80	0.55
Addis Ababa	Mekele (Tigray)	0.44	0.95	0.72	0.39
Addis Ababa	Hoseana (SNNPR)	0.47	0.94	0.84	N/A
Dire Dawa	Oromia South	0.49	0.97	0.80	0.84
Dire Dawa	Oromia West	0.47	0.96	0.83	0.82
Dire Dawa	Amhara	0.63	0.97	0.75	0.60
Dire Dawa	Mekele (Tigray)	0.51	0.93	0.76	0.51
Dire Dawa	Hoseana (SNNPR)	0.31	0.95	0.70	N/A
Oromia South	Oromia West	0.85	0.97	0.95	0.77
Oromia South	Amhara	0.76	0.98	0.87	0.67
Oromia South	Mekele (Tigray)	0.56	0.97	0.65	0.65
Oromia South	Hoseana (SNNPR)	0.67	0.95	0.95	N/A
Oromia West	Amhara	0.78	0.98	0.82	0.47
Oromia West	Mekele (Tigray)	0.60	0.96	0.71	0.41
Oromia West	Hoseana (SNNPR)	0.70	0.96	0.88	N/A
Amhara	Mekele (Tigray)	0.78	0.97	0.61	0.55
Amhara	Hoseana (SNNPR)	0.61	0.95	0.88	N/A
Mekele (Tigray)	Hoseana (SNNPR)	0.45	0.94	0.54	N/A

Source: Authors calculations based on EDRI/ETGE datasets

Note: Red indicates the lowest correlation and green show the highest correlation

