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Analysis of price incentives for maize in Ethiopia for the time period 2005–2012

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Monitoring and Analysing Food and Agricultural Policies (MAFAP)

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CONTENTS

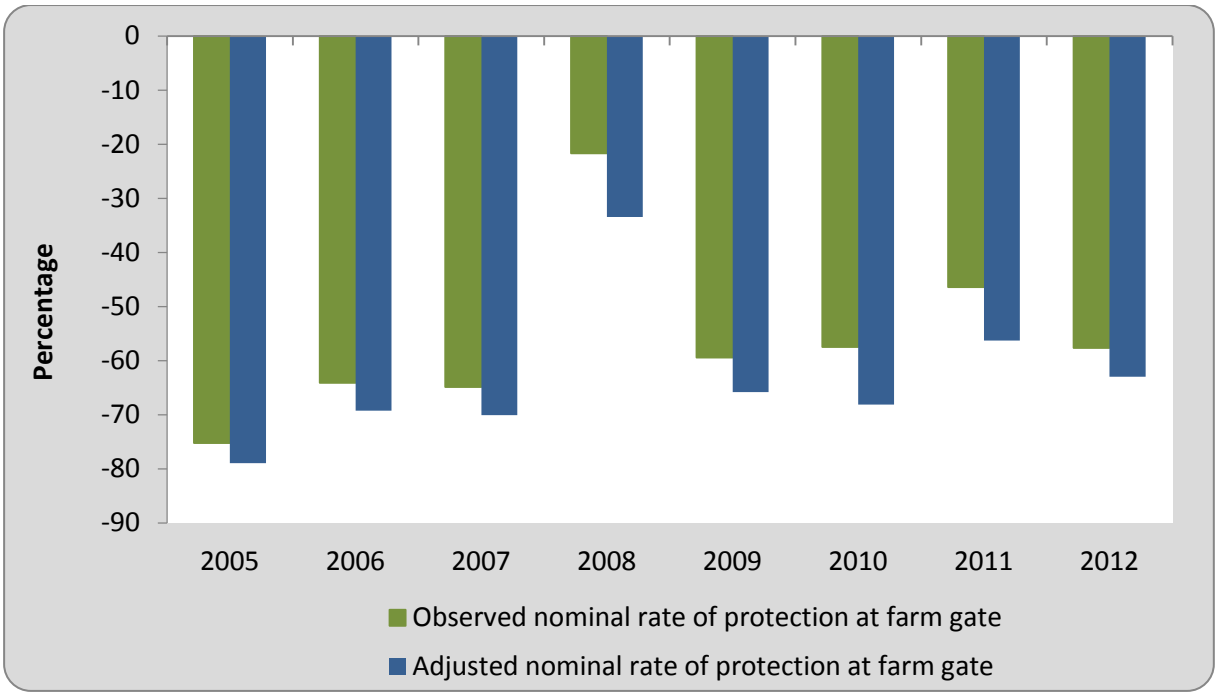
SUMMARY OF THE NOTE

Product: Maize
Period analyzed: 2005-2012
Trade status: Import (2005-2009; 2012) and export (2010 and 2011)

COMMODITY CONTEXT

- During 2005-2012, maize accounted for the largest share in total cereal production and consumption. Over the period, the area allocated expanded from 1.5 million to 2.0 million ha (nearly 32%), output doubled from 3.3 million tonnes in 2005 to 6.1 million tonnes in 2012 and yield expanded by 41 percent (CSA, 2012/13). More farmers produce maize than any other crop.
- Despite a record level maize harvest in 2012 (CSA data, 2012/13), an export ban has been maintained.
- National per capita calorie consumption of maize was 418 in 2009 (FAOSTAT) and dominated cereal consumption with a share of 28.5 percent from 2001 to 2009.
- Ethiopia was a net importer of maize over the period 2005-2012 except in 2010 and 2011. The highest volume of import recorded was about 60,271 tonnes in 2006, and the highest volume of export was 59,994 tonnes in 2011.
- Maize export was banned in 2008, lifted in 2010, re-imposed in 2011 and remains in place currently.
- The maize value chain is very long with little processing and involves a number of small operators mainly providing transport and storage services.

Observed and Adjusted Nominal Rate of Protection at Farm Gate for Maize in Ethiopia,2005-2012



Source: MAFAP, 2014

The observed Nominal Rate of Protection (NRP, green bars) in the graph above measures the effect of policy distortions and overall market performance on price incentives for producers. The adjusted NRP (blue bars) captures the same elements as the observed NRP, in addition to any market distortions resulting from inefficiencies in the commodity's value chain and exchange rate

misalignment. The difference between the two bars reflects the estimated cost that value chain inefficiencies and exchange rate misalignment represent to producers.

DRIVING FACTORS

- Restrictive trade policy (export bans), overvalued exchange rate, high access costs and high international prices provide great disincentives to producers. For instance in 2010 and 2011, when the export ban was absent and the exchange rate had improved after devaluation in 2011, disincentive declined, whereas in 2012 when the aforementioned policies affected the market in the same direction (banned export, overvalued exchange rate, high international prices and a record level of domestic production) the disincentive was far greater.
- Ethiopia being a landlocked country, together with high transaction and transport costs, contributed to high reference prices.
- In explaining the level of disincentive, the importance of the relative increase in international prices vis-à-vis the domestic price is also substantial, as observed in 2008.
- Low domestic demand during years of good harvest and high imports are factors contributing to the decline in domestic price.

RECOMMENDATIONS

- Reconsider restrictive trade policy and adopt careful policy measures to decrease the overvalued exchange rate and reduce access and transaction costs.
- Encouraging investment in processing and value-addition of maize could increase the domestic demand during years of good harvest, even when penetrating the international market is costly. Processing maize for animal feed is an example of value addition not yet common in Ethiopia, but which would increase the domestic demand for maize from investors (e.g., ranchers, poultry), animal feed exporters, etc. Since the demand for maize has been limited to human consumption, there is significant potential to expand into processing for other purposes. Purchasing food-aid from the domestic market rather than importing during years of sufficient supply would further increase incentive for local producers.
- Studies to obtain reliable data on representative producer price, margins of traders, access costs, input prices in maize production and international market distortions as well as precise actual production quantities, as opposed to estimations, will be essential to fully explain the causes of price disincentives to maize producers.

1. PURPOSE OF THE NOTE

This technical note is an attempt to measure, analyze and interpret price incentives for Maize in Ethiopia over the period 2005 – 2012.

For this purpose, yearly averages of domestic farm gate and wholesale prices are compared with reference prices calculated on the basis of the price of the commodity in the international market. The price gaps between reference prices and domestic prices along the commodity's value chain indicate the extent to which incentives (positive gaps) or disincentives (negative gaps) were present at the farm gate and wholesale level. The price gaps are expressed in relative terms as a percentage of the reference price, referred to as the Nominal Rate of Protection (NRP). These key indicators are used by MAFAP to assess the effects of policy and market performance on prices.

This technical note begins with a review of the commodity's production, consumption/utilization, marketing and trade, value chain and policy context (Chapter 2). It also provides a detailed description of how key data elements were obtained and indicators were calculated (Chapter 3). The indicators were then interpreted in light of existing policies and market characteristics (Chapter 4), and key policy recommendations were formulated on the basis of this interpretation (Chapter 5). Finally, the note concludes with a few main messages, limitations of the analysis and areas identified for further research to improve the analysis (Chapter 6).

The results and recommendations presented in this analysis of price incentives can be used by stakeholders involved in policy-making for the food and agriculture sector. They can also serve as input for evidence-based policy dialogue on potential reform options to improve this specific value chain, mostly at the national level, but also at regional or international levels.

This technical note should not be interpreted as an in-depth value chain analysis or detailed description of the commodity's production, consumption/utilization, marketing and trade or policy context. All information related to these areas is presented merely to provide background on the commodity under review, help understand major trends and facilitate the interpretation of the indicators.

2. COMMODITY CONTEXT

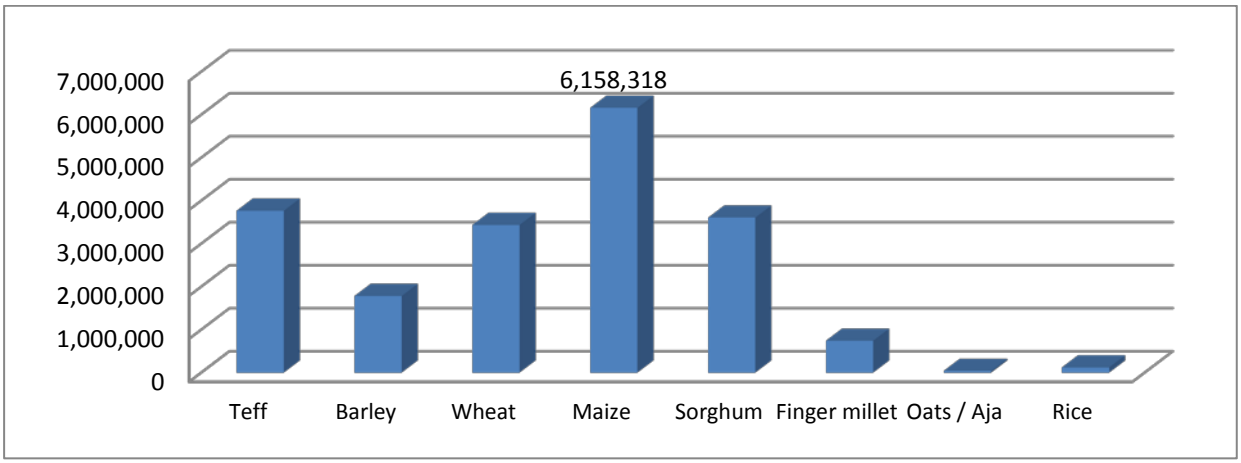
In Ethiopia, agriculture accounted for 44 percent of GDP in 2011/12 (MoFED, 2013)[1]. Within the agricultural sector, cereals play a central role, accounting for roughly 60 percent of rural employment, 80 percent of total cultivated land, more than 40 percent of a typical household's food expenditure, and more than 60 percent of total caloric intake.

PRODUCTION

Maize is the most produced and consumed crop in Ethiopia. The quantity of production and the number of smallholder producers indicate its predominance. In terms of quantity of output, the average share of maize in total cereal output over 2005–2012 was 29 percent, followed by teff at 19.8 and sorghum at 19.5 (CountryStat). Similarly, maize accounts for the largest number of smallholder producers at 9.3 million, followed by 6.3 million for teff and 4.8 million for wheat (CSA, 2012/2013). Only teff exceeds maize in total cereals area share with 28.4 percent, compared to the share of maize at 20.2 percent (Table 1).

The important contribution of maize to smallholders' food security makes it a commodity of national interest. With regard to income, studies suggest that by increasing maize yields four fold, smallholders could increase their income from approximately USD 60 per hectare to between USD 350 and USD 450 (IFPRI, 2010). Moreover, by increasing yield and quality and by decreasing transport costs, the country could sustain the net exports of maize (i.e. maize excluding seed) observed in 2010 and 2011. With increased income, smallholder farmers could adopt productivity increasing technologies and modernize their production.

Figure 1: Production of Cereals in Ethiopia in 2012 (tonnes)



Source: Author's elaboration based on Central Statistical Authority 2011/12 data

In 2012, maize accounted for 31.4 percent of total cereal production, compared to 19.2 percent for teff and 18.3 percent for sorghum, the second and third most cultivated crops (Table 1). A record 6,158,318 tonnes of maize was harvested in 2012, that year having the largest share in total cereal production by more than 31% (Figure 1).

[1] Ministry of Finance and Economic Development (2013), Annual Progress Report for F.Y. 2011/12, Growth and Transformation Plan, Addis Ababa, Ethiopia.

In Ethiopia, smallholders dominate the agricultural sector, accounting for 95 percent of total production, whereas large farms contribute only 5 percent of the total and only 2.6 percent of cereal production in particular. The average farm size is less than one hectare, with 40 percent of farmers cultivating less than 0.52 hectares (Alemayehu et al, 2011). Commercial farms tend to utilize highly productive technologies, yet despite a high yield of roughly 4 tonnes per hectare, commercial farms produce only around 5 percent of maize. This indicates the potential for increasing smallholder productivity through the adoption of modern inputs, such as fertilizer and improved seed, as well as adopting better agronomic practices.

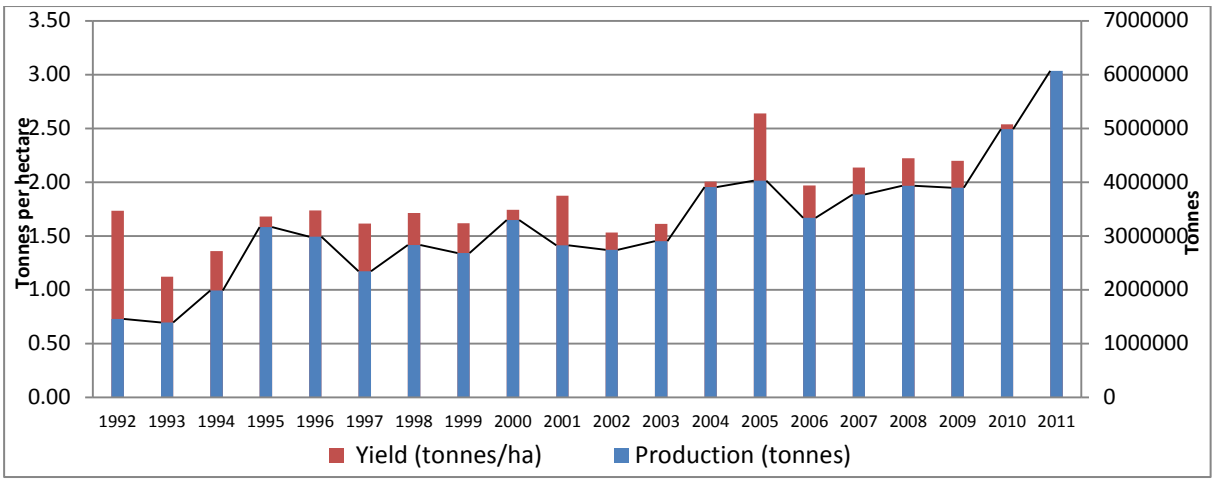
Among major crops, maize is the largest and most productive in Ethiopia, having the fastest growth rates in area cultivated, production and yield (Table 1). For instance, between 2005 and 2012, maize production expanded by 84 percent, area under maize cultivation by 32 percent, while yield increased by 41 percent. The share of maize in total area increased by 11 percent between 2005 and 2012, whereas the share of other cereals such as wheat, sorghum and barely is declining.

Table 1: Area, Production and Yield of Cereals in Ethiopia, 2005 / 2012

Crop	2005				2012				Expansion rate				Average yield (2005-2012)*
	Area 000 ha	Prod. 000 tonnes	Yield tonne /ha	Area share	Area 000 ha	Prod. 000 tonnes	Yield tonne /ha	Area Share	Area 000 ha	Prod. 000 tonnes	Yield tonne /ha	Area share	
Barley	997	1270	1.3	12.3	1019	1782	1.7	10.6	2.2	40.3	30.8	-13.8	15.2
Maize	1526	3336	2.2	18.9	2013	6158	3.1	21.0	31.9	84.6	40.9	11.1	24.4
Millet	333	397	1.2	4.1	432	742	1.7	4.5	29.7	86.9	41.7	9.8	14.3
Sorghum	1468	2173	1.5	18.2	1711	3604	2.1	17.8	16.6	65.9	40.0	-2.2	18.3
Teff	2246	2176	1.0	27.8	2730	3765	1.4	28.4	21.5	73.0	40.0	2.2	11.9
Wheat	1459	2219	1.5	18.1	1628	3435	2.1	17.0	11.6	54.8	40.0	-6.1	18.0
Other	50.6	51.4	1.0	0.6	68	165	2.4	0.7	34.4	221.0	140.0	16.7	19.4
Cereal	8081	11624	1.4	100.0	9601	19651	2.0	100	18.8	69.1	42.9	0.0	17.6

Source: Authors' calculation using CSA Agricultural Sample Survey data (adopted from 2010 technical note)

Figure 2: Trends in Production and Yield of Maize in Ethiopia, 1992-2011 (Tonne/ha)

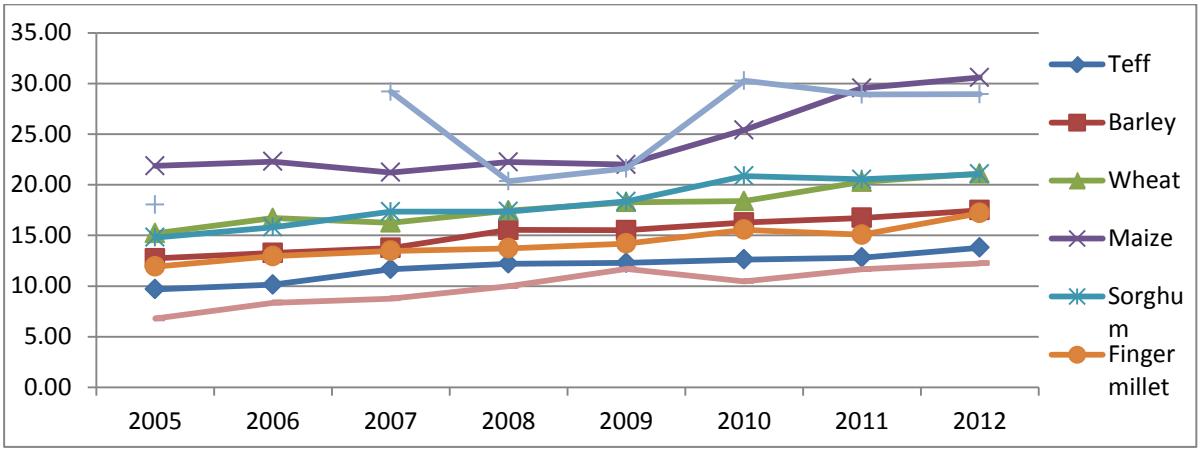


Source: FAOSTAT

Maize is the only crop with significant use of commercial inputs (Demeke, 2012). In 2008, about 37 percent of maize farmers used fertilizers, compared to the national average of 17 percent for all

cereal farmers. An estimated 26 percent of maize growers used improved seeds, which is again about twice the national average for all cereal farmers (Rashid et al 2010) and Demeke (2012). The use of modern inputs in maize production is likely a major contributing factor to the sustained increase in yield up until 2011, compared to other crops produced by smallholders (Figure 3). Figure 3 shows that maize yield exceeds that of all other major crops and that the increase was quite significant between 2009 and 2011. This increase is likely due to the success of the Crash Seed Multiplication Programme (CSMP), initiated in the 2008/09 production season to produce and distribute certified hybrid maize varieties.

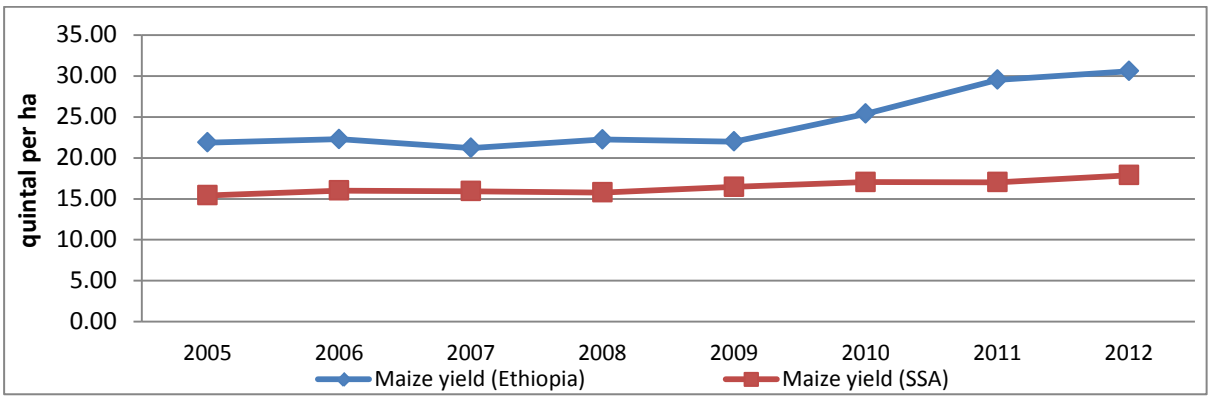
Figure 3: Average Yield for the Main Cereals in Ethiopia, 2005-2012 (qt/h)



Source: CountryStat, 2013

According to data obtained from FAOSTAT, Ethiopia is the third largest producer of maize in Africa, followed by South Africa and Nigeria. Between 2000 and 2010, the country accounted for 12.3 percent of total maize production in Eastern and Southern Africa, compared to 36.3 percent for South Africa. The average yield of maize in Ethiopia over the period 2005-2012 exceeded the average yield of maize of other sub-Saharan African countries (Figure 4). With improved infrastructure and expanded use of improved production technology, Ethiopia has the potential to be a leading exporter of maize.

Figure 4: Trends in Maize Yield, Ethiopia Vis-á-Vis Average of Sub-Saharan Africa 2005-12 (qt/ha)



Source: FAOStat

In terms of internal distribution of maize production, Oromia (61%), Amhara (20%) and SNNPR (12%) are the dominant areas for cultivation (CountryStat, 2013).

CONSUMPTION/UTILIZATION

Cereals dominate the national food basket in Ethiopia, and according to CSA data, maize has been the single most important cereal over the past decades, particularly in rural areas, accounting for 17 percent of the per capita calorie intake, followed by sorghum (14 percent), wheat (13 percent) and teff (11 percent) in 2004/05 (Table 2). In 2009, maize continued to be the most vital source of calories, accounting for 23 percent or 418 kcal per capita per day, followed now by wheat with 322 (FAOSTAT).

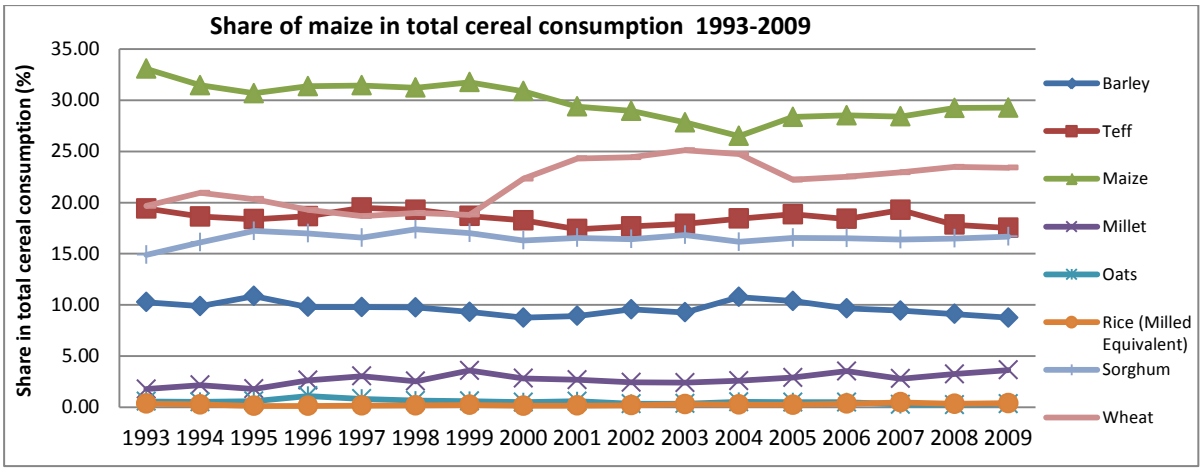
Table 2: Rural vs. Urban Per Capita Calorie Consumption of Food Items in Ethiopia, (2004/05)

	Per capita calories			
Food item	Urban	Rural	National	%
Cereals				
Teff	601.70	196.69	254.13	10.91
Wheat	200.59	309.79	294.30	12.63
Barley	38.16	144.58	129.48	5.56
Maize	107.53	435.99	389.40	16.71
Sorghum	94.72	366.21	327.70	14.06
Other- cereals	25.21	53.29	49.31	2.12
Processed-cereals	195.15	17.10	42.35	1.82
Enset/kocho/bulla	27.18	215.15	188.49	8.09
Total cereals &enset	1290.24	1738.79	1675.17	71.90
Non-cereals				
Pulses	123.94	167.06	160.95	6.91
Oil-seeds	2.49	5.43	5.01	0.22
Animal-products	65.43	58.07	59.12	2.54
Oil & fat	145.18	31.91	47.98	2.06
Vegetables & fruits	60.78	59.43	59.62	2.56
Pepper	6.89	3.57	4.04	0.17
Coffee/tea/chat	30.62	42.72	41.01	1.76
Root-crops	72.36	124.52	117.12	5.03
Sugar & salt	93.54	51.67	57.61	2.47
Other-foods	96.47	103.28	102.31	4.39
Total (National)	1987.96	2386.46	2329.94	100.00

Source: GuushBerhane, et al., Food Grain Consumption and Calorie Intake Patterns in Ethiopia, ESSP II Working Paper 23, IFPRI/ EDRI, May 2011.

Although the share of maize in the total cereal consumption is higher than other cereals, its share has slightly declined from an average of 31.5 percent during 1993-2000 to 28.5 percent during 2001-2009 (Figure 5). During the later period, the consumption of maize declined in favor of wheat until 2011/12, when likely due to increased wheat prices, maize consumption increased again by substitution effect (USDA, 2013). Increases in both wheat and maize consumption also reflect the gradually higher price of teff. In addition, the use of maize for feed, e.g., for poultry, is gradually increasing, indicating the growing importance of maize over time.

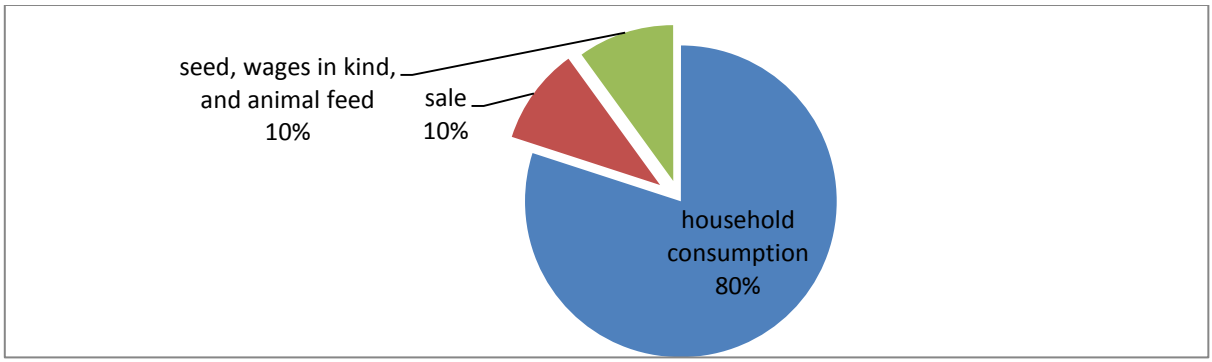
Figure 5: Trends in the Share of Major Staples in the Total Cereal Consumption in Ethiopia, 1993-2009



Source: Author's elaboration based on FAOSTAT data

Maize is an important crop for food security in Ethiopia; CSA data shows that 80% of the maize produced by smallholders is used for household consumption, 10% for sale and the remaining 10% for seed and other purposes (Figure 6). Furthermore, maize has the lowest cost per calorie among all major cereals, about 'one-and-a-half and two times lower than wheat and teff, respectively. 19 percent of the calories in the diet come from maize and its average consumption is 45kg/person (de Groote et al 2002). Maize is also a cheaper source of protein relative to other cereals; 'maize provides 0.2 kg of protein per USD, compared to 0.1 kg of protein per USD from teff and 0.2 kg of protein from wheat and sorghum (Rashid, et al., 2011).

Figure 6: Maize Output Utilization by Farm Households in Ethiopia



Source: CSA data, 2011/12

Medium or large scale milling and processing in Ethiopia is largely limited to wheat, with very few companies involved in processing maize (Rashid, et al. 2010). Despite having the largest number of livestock in Africa, the use of maize grain as animal feed is very limited in Ethiopia, although farmers use the stalks for feed, fuel wood and construction material.

MARKETING AND TRADE

Although improvements are being made in transport and information infrastructure, grain marketing has long been constrained by the remoteness of many rural areas and by the lack of all-weather feeder roads and motorized transport. Since the late 1990s however, public investment in road networks has significantly increased. The Government, with the support of donors, launched the Road Sector Development Program (RSDP) as part of the effort to accelerate growth within the

framework of the broader strategy of agricultural development led industrialization (ADLI). In 2008, Ethiopia had almost 24,000 kilometers of rural roads, almost five times the length of rural roads that existed in 1992. This increased further up to 31,550 km by April 2013.

Mobile phone ownership grew from almost zero in 1999 to about two million in 2008, with the number of subscribers countrywide reaching 18,000 in December 2013. Private investment in trucks increased significantly as well, with the number of small trucks (up to 7 tonnes capacity) increasing eight fold, from 5,590 in 1993 to 48,197 in 2008.

Progress in the area of marketing arrangements and institutions seems to have lagged behind the development in infrastructure (Demeke, 2012). Farmers still sell their surplus maize in the open market to local consumers, assemblers or to regional traders. Farm level storage facilities are inadequate and producers often sell their marketable surplus immediately after harvest when prices are lowest. Trade takes place as a "cash-and-carry" transaction. Buyers and sellers meet personally, negotiate prices and inspect the grain on the spot and complete the transaction with cash payment to the seller/farmer. As there is no reliable market information and organized exchange systems, buyers and sellers have to bargain and negotiate to arrive at mutually agreed prices (e.g. Jaleta, 2007). Because of producers' lack of market information, the role of brokers in the exchange system is substantial (Gabremedhin, 2001). The number of traders at primary, secondary or central market levels has increased considerably, and many operate without licenses, undercutting formally registered traders (Demeke, et al. 2012); no study has estimated this number yet.

Since access to capital is limited, most traders have to sell the produce they buy as quickly as possible, rather than store it for sale later during the lean season. Such a system is highly inefficient because it involves several levels of marketing and introduces huge overheads on the final market price (Rogstadius, 2009). In addition to lack of storage, famers have limited income to spend (e.g., for clothing, to repay debts and other social obligations) and they settle those obligations by selling to assemblers immediately after harvests at a low bargaining power.

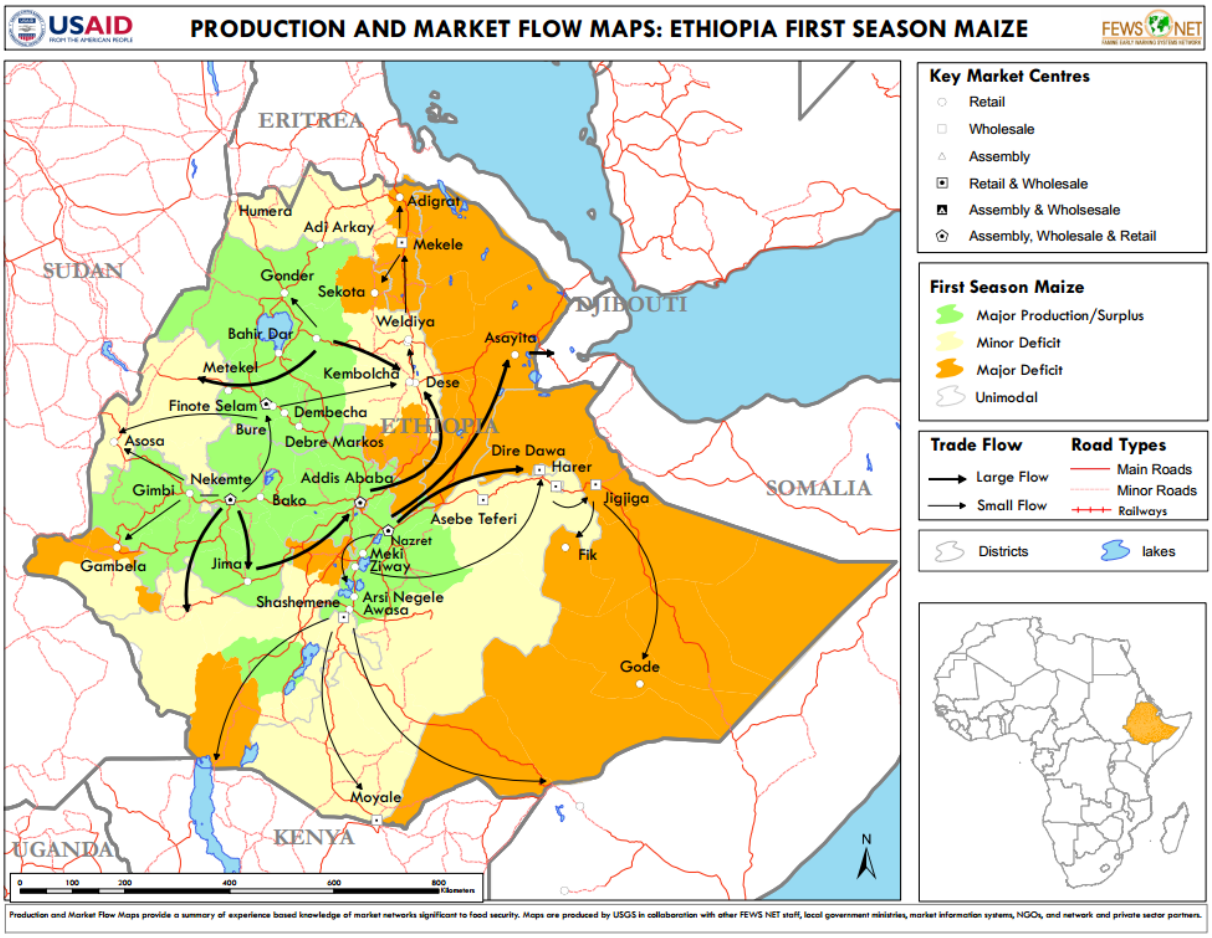
The supply market is also fragmented as a result of the small volume handled by traders and the limited number of large scale buyers. Large buyers also face the challenges of procuring a uniform and consistent supply of quality maize because there is no formal quality control infrastructure such as instruments for checking the level of moisture content, color or size, resulting in concerns about the presence of aflatoxins (Rashid, et al., 2010). With no standardization and quality assurances, grains have to be inspected visually and repackaged every time they change hands, which likely increases the marketing costs along the value chain.

The market for maize does not provide price incentives for better quality and safe maize production and handling practices. More importantly, maize prices collapse considerably whenever there are bumper harvests, as was the case in 1995/96, 1996/97, 1999/00, and 2001/02 (The RATES Center, 2003). Unlike teff and other cereals, the domestic demand for maize (as staple food) is limited in urban areas where the purchasing power is relatively higher. Hence prices are often low and maize is grown mainly for home consumption, with only about 20 percent of production sold in the market[2].

[2] Agricultural Transformation Agency (ATA), http://www.ata.gov.et/programs/value-chain-programs/maize/

The major pathways of maize trade in Ethiopia are from (Figure 7) (i) Jimma to Addis Ababa's central market; (ii) Nekempte to the lowlands of Gambella and SNNPR sub-districts; (iii) central Oromia to Afar, Dire Dawa and Desse and; (iv) central Amhara to Benishangul-Gumz and Desse.

Figure 7: Production and Market Flow Maps of Maize in Ethiopia



Source: FEWSNET, 2014

There are many minor market pathways mainly directed from the highlands of Oromia, Amhara and SNNPR to the lowlands, implying that the highland is the major supplier, though the lowlands have better agro-climatic conditions for maize production (MOFED, 2010). There has been no study that estimates new pathways in maize trade from 2011-2013, nor the cereal trade around the border between neighboring countries.

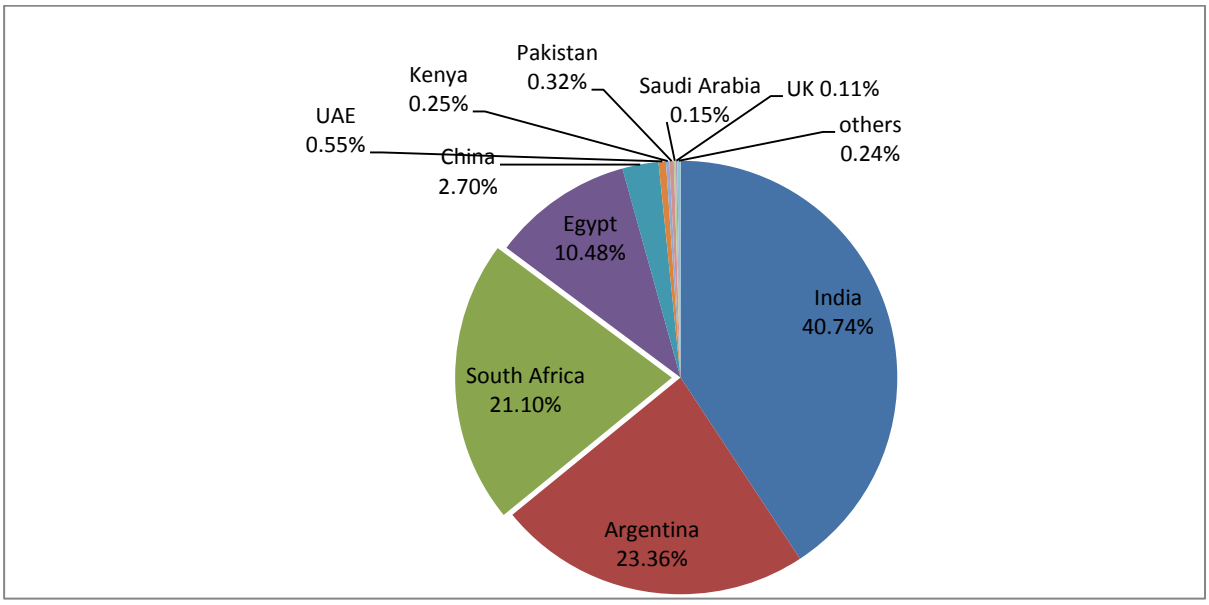
As shown in Figure 10 below, Ethiopia was a net importer of maize from 2005 to 2009, a net exporter in 2010 and 2011, and a net importer again in 2012. Grain was imported during years of serious shortages (e.g., 2008), with the main objective being to sell it (mainly wheat) at subsidized prices to low-income groups in urban areas. Grain imports are largely operated through the parastatal company, the Ethiopian Grain and Trade Enterprise (EGTE).

Ethiopia's import of maize was reported as 60,153.2 tonnes in 2011, which is higher than the previous six years' average of 40,392 tonnes. According to the FAO database, the volume of official maize imports increased during 2005-2010 (average of 40,393 tonnes) compared to the period 2000-2004 (average of 13,584 tonnes), increasing about three-fold. Nevertheless, the share of imported maize in the total maize supply is very low; imports accounted for less than one percent of total

production in 2000-2009, and this trend continued until 2012. The majority of the import is part of food aid shipments coming from donors, such as the United States, accounting for 38 percent of the total maize import during the period 2000-2011.

During 2000-2011, maize imports from India and Italy, the second and third most important partners, occurred mainly in 2009, with almost no imports in other years during the period. In 2012, however, imports from the United States were overtaken by India, with a share of 40.7 percent, followed by imports from Argentina and South Africa (Figure 8). Commercial importing of maize is not feasible since import parity prices are often significantly above domestic prices (Figure 11).

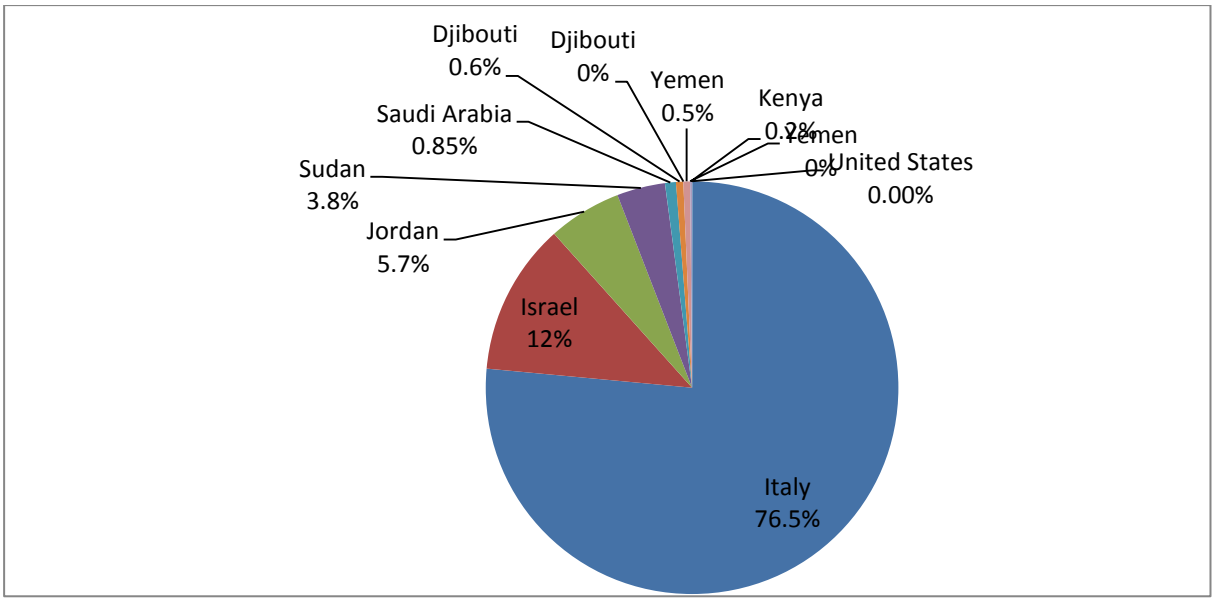
Figure 8: Partner Countries from which Ethiopia Imports Maize, 2012



Source: UNCOMTRADE, 2012

Export promotion has been sought as a solution to maize surplus and price collapse but there has been limited success in exporting the commodity. The volume of official maize exports remained low and erratic until 2010, as shown in Figure 10. In 2010 and 2011, however, Ethiopia became a net exporter to countries such as Italy, Israel, Jordan, Sudan and others (Figure 9).

Figure 9: Share of Maize Export Among Ethiopia's Trading Partners, 2011

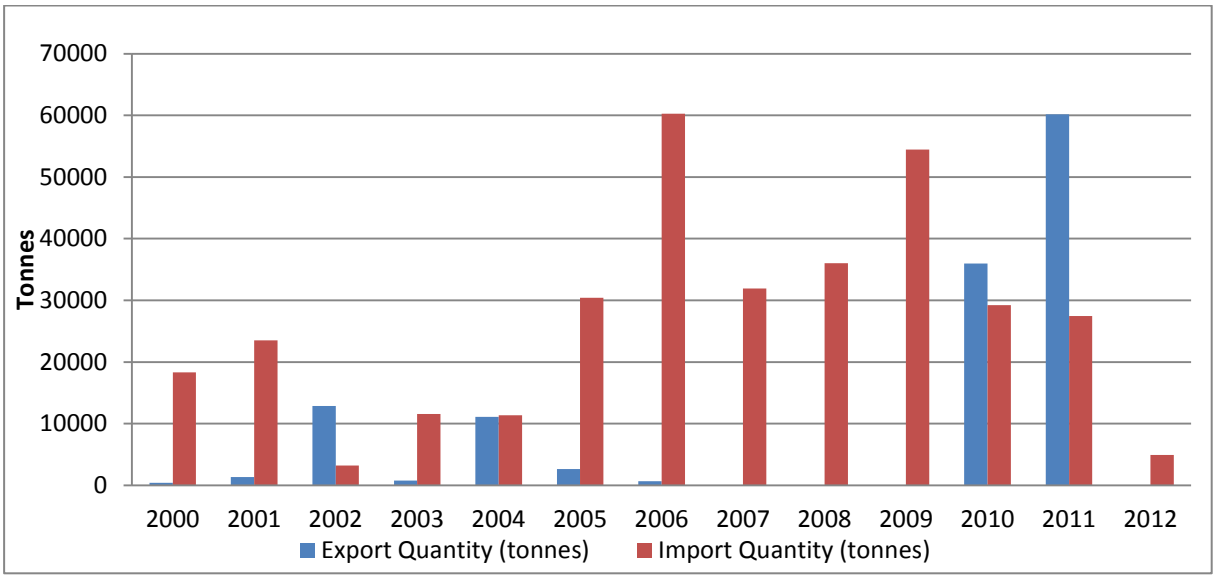


Source: UNComtrade

Apart from limited surplus and export bans, low export parity prices (see Figure 11) have discouraged the commercial export of maize, resulting in a net negative trade balance for most of the period.

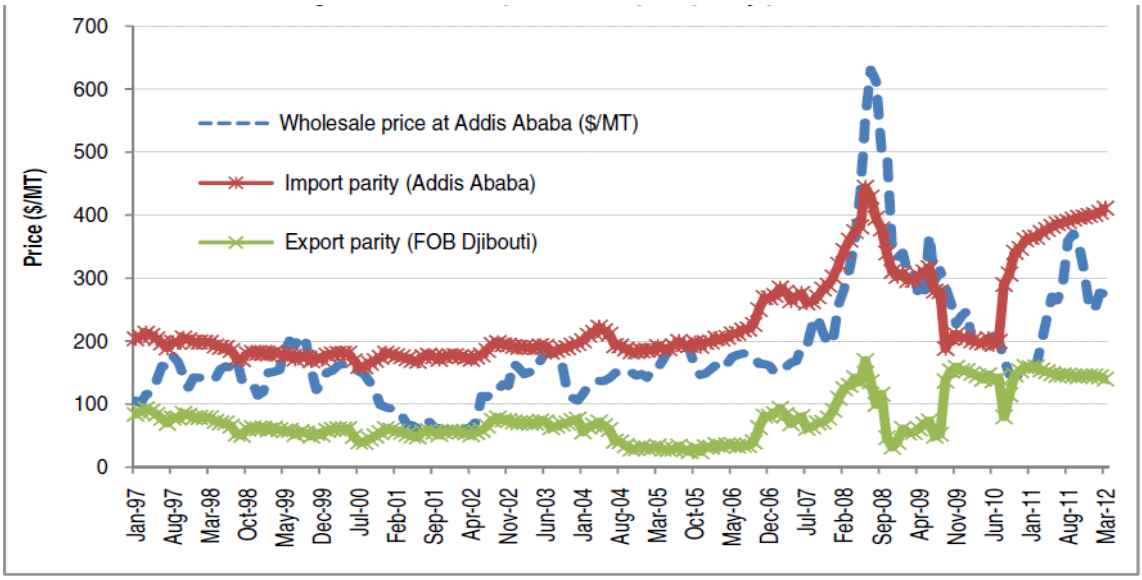
In general, importing or exporting maize is seldom a commercial option in Ethiopia for four major reasons: (i) high transport cost to export and import maize; (ii) export bans; (iii) volatile prices and; (iv) geographically dispersed production.

Figure 10: Trend in Export and Import of Maize, Ethiopia (2000-2012)



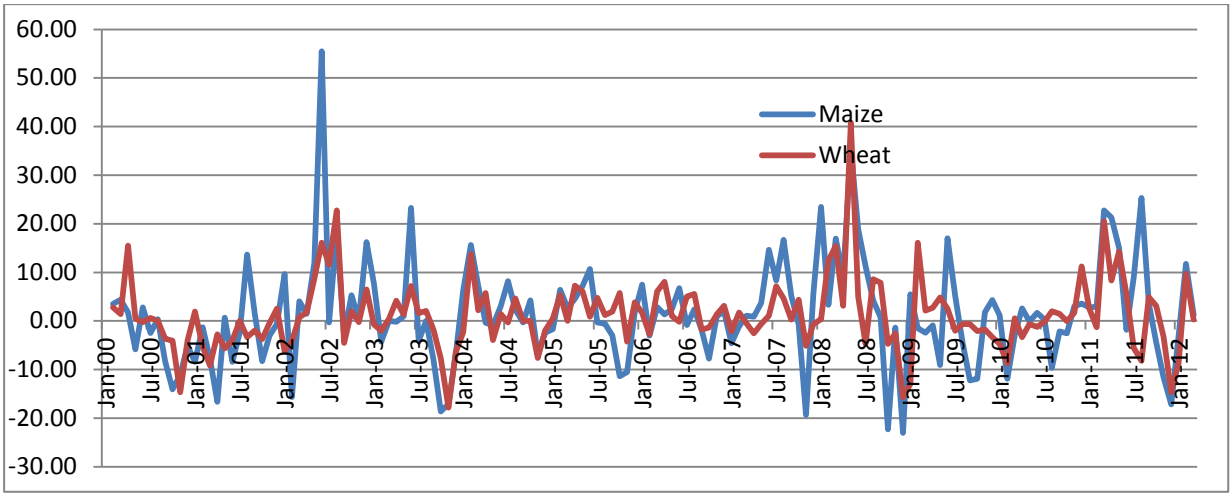
Source: FAOSTAT 2000-2011, and Ethiopian Customs Authority for 2012

Figure 11: Import and Export Parity Prices of Maize in Ethiopia (Jan 1997 - March 2012)



Source: Tadesse (2012) ASARECA project (preliminary draft report), EDRI

Figure 12: Monthly Changes in Wholesale Prices in Addis Ababa (Aug. 2001 – Dec. 2009)



Source: Adapted from 2010 technical note of maize (Calculated based on GIEWS data)

After a closer look at the geographic dispersion of maize production in the market flow map (Figure 7), trade implications have become clear; small volumes from spatially dispersed locations involve high marketing cost, thus discouraging trade.

DESCRIPTION OF THE VALUE CHAIN

The maize value chain in Ethiopia involves input suppliers, producers, traders (local assemblers and wholesalers), retailers, processors and consumers (Figure 11). The marketing chains are long and involve too many operators who rarely provide marketing services beyond transport and storage. Linkage is very limited between input suppliers and output traders; Input supply is dominated by two parastatals, the Ethiopian Seed Enterprise (ESE) and the Agricultural Input Supply Enterprise (AISE). Unlike in the input market, the EGTE has a limited role in the domestic grain market under the present Government, purchasing bulk grain either for export or stocking the domestic grain reserve.

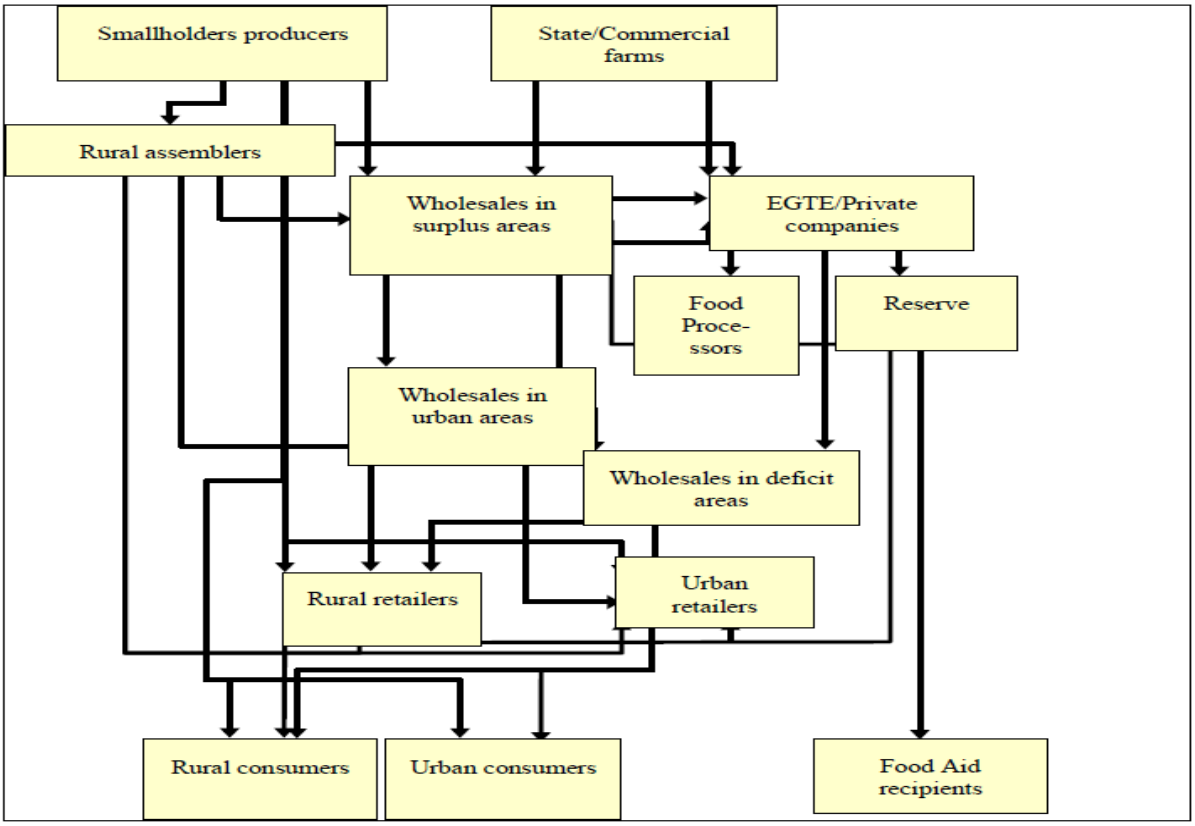
Farmers use transport animals like donkeys, human labor or cars to transport their grain to the nearest local or regional market. They may also sell to rural assemblers, mostly independent operators at primary markets, who assemble and transport the grain using pack animals and small trucks for sale in secondary or urban markets.

Local markets in surplus producing areas often have a number of regional traders who transport and sell grain in Addis Ababa to wholesalers and processors by means of brokers. The broker arranges the sale ahead of time so that the grain can be unloaded at the buyer's warehouse.

Brokers receive the truckload of grain from the truck driver, who sells on behalf of their regional client (Rashid and Negassa, 2011). The grain is commonly unloaded at the buyer's warehouse and the money is sent to the regional trader through the bank of the truck driver. Brokers are paid fees, which range between one and four Birr per 100 kg in 2012.

Regional wholesalers operate with limited capital and commonly use small trucks (less than 10 tonnes) to transport to the central market (Addis Ababa). There are no big traders with significant storage and trucking capacity, resulting in small scale or volume of operation, high cost and high risk, and poor coordination. Among the factors that have contributed to high transaction costs and dysfunctional maize markets are lack of formal grades and standards, lack of adequate warehouse facilities, lack of market information, and inadequate contract enforcement mechanisms. Lack of quality assurance, for instance, has meant that goods have to be inspected visually and repackaged every time they change hands, resulting in a highly inefficient system and huge handling costs.

Figure 13: Main Pathway for the Maize Value Chain in Ethiopia, 2003



Source: The RATES Center, 2003

POLICY DECISIONS AND MEASURES

The government's central economic strategy guiding the integrated and comprehensive policies aimed at achieving poverty reduction and broad based economic growth is **Agricultural Development Led Industrialization (ADLI).** Launched in 1991 in cooperation with the WB and IMF[3], this long-term strategy continues to evolve in response to changing circumstances while pursuing the transformation of the economic structure of the country, in a shift from subsistence to commercial agriculture for the growth of industry and services. In order to fulfill this development vision, two five-year plans have been implemented over the 2007-2013 review period.

During the **Plan for Accelerated and Sustained Development to End Poverty (PASDEP)** 2005/06 to 2009/10, Ethiopia achieved rapid agricultural development led economic growth and witnessed progress in the targeted growth of the service sector. Yet, the growth and investment targets for the current **Growth and Transformation Plan (GTP)** 2010/11-2014/15 are even higher to maintain or exceed an average GDP growth rate of 11 percent. More specifically, the plan aims to enhance and strengthen productivity of smallholder farmers and pastoralists, marketing systems, private sector engagement, irrigation and infrastructure, and to significantly reduce the number of chronically insecure households.[4] Cereal production is given attention through an intensive extension program and promotion of agricultural technologies. The GTP aims to double grain output by 2015 (MOFED, 2010). To increase grain output, the other strategy is to encourage local and foreign investors to invest in the abundant lowlands.

The **Policy Investment Framework** 2010-2020 aims to operationalize the GTP, ADLI and the CAADP Compact signed in 2009 by prioritizing and planning investments, and securing finance needed from the government and international development partners. The **Agriculture Growth Program (AGP)** 2010-2015 also falls under the broader ADLI and GTP, attempting to increase productivity, market performance and processing along the entire value chain of several key commodities.[5]

Between 1976 and 1990, the former Government controlled grain trade through a Government parastatal, the Agricultural Marketing Corporation (AMC). Farmers and traders were forced to sell grain to the AMC at administratively fixed low prices. The AMC sold food grain it purchased to urban consumers, mainly in the city of Addis Ababa, through food ration shops (Gabre-Madhin, 2001). After 1991, the new Government of Ethiopia introduced policy reforms that restored private trade, and the AMC was transformed and renamed as the Ethiopian Grain Trade Enterprise (EGTE). The EGTE now operates in the open market in competition with the private sector with the objectives of (i) stabilizing prices for producers and consumers; (ii) earning foreign exchange through exporting grain and; (iii) facilitating the purchase and distribution of Emergency Food Security Reserve. Over the years, the public enterprise has expanded its role from price stabilization to include exporting pulses and oilseeds (Rashid and Negassa, 2011), as well as cereals, such as maize, in the years allowed: 2010 and 2011.

The most recent and important market development measure in Ethiopia has been the establishment of the Ethiopian Commodity Exchange (ECX). The objective of the ECX is to revolutionize agricultural trade through the creation of a new marketplace that serves farmers,

[3] For more information, please refer to; http://www.ethiopia.gov.et/policies-and-strategies1 accessed on 01/04/2014

[4] For more information, please refer to; http://www.ata.gov.et/priorities/national-growth-transformation-plan/; accessed on 01/04/2014

[5] This section was composed using information gathered from the MoARD Report: Ethiopia's Agricultural Sector Policy and Investment Framework (PIF) 2010-2020, September 2010; http://www.caadp.net/pdf/Ethiopia%20Post-Compact%20Investment%20Plan.pdf

traders, processors, consumers and other actors. The ECX commenced its trading operations in April 2008. Among its members are cooperative unions, industrial processing enterprises, commercial farmers, private exporters and domestic trading firms engaged in agricultural commodity businesses. The ECX currently operates warehouses in major market centers, including Addis Ababa, Adama, Shashemene, Nekempte, Humera, Metema and Bure. However, maize is not among the major commodities traded at ECX; trade is still largely limited to coffee, sesame and pea-bean (Rashid and Negassa, 2011), and more recently mung-bean.

In Ethiopia, high food-price volatility was prevalent in 2008, 2011 and 2012. The inflation rate of cereals during 2008, 2011 and 2012 were respectively 99, 34 and 33 percent, whereas the general inflation rate in the three years were respectively 44, 33 and 23 percent (CSA, 2013). Government policy responses to the price hikes in 2008 and in 2011 have included the importation and sale of imported wheat, edible oil and corn to the urban poor at subsidized prices, mainly through the EGTE. Beginning in April 2008, the Government's rationing of the foreign exchange inhibited private sector imports, which finally resulted in less imports and higher prices. It is argued that allowing the private sector access to the foreign exchange to import grain would have had the same welfare effects, while saving the Government US$ 90 million in subsidy rents (Dorosh, et al. 2009).

Beyond implicit private import restriction, the Government explicitly banned grain exports in February 2008. This was lifted for cereals such as maize in July 2010, only to be re-imposed in March 2011, as rising food prices started to take a toll on the general inflation;[6] a measure that is still in place. Occasionally, once the domestic supply needs were considered met, maize exports were allowed to neighboring countries (USDA, 2013). The lack of reliable and real time data poses a major threat in these circumstances, since it is based on available data that the *sufficiency* of national supply is decided. The available data from the Ethiopian Revenue and Customs Authority (ERCA) and the United Nations COMTRADE database (UN Comtrade) indicates that in the years of allowed exports (2010/11), the country was a net exporter of maize.

Other measures in response to the 2008 food price crisis include the reintroduction of urban food rationing, and the informal suspension of local procurement by WFP and other food aid donors. Moreover, in a response to increasing inflation of wheat and other grains, the government lifted value-added & turnover taxes on imported foodstuffs (USDA, 2013).

A key measure aimed at increasing maize production was the Crash Seed Multiplication Programme (CSMP), launched during the 2008/09 production season. The programme objective was to address the shortage of improved seed in relation to demand, and thus, was primarily focused on the multiplication and distribution of certified hybrid maize varieties. The programme was centrally driven by the MoARD and involved all relevant institutions, such as the Ethiopian Institute for Agricultural Research (EIAR), the National Seed Multiplication and Distribution Committee (NSMDC) and the Ethiopian Seed Enterprise (ESE). Overall, the supply of certified hybrid seeds was increased from about 87,000 quintals in 2008/09 to an estimated 193,000 quintals by 2010/2011.[7]

[6] http://ethiopiantimes.wordpress.com/2011/03/19/government-re-imposes-maize-export-ban/

[7] For more information please see; The Political Economy of Ethiopian Cereal Seed Systems at: Policy_Brief_048 v2 (2).pdf

3. METHODOLOGY

MAFAP methodology seeks to measure price incentives for producers and other marketing agents in key agricultural value chains. The analysis is based on the comparison between observed domestic prices and constructed reference prices. Reference prices are calculated from the international price of the product at the country's border, where the product enters the country (if imported) or exits the country (if exported). This price is considered the benchmark price, free of influence from domestic policies and markets. MAFAP estimates two types of reference prices – observed and adjusted. *Observed reference prices* are those that producers and other marketing agents could receive if the effects of distortions from domestic market and trade policies, as well as overall market performance, were removed. *Adjusted reference prices* are the same as observed reference prices, but also exclude the effects of any additional distortions from domestic exchange rate policies, structural inefficiencies in the commodity's value chain, and imperfect functioning and non-competitive pricing in international markets.

MAFAP's price incentives analysis is based on the law of one price, which is the economic theory that there is only one prevailing price for each product in a perfectly competitive market. This law only applies in the case of homogeneous goods, if information is correct and free, and if transaction costs are zero. Thus, this analysis was conducted for goods that are either perfectly homogeneous or perfect substitutes in the local market in terms of quality, or, failing that, are simply comparable goods. Indicators calculated from reference and domestic prices will, therefore, reveal whether domestic prices represent support (incentives) or a tax (disincentives) to various agents in the value chain.

Domestic prices are compared to reference prices at two specific locations along commodity value chains – the farm gate (usually the main production area for the product) and the point of competition (usually the main wholesale market where the domestic product competes with the internationally traded product). The approach for comparing prices at each location is summarized below, using an imported commodity as an example. In this situation, the country is importing a commodity that arrives in the port at the benchmark price (usually the unit value CIF price at the port of entry). In the domestic market, we observe the price of the same commodity at the point of competition, which is in this case the wholesale market, and at the farm gate. We also have information on observed access costs, which are all the costs associated with bringing the commodity to market, such as costs for processing, storage, handling, transport and the different margins applied by marketing agents in the value chain. These include access costs between the border and wholesale, as well as between the farm gate and wholesale.

The benchmark price is made comparable to the domestic price at wholesale by adding the access costs between the border and wholesale, resulting in the observed reference price at wholesale. This takes into account all the costs incurred by importers and other agents to bring the commodity to market, which in effect, raises the price of the commodity. The reference price at wholesale is further made comparable to the domestic price at the farm gate by deducting the access costs between the farm gate and wholesale, resulting in the observed reference price at farm gate. This takes into account all the costs incurred by farmers and other agents to bring the commodity from the farm to the wholesale market. Mathematically, the equations for calculating the observed reference prices at wholesale(RP_{owh}) and farm gate $(RP_{ofg})$for an imported commodity are as follows:

$$RP_{owh} = P_b + AC_{owh}$$

$$RP_{ofg} = RP_{owh} - AC_{ofg}$$

where AC_{owh} are the observed access costs from the border to wholesale, including handling costs at the border, transport costs from the border to the wholesale market, profit margins and all observed taxes and levies, except tariffs, and P_b is the benchmark price. AC_{ofg} are the observed access costs from the farm gate to wholesale, including handling costs at the farm, transport costs from farm to wholesale market, processing, profit margins and all observed taxes and levies.

The same steps described above can be taken a second time using benchmark prices and access costs that have been adjusted to eliminate market distortions due to exchange rate misalignments, structural inefficiencies in the commodity's value chain[8] and imperfect functioning and non-competitive pricing in international markets, where possible and relevant. The adjusted benchmark prices and access costs are then used to generate a second set of *adjusted* reference prices, in addition to the first set of *observed* reference prices calculated.

For exported commodities, a slightly different approach is used. In this case, the border is generally considered the point of competition (wholesale), and the unit value FOB price for the commodity is normally taken as the benchmark price. Furthermore, observed and adjusted reference prices at wholesale are obtained by subtracting, rather than adding, the access costs between the border and wholesale. Mathematically, the equations for calculating the observed reference prices at wholesale(RP_{owh}) and farm gate $(RP_{ofg})$for an exported commodity are as follows:

$$RP_{owh} = P_b - AC_{owh}$$

$$RP_{ofg} = RP_{owh} - AC_{ofg}$$

After observed and adjusted reference prices are calculated for the commodity, they are subtracted from the domestic prices at each point in the value chain to obtain the observed and adjusted price gaps at wholesale and farm gate. *Observed price gaps* capture the effect of distortions from trade and market policies directly influencing the price of the commodity in domestic markets (e.g. price ceilings and tariffs), as well as overall market performance. *Adjusted price gaps* capture the same as the observed, in addition to the effect of any distortions from domestic exchange rate policies, structural inefficiencies in the commodity's value chain, and imperfect functioning and non-competitive pricing in international markets. Mathematically, the equations for calculating the observed price gaps at wholesale(PG_{owh}) and farm gate $(PG_{ofg})$are as follows:

$$PG_{owh} = P_{wh} - RP_{owh}$$

$$PG_{ofg} = P_{fg} - RP_{ofg}$$

where $P_{fg}$is the domestic price at farm gate, RP_{ofg} is the observed reference price at farm gate, P_{wh} is the domestic price at wholesale, and RP_{owh} is the observed reference price at wholesale.

[8] Structural inefficiencies in commodity value chains may include government taxes and fees (excluding fees for services), high transportation and processing costs, high profit margins captured by various marketing agents, bribes and other non-tariff barriers.

A positive price gap, resulting when the domestic price exceeds the reference price, means that the policy environment and market functioning as a whole generate incentives (support) to producers or wholesalers. For an imported commodity this could be due to distortions such as the existence of an import tariff. On the other hand, if the reference price exceeds the domestic price, resulting in a negative price gap, this means that the policy environment and market functioning as a whole generate disincentives (taxes) to producers or wholesalers. For an imported commodity this could be due to distortions such as a price ceiling established by the government to keep domestic prices low.

In general, price gaps provide an absolute measure of the market price incentives (or disincentives) that producers and wholesalers face. Therefore, price gaps at wholesale and farm gate are divided by their corresponding reference price and expressed as a ratio, referred to as the ***Nominal Rate of Protection (NRP)***, which can be compared between years, commodities and countries.

The *Observed Nominal Rates of Protection* at the farm gate (NRP_{ofg}) and wholesale (NRP_{owh}) are defined by the following equations:

$$NRP_{ofg} = \frac{PG_{ofg}}{RP_{ofg}} \; ; \; NRP_{owh} = \frac{PG_{owh}}{RP_{owh}}$$

where $PG_{ofg}$is the observed price gap at farm gate, RP_{ofg} is the observed reference price at the farm gate,$PG_{owh}$is the observed price gap at wholesale and RP_{owh} is the observed reference price at wholesale.

Similarly, the *Adjusted Nominal Rates of Protection* at the farm gate (NRP_{afg}) and wholesale (NRP_{awh}) are defined by the following equations:

$$NRP_{afg} = \frac{PG_{afg}}{RP_{afg}} \; ; \; NRP_{awh} = \frac{PG_{awh}}{RP_{awh}}$$

where $PG_{afg}$is the adjusted price gap at farm gate, RP_{afg} is the adjusted reference price at the farm gate,$PG_{awh}$is the adjusted price gap at wholesale and RP_{awh} is the adjusted reference price at wholesale.

If public expenditure allocated to the commodity is added to the price gap at farm gate when calculating the ratios, the ***Nominal Rate of Assistance (NRA)*** is generated. This indicator summarizes the incentives (or disincentives) due to policies, market performance and public expenditure.[9] Mathematically, the Nominal Rate of Assistance is defined by the following equation:

$$NRA = \frac{PG_{afg} + PE_{csp}}{RF_{afg}}$$

where PE_{csp} is commodity-specific public expenditure that has been identified and measured as monetary units per tonne.

[9] The NRA indicator was not calculated for any of the commodities analyzed because of insufficient data on public expenditure. However, it will be developed in the forthcoming reports, as the public expenditure analysis is improved and better data are made available.

Finally, MAFAP methodology estimates the ***Market Development Gap (MDG),*** which is the portion of the price gap that can be attributed to "excessive" or inefficient access costs within a given value chain, exchange rate misalignments, and imperfect functioning of international markets. "Excessive" access costs may result from factors such as poor infrastructure, high processing costs due to obsolete technology, government taxes and fees (excluding fees for services), high profit margins captured by various marketing agents, bribes and other non-tariff barriers. Therefore, the total MDG at farm gate is comprised of three components – gaps due to "excessive" access costs, the exchange rate policy gap and the international market gap. When added together, these components are equivalent to the difference between the observed and adjusted price gaps at farm gate.

Similar to the price gaps calculated, the MDG is an absolute measure, which is also expressed as a ratio to allow for comparison between years, commodities, and countries. This relative indicator of the total MDG affecting farmers is derived by calculating the ratio between the total MDG at farm gate and the adjusted reference price at farm gate as follows:

$$MDG_{fg} = \frac{(ACG_{wh}+ACG_{fg}+EXPG+IMG)}{RP_{afg}}$$

where ACG_{wh} is the access cost gap at wholesale defined as the difference between observed and adjusted access costs at wholesale, ACG_{fg} is the access cost gap at farm gate defined as the difference between observed and adjusted access costs at the farm gate, ERPG is the exchange rate policy gap, and IMG is the international market gap.

A more detailed description of the methodology applied in this analysis is available on MAFAP's website atwww.fao.org/in-action/mafap.

4. DATA REQUIREMENTS AND CALCULATION OF INDICATORS

To calculate MAFAP's price incentives indicators, several types of data are needed. This section presents the data that was obtained and methodological decisions that were taken in this analysis.

TRADE STATUS OF THE PRODUCT

The three main data sources used to determine maize's trade status are FAOSTAT, UN Comtrade and ERCA (Table 3). Data from UN Comtrade is typically extracted from national customs authorities and, as could be expected, the figures are almost the same as those from ERCA for all years of the study period except for 2005 and 2006, when the two datasets report opposite trade status. FAOSTAT figures strongly differ, in absolute values, from ERCA's and UN Comtrade's for all years except 2008 and 2011, but report the same trade status as the two other data sets except in 2005 and 2006.

For those two years, it has been decided to use FAOSTAT data to determine maize's trade status in Ethiopia. Based on (Demeke, 2012), it appears more reasonable to consider Ethiopia as a net importer of maize during those 2 years: an export ban on maize was implemented in 2006, and exports were erratic in 2005. The figures on imports from UN Comtrade and ERCA for 2005 and 2006 appear unrealistic, with only 42 and 9 tonnes, respectively, all the more because Ethiopia is not self-sufficient in maize.

For the period 2007 to 2012, all three data sets show that Ethiopia is a net importer of maize from 2007 to 2009 and for 2012; and a net exporter for 2010 and 2011.

Table 3: Trade Status of Maize, Ethiopia, in Tonnes (2005-2012)

Year	2005	2006	2007	2008	2009	2010	2011	2012
UN Comtrade								
Import	42	71	3201	33157	5081	2216	1904	2444
Export	1838	631	0	0	0	34903	59994	0
Net (m-x)	-1796	-560	3201	33157	5081	-32687	-58091	2444
Trade status	**X**	**x**	**m**	**m**	**m**	**x**	**x**	**m**
Ethiopian Revenue and Customs Authority								
Import	9	224	3201	33157	5066	2216	1869	970
Export	976	71	0	0	0	34903	59994	0
Net (m-x)	-967	153	3201	33157	5066	-32687	-58125	970
Trade status	**X**	**m**	**m**	**m**	**m**	**x**	**x**	**m**
FAOSTAT								
Import	30436	60271	31912	36050	54466	29222	7625	**na**
Export	2606	672	17	0	0	35994	60148	**na**
Net (m-x)	27830	59599	31895	36050	54466	-6772	-52523	**na**
Trade status	**M**	**m**	**m**	**m**	**m**	**x**	**x**	**na**

Source: UN Comtrade, FAOSTAT and Ethiopian Revenue and Customs Authority data, 2014

MARKET PATHWAY ANALYSED

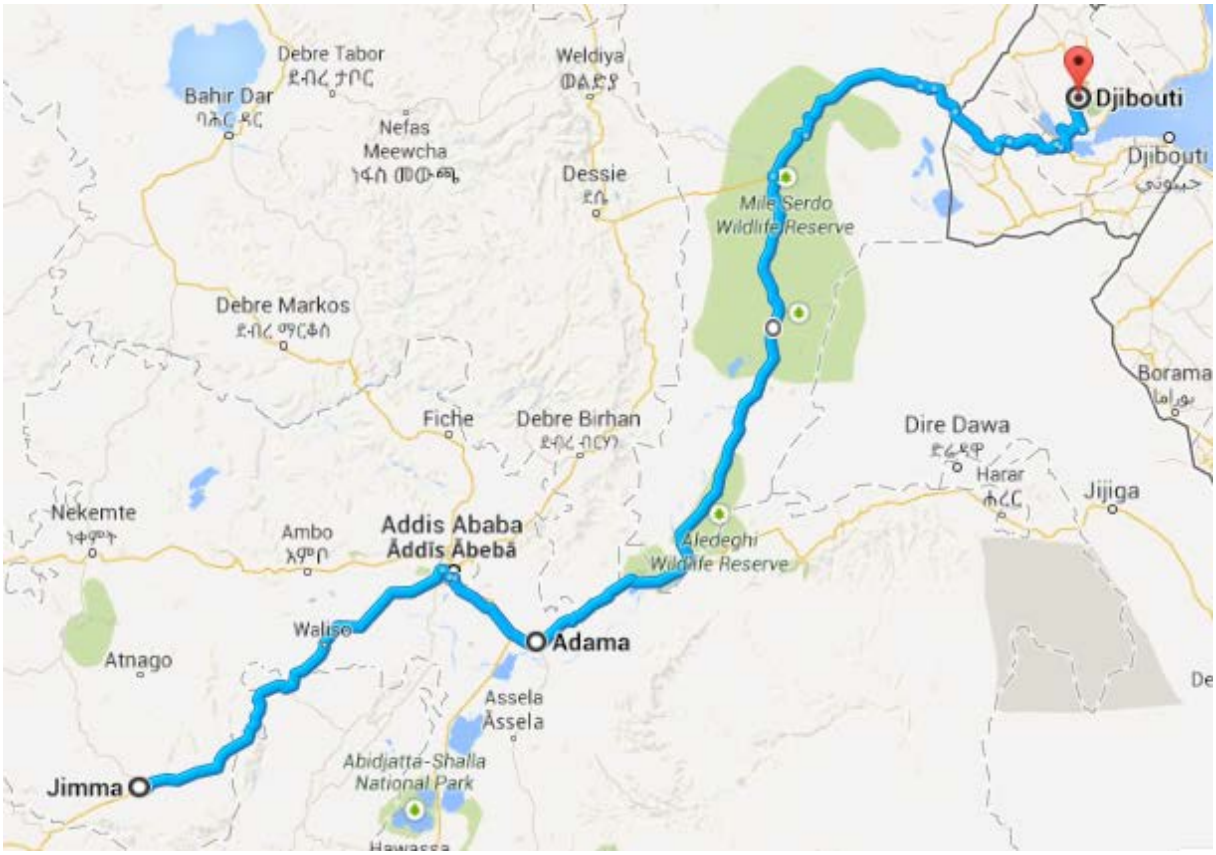
The type of maize that was analyzed is white maize, but the data available refers to an unspecified type of maize.

The main production area in Ethiopia for maize overall is the Oromia Region (61%), as described in the PRODUCTION section. The zone of Jimma is part of the Oromia Region and was thus considered a representative production area for the MAFAP analysis of maize in the country. Maize traders in Jimma and nearby towns, such as Limmu, buy from farmers and assemblers and sell at the central market in Addis-Ababa (see MARKETING AND TRADE section).

Addis-Ababa is therefore considered a representative point of competition between Ethiopian maize and imported maize, as well as between Jimma maize and other maize produced in the country.

For the years in which it was imported, the entry point for maize that was considered is the port of Djibouti, which is the largest port for grains imported from overseas to Ethiopia. Maize is mainly imported from the USA (as food aid), from India and from Argentina (see MARKETING AND TRADE section). The port of Djibouti is also the exit point for maize for the years during which it was exported. Due to export restrictions, few quantities of maize are officially traded in neighboring countries, and data on maize exports in such countries is scarce. Overseas exports were thus considered, which is why the port of Djibouti was considered as an exit point rather than inland border towns.

Figure 14: Market Pathway Analysed for Maize in Ethiopia: Jimma, Production Area, Addis Ababa, Point of Competition and Port Djibouti Point of Entry/Exit



Source: Authors, from Google Maps

BENCHMARK PRICES

Observed

Ethiopia was a net importer of maize from 2005 to 2009 and in 2012; and a net exporter in 2010 and 2011 (see Table 4), thus two different benchmark prices were established.

The benchmark price considered for the years of net import is the CIF price for maize, referred to as *maize excluding seeds*, HS code 10059000 by Customs. For years of net export, the benchmark price considered is the FOB price, referring to the same product as the CIF price. Both CIF and FOB prices were calculated from the ERCA data, as the ratio of total volumes over total value of imported maize

in the port of Djibouti, which is the port of trade outlet for Ethiopia. ERCA figures for value and volumes of imported maize were compared to the same figures from UN Comtrade, which were slightly superior during 2005, 2006, 2008 and 2011 (see Figure 15). ERCA data was preferred over UN Comtrade for the whole period because it is a national source of data. It is interesting to note that the CIF prices computed from ERCA and UN Comtrade data both show a strong increase in 2009, which seems to reflect the international food price hikes of 2008, but with a one year lag (Table 4). This suggests realistic prices.

Table 4: Comparison of Calculated Benchmark Prices for Imported and Exported Maize in Ethiopia, 2005-2012

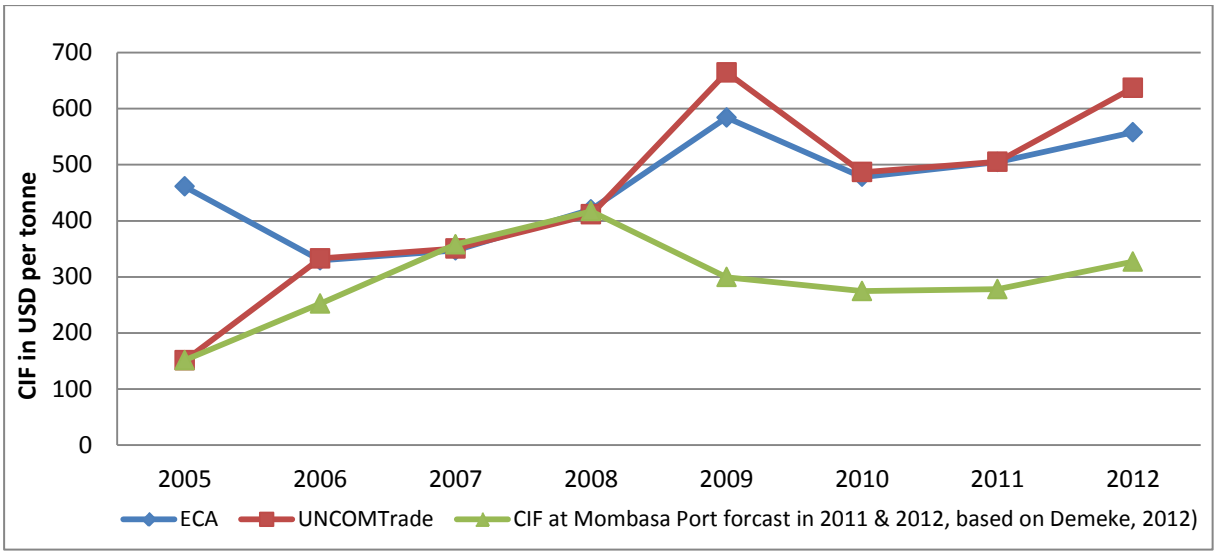
	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Trade Status	m	m	m	m	m	X	x	m
International price used	CIF	CIF	CIF	CIF	CIF	FOB	FOB	CIF
ERCA (MAFAP Benchmark price)	461.00	329.28	347.23	420.21	583.99	478.04	504.62	557.71
UN Comtrade	151.00	332.70	350.60	411.40	664.30	486.50	505.20	637.00
CIF at Mombasa Port for 2011 & 2012	151.31	252.49	358.07	417.12	299.46	274.76	NA	NA

Source: Author's computation from various sources, 2014

Another alternative that was considered but discarded, was to compute a CIF price in Djibouti from the FOB price of maize in Durban, South Africa, which is the 3rd largest exporter of maize to Ethiopia (excluding USA's food aid). This option was considered because the data reported by ERCA (and thus UN Comtrade) may be flawed due to the fact that Customs sometimes resorts to illegal under-declaring practices. Nevertheless, the data was too scarce to produce a satisfactory CIF price at Djibouti for the entire study period.

Due to unavailable data on the freight and insurance costs between the port of Durban and that of Djibouti, the only option was to calculate a CIF price for maize at the port of Mombasa, Kenya. Furthermore, data was only available up to 2010, since Kenya started to import maize from Uganda rather than from South Africa in 2011 and 2012 (see Figure 15 below for a comparison of all price data sources).

Figure 15: Comparison of Maize CIF and FOB Prices in Ethiopia from 2005-2012 (three data sources)



Source: UN Comtrade, ERCA and Demeke (2012)

Adjusted

The benchmark price was not adjusted in this study.

DOMESTIC PRICES

Observed prices at point of competition

The average annual wholesale price for unspecified maize in Addis Ababa is considered the wholesale price at the point of competition, made available from EGTE. In fact, EGTE collects monthly prices for Addis Ababa and several major markets in the country for major cereals, pulses and oilseeds.[10] The years 2008 and 2011 have shown a substantial increase in wholesale price in Addis Ababa (143% and 71%, respectively), which corresponds to the successive food crisis when food prices surged (Table 4). It seems to indicate a relatively good price transmission along the value chain from the international market.

Table 5: Wholesale Price for Maize in the Market of Addis Ababa, in ETB/tonne, 2005-2012

	Unit	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Wholesale purchase price observed at the market of Addis Ababa	ETB/tonne	1469	1463	1705	4152	3385	2623	4498	5013

Source: EGTE, 2013

Observed prices at farm gate

The Jimma farm gate price for maize was calculated from the wholesale price in Jimma that was reported by the EGTE. The Central Statistical Agency (CSA) also reports a series of farm gate prices. The CSA producer price is rather similar to the producer price that was calculated from the EGTE wholesale price between 2005 and 2008, with a difference of lower than 7 percent for all years during this period. Afterwards, the differential increased from 2009 to 2012, reaching 16% in 2009

[10] There are also retail and farm gate prices but these are often incomplete.

and 19% in 2010. Analysts opted for the calculation of farm gate prices with EGTE data for the sake of uniformity in the analysis of data sources between farm gate and wholesale price.

Table 6: Comparison of Maize Producer Price in Jimma from CSA and Calculated from EGTE data, in ETB/tonne and %, 2005-2012

	Unit	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Producer price (EGTE, MAFAP)	ETB/ tonne	1121	1218	1311	3606	3129	1858	3345	4420
Producer price (CSA)	ETB/ tonne	1070	1184	1400	3363	2624	1499	3718	4837
Differential	**%**	**4.60%**	**2.77%**	**(6.83%)**	**6.73%**	**16.14%**	**19.32%**	**(11.16%)**	**(9.43%)**

Source: Author's elaboration based on CSA and MAFAP

The analysts calculated the Jimma farm gate price from the wholesale price in Jimma by deducting from the wholesale price (i) the estimated wholesalers' margin (5 percent of the wholesale price); (ii) transport costs from the wholesale market to farm gate, estimated from the transport cost per kilometer between Addis Ababa and Jimma and; (iii) handling, taxes and fees, and other levies.

Table 7: Calculation of the Farm Gate Price for Maize in Jimma, in ETB/tonne, 2005-2012

		Unit	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
1	Wholesale price in Jimma	ETB/tonne	1243	1345	1453	3881	3409	2089	3721	4888
2	Transport from Addis-Ababa to Jimma	ETB/tonne/km	0.65	0.65	0.82	0.98	1.14	1.55	1.97	2.45
3	Distance from Jimma wholesale to Jimma farm gate (estimated average)	Km	30	30	30	30	30	30	30	30
4	Estimated transport from Jimma wholesale to Jimma farm gate (2*3)	ETB/tonne	19.6	19.6	24.5	29.4	34.3	46.6	59.2	73.5
5	Margin (Wholesale price*5%)	ETB/tonne	62	67	73	194	170	104	186	244
6	Handling (loading)	ETB/tonne	20	20	20	20	30	30	65	80
7	Taxes and fees (brokers' fees)	ETB/tonne	15	15	20	27	35	40	56	60
8	Others (levies)	ETB/tonne	5	5	5	5	10	10	10	10
9	**Estimated producer price in Jimma (1-4-5-6-7-8)**	**ETB/tonne**	**1121**	**1218**	**1311**	**3606**	**3129**	**1858**	**3345**	**4420**

Source: Authors calculations from interviews, EGTE (2014), USAID, Office of Food For Peace Ethiopia, Bellmon Estimation (2010)

Marketing costs between the Jimma wholesale market and farm gate have not been deducted due to the lack of reliable data.

EXCHANGE RATES

Observed

The exchange rate from USD to Ethiopian Birr was used to convert the benchmark price into local currency. It was obtained from the National Bank of Ethiopia (Table 8).

It increased from an average of Birr 8.74 to US$1 in 2005 to 9.80 in 2007 (Demeke, 2012). The rate increased to Birr 12.10 in 2008 and Birr 12.89 in 2009, and further to an average of 16.90 in 2011 and 17.60 in 2012. The jump from Birr 12.89 to Birr 16.90 happened after the devaluation in September 2011.

Table 8: Observed Exchange Rate in Ethiopia, in Birr/tonne, 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Exchange rate (Birr per US$1)	8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60

Source: National Bank of Ethiopia, 2014

Adjusted

Ethiopia adopts a floating exchange rate that is under strong government control. The National Bank of Ethiopia is the sole provider of foreign exchange and only authorized banks and investors who are able to bid for at least USD 0.5 million are allowed to participate in the weekly foreign exchange auction. The marginal rate of each auction (once a week) serves as the official rate until a new rate is established in the next round (a week later).

It is believed that the domestic currency (Birr) was overvalued throughout the 2008-2012 period, especially in 2008, 2009 and 2010 (Demeke, 2012). The extent of overvaluation was estimated at 40 percent during this period and the Government was forced to devalue the Birr by 25 percent in September 2010 (Rashid, 2010). Another study (Dorosh, et al., 2009) showed that the nominal exchange rate appreciated by 13.8 percent between July 2004 and January 2008. The major causes of currency appreciation in Ethiopia are the high rate of inflation (relative to the low inflation rate among its trading partners) and the increasing pressure on foreign exchange reserves. Between 2005 and 2008, inflation rates hit double digits and then declined to 8.5 and 7 percent in 2009 and 2010, only to increase again in 2011 and 2012 to 35 and 21 percent, respectively (CSA). In 2007 and 2008, the foreign currency reserve fell short of the critical requirement of 12 weeks' worth of imports and the Government instituted foreign exchange rationing (Rashid, 2010). In March 2008, access to foreign exchange for imports was rationed to curb excessive drawdown of foreign exchange reserves.

For this analysis, it is assumed that the local currency was, on average, 20 percent overvalued during the period 2005-2010. The exchange rate has been adjusted accordingly in our calculation of adjusted reference prices (Demeke, 2012). Similarly, in 2011 and 2012, a respective adjustment rate of 13 and 12 percent was taken as per the information from IMF and the World Bank. The adjustment factor approximates the depreciation of the local currency, had a more liberal fiscal

policy been pursued. The adjusted exchange rate has thus increased from Birr 10.40 in 2005 per US$1 to Birr 15.47 in 2010 (Table 9), and from Birr 19.10 per US$1 to Birr 19.70 in 2012.

Table 9: Observed and Adjusted Exchange Rate Birr to US$ (annual average)

	2005	2006	2007	2008	2009	2010	2011	2012
Observed (Birr per US$1)	8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
Adjusted (Birr per US$1)	10.40	10.49	11.05	11.76	14.52	15.47	19.10	19.70

Source: National Bank of Ethiopia; IMF and World Bank for 2011 and 2012

ACCESS COSTS

Observed

<u>From border to point of competition/point of competition to border</u>

In our analysis, the access costs between the port and the point of competition (or point of competition to the port, for export years), refer to the segment between the port of Djibouti (entry/exit point for maize and benchmark price) and the wholesale market of Addis Ababa (point of competition price), as described in the MARKET PATHWAY ANALYSED section.

Access costs from the port of Djibouti to the wholesale market of Addis Ababa include surtax and withholding tax, port handling, transport, unloading, license fee, margin and miscellaneous costs (percentage of the CIF price).

The cost estimates for surtax, withholding tax and port handling are based on a USAID Bellmon study (USAID, 2010), and were not reported in 2010 and 2011 because maize was exported during these years. In 2012, the data was collected from the EGTE. Over the years, the variations in the costs from the USAID study correspond to access costs obtained from major grain traders and trade associations from 2005-2010, confirming their reliability.

Transport costs from the port of Djibouti to Addis Ababa were obtained for 2012 from focus group discussions with traders, and were deflated for all previous years of import (2006 to 2009) using the inflation rate from CSA data. The transport costs for 2010 and 2011 are of a different nature, given that maize was exported during these two years. In fact, data from several sources (EGTE, Ethiopian Shipping and Logistic Services Enterprise, other exporters) indicates that transport costs for exports are lower than those of imports, e.g., in 2012, transporters charged ETB 800-900 per tonne of imported maize from the port of Djibouti to Addis Ababa, whereas they only charged ETB 600 per tonne of exported maize. The reason for this difference is that when taking goods to the port of Djibouti from Addis Ababa, transporters have the opportunity to load new goods on the way back from the port to Addis Ababa, thus completing a round trip transport and maximizing their gains. Import loading firms, on the other hand, may go empty at the time of dispatch from Addis Ababa. Transport costs for 2010 and 2011 were collected from the EGTE, ESLSE and exporters associations rather than using the deflator on the 2012 data obtained from the focal group discussions.

Miscellaneous costs were arbitrarily estimated at 1 percent of the CIF price for import years, and were estimated at 157 ETB/tonne and 175 ETB/tonne in 2010 and 2011, based on interviews with key informants.

Access costs for the years 2011 and 2012 also include the processing costs (cleaning, baggage and labour costs) of maize to be exported, obtained from the EGTE. The baggage cost is the highest of those three cost items, e.g., in 2013, the baggage cost plus the labour cost incurred to prepare maize for export packs was 220 ETB/tonne, having increased from 140 ETB/tonne in 2011. The cleaning cost is about 50 ETB/tonne and it does not vary from year to year.

Margins are calculated from interviews with key informants. Though importers are reluctant to divulge their exact margin, it is estimated at 3% of the CIF price, based on the information from exporters and the EGTE. The margin for exporters was estimated at 3% of the FOB.

Loading and unloading costs, as well as handling costs, were obtained from (USAID, Bellmon, 2010), as quoted in (Demeke, 2012).

Table 10: Observed Access Costs from the Port of Djibouti to the Wholesale Market of Addis for Maize – ETB/tonne (nominal prices), 2005-2012

Item	Unit	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Surtax & withholding tax	ETB/tonne	51.4	62	82.7	118.5	97.4	0	0	106
Processing	ETB/tonne	0	0	0	0	0	153.7	190	0
Port Handling	ETB/tonne	233	233	233	233	233	233	233	233
Transport costs	ETB/tonne	341	370	415	467	494	425	577	850
Loading and Unloading	ETB/tonne	32	32	32	32	32	32	32	32
Miscellaneous (1% of CIF for 2005-2009 and 2012 – estimated for 2010 and 2011)	ETB/tonne	40	29	32	41	71	157	175	98
Margins (3% of CIF for 2005-2010 and 2013, 3% of FOB for 2010 and 2011)	ETB/tonne	120	86	96	124	212	185	256	294
License fee (2% of margin)	ETB/tonne	2.4	1.7	1.9	2.5	4.2	3.7	5.1	5.9
Total observed access costs	**ETB/tonne**	**820**	**814**	**893**	**1018**	**1144**	**1189**	**1468**	**1619**

Source: Adopted from Demeke (2012) USAID, Office of Food For Peace Ethiopia, Bellmon Estimation, Annex 1 Economic Data and Trends, Sept.2011

<u>From farm gate to point of competition</u>

The marketing costs from Jimma to Addis Ababa were obtained from discussions with traders, brokers and traders associations at the central grain market in Addis Ababa, and include costs such as loading, transport, broker fees for trucks, unloading, storage, broker fees for selling maize in Addis and margins for traders (Table 11). To compare and cross check the information from Addis Ababa, information was also collected from grain traders, transporters and brokers in Jimma.

Transport costs are the major component of the total access costs. In terms of USD/km/tonne, transport costs have almost doubled from 7.7 cents in 2005 to 14.3 cents in 2012. The observed transport costs are well above the costs reported for the Djibouti-Addis Ababa road and the international rates (as indicated above). To a degree, the high cost is due to the use of smaller trucks (often six tonne capacity Isuzu cars) rather than bigger trucks with lower costs per unit.

Between 2005 and 2008, margins were estimated to be 5 percent of the purchase price (producer price), while only 2.5 percent of the purchase price from 2008 to 2012, reflecting the marginal decline from 2008 that was reported by traders and a recent study (Rashid and Negassa, 2011). In order to be competitive, traders were forced to squeeze their margins because of excessively high prices, which could be the reason for the decrease in margins. In fact, traders have indicated that their profits have declined with soaring prices, especially in 2011 and 2012, as most customers have cut back on their purchases.

Table 11: Observed Access Costs from Jimma to the Wholesale Market of Addis for Maize – ETB/tonne (nominal prices), 2005-2012

	Unit	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Loading	ETB/tonne	20	20	20	20	30	30	65	80
Transportation costs	ETB/tonne	200	200	250	300	350	475	604	750
Broker fees for accessing truck (load)- per tonne	ETB/tonne	5	5	5	7	10	10	16	20
Broker fees for selling grain in Addis	ETB/tonne	10	10	15	20	25	30	40	40
Estimated margins for traders (5% for 2005-2008 and 2.5% for 2009-2012)	ETB/tonne	56	61	66	180	78	46	84	111
Other costs	ETB/tonne	5	5	5	5	10	10	10	10
Total costs	**ETB/tonne**	**296**	**301**	**361**	**532**	**503**	**601**	**819**	**1011**

Source: Compiled based on information collected from traders and trader association at the central grain market (Ehil Berenda) Addis Ababa, 2014

The main factors that led to increased access costs between farm gate and the point of competition in 2011 and 2012 were high inflation rates and increased fuel prices. During these two years, the average annual general inflation rates were 35 and 24 percent, respectively. In 2011, the average transport inflation rate was 35 percent, while transport costs increased by 27 percent between 2010 and 2011. Additionally, between 2011 and 2012, broker fees for the sale of grain and trucks increased by about 33 and 60 percent.

For the years 2006, 2009 and 2012, the access costs between Jimma and Addis Ababa exceeded the price differential between the farm gate at Jimma and Addis Ababa's wholesale market. This suggests that for those 3 years, on average, (i) traders sold at a loss, and/or (ii) they reported overestimated access costs during interviews with the analysts and/or (iii) there are inaccuracies in the farm gate and/or wholesale prices. However, the ratio of the total differential over the wholesale price is only 3.8, 7.4 and 8.3 percent during the years 2006, 2009 and 2012, respectively. Thus, the negative differential could very well be due to noise in the price data used in the analysis, e.g., in 2006, had the wholesale price figure been 3.8 percent higher (possibly with more accurate information from traders, who tend to underestimate the prices they report), then there would not have been a negative differential between the access costs and the wholesale-farm gate prices.

Table 12: Comparison of the Price Differential Between Addis Ababa's Wholesale and Jimma's Farm Gate Prices for Maize, and the Access Costs Between Addis Ababa and Jimma for Maize, in ETB/tonne, 2005-2012

		2005	2006	2007	2008	2009	2010	2011	2012
1	**Price differential**	348	245	394	546	256	765	1153	593
2	**Access costs**	296	301	363	535	506	606	823	1011
3	**Total differential (1-2)**	**52**	**(56)**	**31**	**11**	**(250)**	**158**	**330**	**(417)**
4	**Ratio of total differential over wholesale price**	3.5%	3.8%	1.8%	0.3%	7.4%	6.0%	7.3%	8.3%

Source: Authors

Adjusted

<u>From border to point of competition / from point of competition to border</u>

Adjusted access costs reflect the costs that would prevail in an efficient value chain, and thus the observed access costs were adjusted by deducting the surtaxes and withholding taxes that are currently applied on maize imports (see Table 13).

Although observed transport costs are considered inefficient as such, they were not adjusted due to insufficient information. Despite being considered potentially excessive, margins were also not adjusted due to insufficient information.

Table 13: Calculation of Adjusted Access Costs Between the Port of Djibouti and Addis-Ababa for Maize in Ethiopia, in ETB/tonne, 2005-2012

		2005	2006	2007	2008	2009	2010	2011	2012
1	Observed access costs	820	814	893	1018	1144	1189	1468	1619
2	Surtax and withholding tax	51.4	62	82.7	118.5	97.4	0	0	106
3	Adjusted access costs (1-2)	768	752	810	899	1046	1189	1468	1513

Source: Authors

<u>Farm gate to point of competition</u>

Transport costs from Jimma to Addis Ababa have been adjusted by reducing the observed transport cost to 6.75 USD cents/km/tonne per year, estimated as the average between 6.1 and 7.4 USD cents/km/tonne, which is only slightly higher than the rates charged along the Djibouti-Addis Ababa road. Adjusted transport costs are thus 30 to 53 percent lower than the observed costs for the 2005-2012 period, reflecting the estimated costs that would prevail in a more efficient maize value chain.

Broker fees for the sale of grain and trucks were also adjusted. In fact, such fees are considered excessive and would be much less with measures that increase market information and producers' bargaining power, such as farmers' cooperatives, mobile network expansion and information

systems on truck availability. It is assumed that such measures would contribute to a more efficient grain market, reducing broker fees for selling grain by half, and removing broker fees for trucks.

Table 14: Calculation of Adjusted Access Costs Between Addis-Ababa and Jimma for Maize in Ethiopia, in ETB/tonne, 2005-2012

		2005	2006	2007	2008	2009	2010	2011	2012
1	Observed access costs	296	301	361	532	503	601	819	1011
2	Inefficiencies in transport costs	40	40	75	90	105	190	262	393
3	Inefficiencies in broker fees for grains	5	5	7.5	10	12.5	15	20	20
4	Broker fees for trucks	5	5	5	7	10	10	16	20
5	**Adjusted access costs (1-2-3-5)**	**246**	**251**	**273**	**425**	**376**	**386**	**521**	**577**

Source: Authors

BUDGET AND OTHER TRANSFERS

In this study, no specific budget transfer to maize is documented between 2010 and 2012. This could be addressed in the country report for the incentive/disincentive analysis.

QUALITY AND QUANTITY ADJUSTMENTS

No adjustment factor is used during the study period because the maize prices used for the analysis refer to the same quantity unit and quality of maize.

DATA OVERVIEW

Following the discussions above, the table below summarizes the main data sources used and the methodological decisions taken for the analysis (Table 9).

Table 15: Data Sources and Methodological Decisions

		Description	
Concept		***Observed***	***Adjusted***
Benchmark price		The CIF price (2005-2009 and 2012) and FOB price (2010-2011) were calculated as the ratio between volume and value of, respectively, imported and exported maize (referred to as *maize excluding seeds, HS code 100590*) from port Djibouti. The source is the Ethiopian Customs Authority (ERCA). Although the figures from ERCA data were close to those of UN Comtrade, it was decided to opt for the national source of data.	*N.A.*
Domestic price at point of competition		The wholesale price data in Addis-Ababa for maize, unspecified type, from EGTE is used for analysis.	*N.A.*
Domestic price at farm gate		The wholesalers' gross margin was deducted from the price at the Jimma wholesale market to obtain the Jimma farm gate price. The wholesalers' gross margin in Jimma was estimated as half of the margin of the Addis Ababa wholesale price, in line with Demeke (2012).	*N.A.*
Exchange rate		National Bank of Ethiopia is the source of data for the average observed exchange rate (from 2005- 12).	IMF and World Bank are data sources for the adjusted exchange rate.
Access cost from the point of competition to the border		- Transport costs in 2012 were obtained from discussions with traders and deflated to arrive at an estimated transport cost for imports for the previous years, using inflation rates from CSA. Similar method is applied to compute the export transport costs. Transport costs for 2010 and 2011 were collected from EGTE, ESLSE and pulses and oilseed exporters associations - Margins were estimated based on the information from importers and exporters including EGTE: they were thus estimated as 3% of the CIF price for importers and 5% of the FOB price for exporters. From the estimated margins, a 2% license fee was also estimated. - Processing costs of export were obtained from EGTE with a breakdown of cleaning, baggage and labor costs. For exports, a total cost of about 25USD was estimated to reflect loading, port handling and other costs based on EGTE and ESLSE. - Surtaxes and withholding taxes on imports were estimated at 2-3% of the CIF and were obtained from Demeke (2012), while surtaxes and withholding taxes on exports were zero in 2010 and 2011. - Other costs were computed as residual.	The surtax and withholding tax were deducted.
Access costs from the point of competition to farm gate		- Transport costs from Jimma to Addis Ababa for the years before 2011 are taken as they were from Demeke, 2012, and for 2012 interview data from Ehil Berenda grain traders association and individual traders were used. The interview and discussion data from Ehil Berenda also include brokers' fee for grain selling, truck brokers' fee, loading and unloading costs, and margins.	- Transport costs were equated to an average 6.75USD/ tonne/km. - Broker fees for trucks were deducted - Broker fees for selling grain were halved.
QT adjustment	Bor-PoC	*N.A.*	*N.A.*
	PoC-FG	*N.A.*	*N.A.*
QL adjustment	Bor-PoC	*N.A.*	*N.A.*
	PoC-FG	*N.A.*	*N.A.*

The data used for this analysis is summarized below.

Table 16: Data Used for Analysis

		Year	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
		trade status	*m*	*m*	*m*	*m*	*m*	*x*	*x*	*m*
DATA	*Unit*	*Symbol*								
Benchmark Price										
Observed		$P_{b(int\$)}$	**461.0**	**329.3**	**347.2**	**420.2**	**584.0**	**478.0**	**504.6**	**557.7**
Adjusted		P_{ba}								
Exchange Rate										
Observed		ER_o	8.7	8.7	9.2	9.8	12.1	12.9	16.9	17.6
Adjusted		ER_a	10.4	10.5	11.1	11.8	14.5	15.5	19.1	19.7
Access costs border - wholesale										
Observed		AC_{owh}	819.7	813.4	892.6	1,018.1	1,143.3	1,190.3	1,467.7	1,619.5
Adjusted		AC_{awh}	768.3	751.4	809.9	899.6	1,045.9	1,190.3	1,467.7	1,513.5
Domestic price at wholesale		P_{dwh}	**1,469.2**	**1,463.3**	**1,704.5**	**4,151.9**	**3,385.0**	**2,622.5**	**4,497.5**	**5,013.3**
Access costs wholesale - farm gate										
Observed		AC_{ofg}	296.1	300.9	362.5	535.3	506.2	606.4	823.0	1,010.5
Adjusted		AC_{afg}	246.1	250.9	272.5	425.3	346.2	386.4	521.0	576.5
Farm gate price		P_{dfg}	**1,121.2**	**1,218.1**	**1,310.8**	**3,605.5**	**3,129.2**	**1,858.0**	**3,344.7**	**4,420.1**
Externalities associated with production		E	-	-	-	-	-	-	-	-
Budget and other product related transfers		BOT	-	-	-	-	-	-	-	-
Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}	-	-	-	-	-	-	-	-
Quality conversion factor (border - point of competition)	Fraction	QL_{wh}	-	-	-	-	-	-	-	-
Quantity conversion factor (point of competition – farm gate)	Fraction	QT_{fg}	-	-	-	-	-	-	-	-
Quality conversion factor (point of competition – farm gate)	Fraction	QL_{fg}	-	-	-	-	-	-	-	-

SUMMARY OF INDICATORS

Table 17: MAFAP Price Gaps for Maize in Ethiopia, (ETB/tonne), 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	m	m	x	x	x	x	x	x
Observed price gap at point of competition	(3,347)	(2,228)	(2,386)	(984)	(4,825)	(2,349)	(2,563)	(6,422)
Adjusted price gap at point of competition	(4,094)	(2,742)	(2,942)	(1,689)	(6,140)	(3,583)	(3,673)	(7,487)
Observed price gap at farm gate	(3,399)	(2,172)	(2,419)	(998)	(4,577)	(2,512)	(2,781)	(6,005)
Adjusted price gap at farm gate	(4,195)	(2,737)	(3,063)	(1,810)	(6,020)	(3,961)	(4,133)	(7,504)

Source: Author's own calculations using data as described above.

Table 18: MAFAP Nominal Rates of Protection and Assistance for Maize in Ethiopia, (%), 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	m	m	m	m	m	x	x	m
Observed NRP at point of competition	-69%	-60%	-58%	-19%	-59%	-47%	-36%	-56%
Adjusted NRP at point of competition	-74%	-65%	-63%	-29%	-64%	-58%	-45%	-60%
Observed NRP at farm gate	-75%	-64%	-65%	-22%	-59%	-57%	-46%	-58%
Adjusted NRP at farm gate	-79%	-69%	-70%	-33%	-66%	-68%	-56%	-63%
Observed NRA at farm gate	-75%	-64%	-65%	-22%	-59%	-57%	-46%	-58%
Adjusted NRA at farm gate	-79%	-69%	-70%	-33%	-66%	-68%	-56%	-63%

Source: Author's own calculations using data as described above.

Table 19: MAFAP Market Development Gaps for Maize in Ethiopia, (%), 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	m	m	m	m	m	x	x	m
Access costs gap to competition point (ACGwh)	51.4	62.0	82.7	118.5	97.4	-	-	106.0
Access costs gap to farm gate (ACGfg)	(50.0)	(50.0)	(90.0)	(110.0)	(130.0)	(220.0)	(242.0)	(434.0)
Exchange rate policy gap (EXRP)	(797.5)	(576.2)	(638.9)	(823.6)	(1,413.3)	(1,233.3)	(1,110.2)	(1,171.2)
International markets gap (IMG)	-	-	-	-	-	-	-	-

Source: Author's own calculations using data as described above.

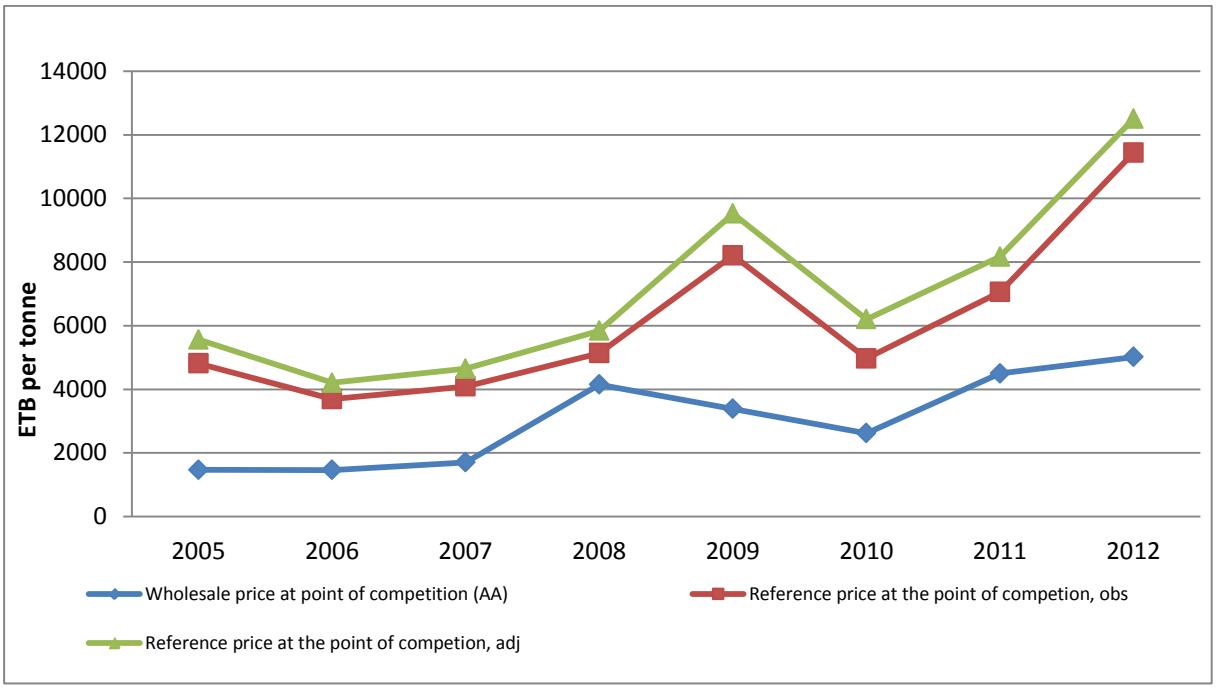
5. RESULTS AND INTERPRETATION

MAFAP analysis is based on the comparison of domestic prices, at both the farm gate and wholesale levels, with reference prices. Reference prices reflect prices that producers could get in the absence of domestic policy and market distortions. Price difference indicators between domestic and references prices are calculated at the wholesale and farm level (see METHODOLOGY for details of the methodology used to calculate the indicators).

The observed and adjusted reference prices at point of competition and farm gate and the actual wholesale prices at the point of competition and farm gate are depicted in Figure 16 and Figure 17.

The comparison between observed reference prices and actual wholesale prices at the point of competition (Figure 16) indicates that in all years, both the observed and adjusted reference prices were higher than the actual price at the point of competition. A higher reference price at the point of competition implies that maize produced domestically is cheaper compared to international prices. A low domestic price means that there is room for a better price for producers, if domestic market and trade policies were removed, and overall market performance was enhanced. Cheap domestic prices benefit consumers, but discourage producers.

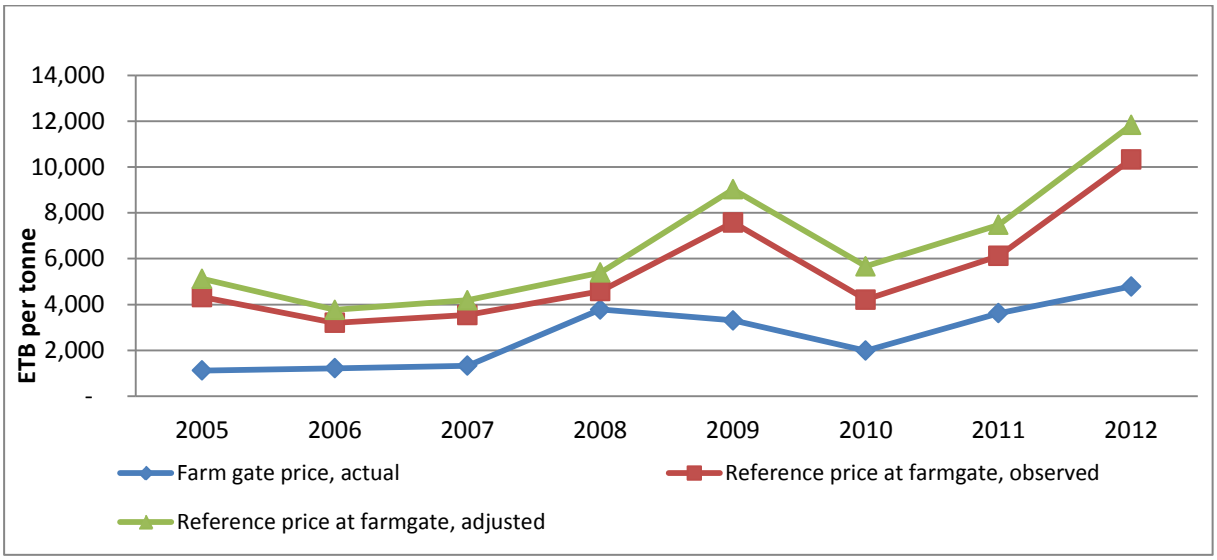
Figure 16: Comparison of Observed and Adjusted Reference Prices at the Point of Competition with the Actual Price at the Point of Competition for Maize in Ethiopia (ETB/tonne), 2005-2012



Source: own calculation based on the MAFAP table in Annex-I.

Comparison of the observed and adjusted reference prices with the actual price at farm gate (Figure 17) indicates a similar implication for producers. The actual farm gate price is lower than the observed and adjusted reference prices at farm gate in all years, with no exception. A cheaper farm gate price for maize is advantageous for traders to buy and sell to consumers, but at the expense of producers. Figures 14 and 15 also indicate that the reference and domestic prices are fluctuating, which indicates the instability of the maize market at both the domestic and international level, showing the risks attached to the production and marketing of maize.

Figure 17: Comparison of Observed and Adjusted Reference Price at Farm Gate with the Actual Price at Farm Gate for Maize in Ethiopia (ETB/tonne), 2005-2012



Source: own calculation based on the MAFAP table in Annex-I.

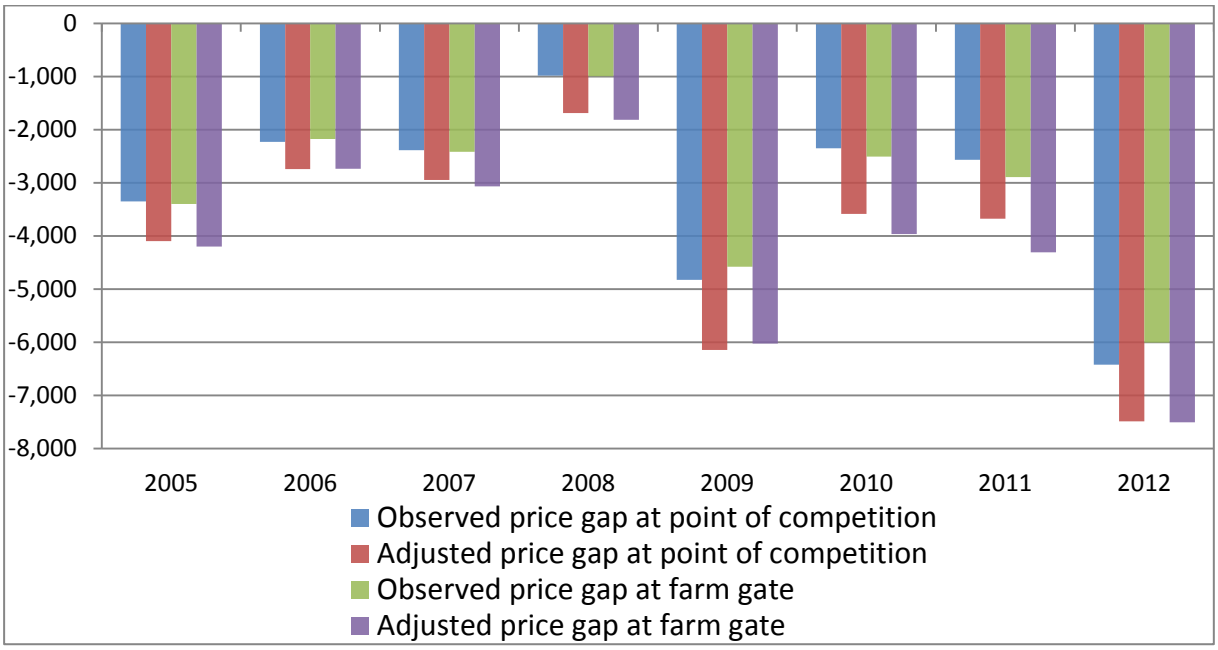
Figure 18 (extracted from the MAFAP excel sheet of maize in Annex I) shows that the price gaps between domestic and reference prices were substantial and negative (see also Table 20). For each year, domestic prices at the wholesale level were below the reference prices. PGs were decreasing slowly until 2008, signifying that domestic prices were getting closer to the reference prices. In other words, the value chain was becoming more efficient in regards to price transmission. In 2008, the total export ban on all grains put a stop to this trend, and the PGs widened as domestic prices increased, while actual prices paid to producers fell (Figure 18). Observed PG at wholesale was ETB 4825.

In 2010, the price gaps at wholesale and farm gate levels were lower. The benchmark price fell by 20 percent, together with the domestic price (see Table 16), which could be because the domestic market was better linked with the international one. In fact, despite the export ban, EGTE still managed to export maize. The rationale behind the lifting of the export ban in 2010 was that production in the country had increased by 28 percent; the domestic price would have decreased substantially had the export ban continued. By exporting this surplus maize to neighboring countries, a further decline of domestic prices seems to have stopped. In 2011, all prices noticeably increased, however, international prices increased by only 5.6 percent, while wholesale and farm gate prices increased by 71 and 82 percent, respectively. Still, agents of the value-chain received price disincentives, although lower than the one in 2010, which could be due to (i) the devaluation of the exchange rate from 12.89 ETB/USD to 16.90 ETB/USD, which distorted the national market or (ii) the continued exports by the EGTE, since the export ban was no longer in force.

In 2012, price gaps were exceptionally high (Figure 18) and agents received heavy price disincentives. This could be because of the lack of a close link between the international and domestic market, as the EGTE did not export maize while the export ban was in place. It could also be due to the shift from access costs related to export to those related to import. According to the EGTE, surtaxes and withholding taxes are levied when maize is imported, yet exporters are not subject to these additional taxes. These costs resulted in a relatively lower price gap at wholesale and farm gate in 2010 and 2011.

The price deficits for the adjusted wholesale price gap (PGawh) were greater in all years. The negative price wedge confirms that buyers or consumers benefited, since they paid a much lower price for maize than the equivalent international price. On the other hand, maize producers lost as they were paid a very low price compared to international levels.[11] The extent of this disincentive for farmers is more clearly explained by the price wedge at farm gate level: observed price gaps (PGofg) were negative in all years and ranged from Birr 803 per tonne in 2008 to Birr 5,547 per tonne in 2007. Overall, the price gaps at wholesale and farm gate are quite similar, possibly due to a well-functioning price transmission from wholesale to farm gate. In terms of value chain efficiency, the adjusted price gaps (PGafg) were more negative than those observed due to the surtaxes and withholding taxes levied for imported maize and an overvalued exchange rate (overvalued around 20 percent throughout the period). In 2012, farmers' losses were exceptionally high (Figure 18), and were relatively better during the net export years (2010 and 2011) than during the net import years.

Figure 18: Price Gap Between Domestic and Reference Prices – Observed and Adjusted for Maize in Ethiopia (ETB/tonne), 2005-2012



Source: own calculation based on the MAFAP table in Annex-I.

Table 20: MAFAP Price Gaps for Maize in Ethiopia (ETB/tonne), 2005-2012 (Birr/tonne)

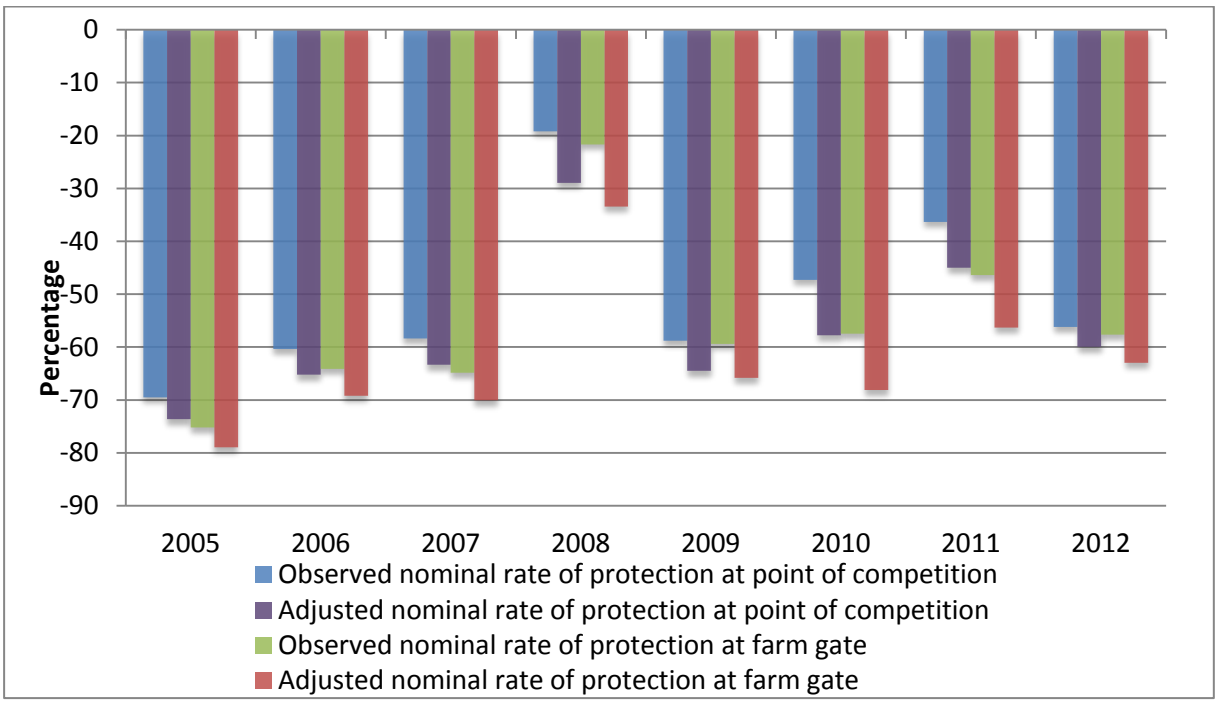
	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	m	m	m	m	m	x	x	m
Observed price gap at wholesale PGo_{wh}	-3347	-2228	-2386	-984	-4825	-2349	-2563	-6422
Adjusted price gap at wholesale PGa_{wh}	-4094	-2743	-2942	-1689	-6140	-3582	-3673	-7487
Observed price gap at farm gate PGo_{fg}	-3,399	-2,172	-2,417	-995	-4,575	-2,507	-2,893	-6,005
Adjusted price gap at farm gate PGa_{fg}	-4,195	-2,737	-3,063	-1,810	-6,020	-3,961	-4,305	-7,504

Source: own calculation based on the MAFAP table in Annex-I.

[11] Low producer price is observed not in the case of Ethiopia alone. Producers in the majority of East and West African countries face a similar problem (MAFAP East African Community presentations, Sept 2013, Arusha).

The nominal rate of protection (NRP) is negative at both the wholesale and farm gate level (Figure 19 and Table 21, based on Annex I). The figure is consistent with the negative price wedge. The observed NRP at the wholesale level (NRPowh) varied from -19 percent in 2008 to -69 percent in 2005, with no positive values. During the years of net maize export, there was a relative improvement from -47 percent in 2010 to -36 percent in 2011, while previously the adjusted NRP (NRPawh) was more negative, ranging from -28 percent in 2008 to -74 percent in 2005. Maize producers were implicitly taxed; the observed NRP at farm gate (NRPofg) and the adjusted NRP (NRPafg) averaged -53 percent and -60 percent. In other words, farmers were being implicitly taxed at a rate of 60 percent for growing and selling maize (at the adjusted rates). The rate of implicit taxation in 2005 was 78 percent (adjusted). In 2008, the level of implicit taxation declined to 18 percent, possibly due to the temporary increase in domestic price. Overall, disincentives declined in the later years of the analysis (except in 2012) because the EGTE was permitted to export and the Birr devaluated in September 2011. Under such conditions, agents of the maize value chain are better linked with the international market.

Figure 19: Observed and Adjusted Nominal Rate of Protection at PoC and FG for Maize in Ethiopia (%), 2005-2012



Source: Authors computation from the quantitative information in Annex I

Additionally, the data summarized in Table 16 shows that the position of international prices in relation to domestic prices adequately explains the level of incentive/disincentive in 2008. Compared to international prices, domestic prices rose substantially in 2008 (20 percent rise against 185 percent rise). This improvement in relative prices decreased the disincentive substantially to -18 percent (observed) and -30 percent (adjusted) from the much higher disincentives in the other years.

Table 21: MAFAP Nominal Rates of Protection (NRP) for Maize in Ethiopia, 2005-2012 (%)

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	m	m	m	M	m	x	x	m
Observed NRP at wholesale[1]	-69%	-60%	-58%	-19%	-59%	-47%	-36%	-56%
Adjusted NRP at wholesale[1]	-74%	-65%	-63%	-29%	-64%	-58%	-45%	-60%
Observed NRP at farm gate[2]	-75%	-64%	-65%	-22%	-59%	-57%	-46%	-58%
Adjusted NRP at farm gate[2]	-79%	-69%	-70%	-33%	-66%	-68%	-56%	-63%

Source: Own calculations using data as described above.

The Market Development Gap (MDG) has been computed and its components are summarized in Table 22. The MDG indicates the portion of the price gap that can be attributed to "excessive" access costs within a given value chain, exchange rate misalignments, and imperfect functioning of international markets. In this study, only the first two components mentioned are estimated to compute the MDG (accounting for only 17 percent, on average). The excessive access costs are further into the point of competition and farm gate components. Between 2005 and 2012, the cost of transport has nearly quadrupled in nominal terms, mainly due to high fuel costs and high domestic inflation rates. The sum of these components is divided by the adjusted reference price at farm gate to reach the relative MDG.

Table 22: MAFAP Market Development Gap (MDG) for Maize in Ethiopia, 2005-2012 (ETB/tonne and %)

	2005	2006	2007	2008	2009	2010	2011	2012
Per tonne	-796	-564	-646	-815	-1445	-1453	-1412	-1499
Percentage	-15	-14	-15	-15	-16	-25	-18	-13

Source: own computation from the quantitative information in Annex I

Due to high transportation costs, domestic prices are often within export and parity prices, implying that maize cannot be exported or imported profitably (Figure 9). Observed access costs (mainly transport) accounted for 35 percent of the CIF price during the period 2005-10 (see Annex I) and 29 percent during 2005-2012. The exceptions are few; in 1996/97, 2002, 2010 and 2011, domestic prices matched export parity prices and made exporting a profitable option (Figure 9). These isolated situations, however, only lasted for a short period, with no real incentive for traders to consider exporting maize as a viable business. In most cases, export parity prices were below domestic prices, implying that traders cannot export maize at a profit. Moreover, overvaluation of the domestic currency (see the section on exchange rates below) contributed to lower export parity prices, hence less pressure on increasing domestic prices (i.e. little or no demand for export equals low prices). The export ban on maize and other cereals (see below) has also discouraged exporting, and added to the downward pressure on prices. After 2011, the export of maize and other cereals was banned in order to stabilize domestic food prices. Maize trade is also affected by high price volatility. As shown in Figure 10, the peaks and the troughs are more pronounced in the case of maize than for wheat.

Many scenarios are possible with the two components. First, when only one of the distortions is corrected to decrease disincentives, e.g., before devaluation in 2010, the lifting of the export ban stops a further price decline of domestic maize produced. Compared to 2009, the measure might have decreased the disincentive. Second, when two restrictive policies work in the same direction, e.g., in 2012, when exporting was banned and the exchange rate was relatively overvalued. In 2010,

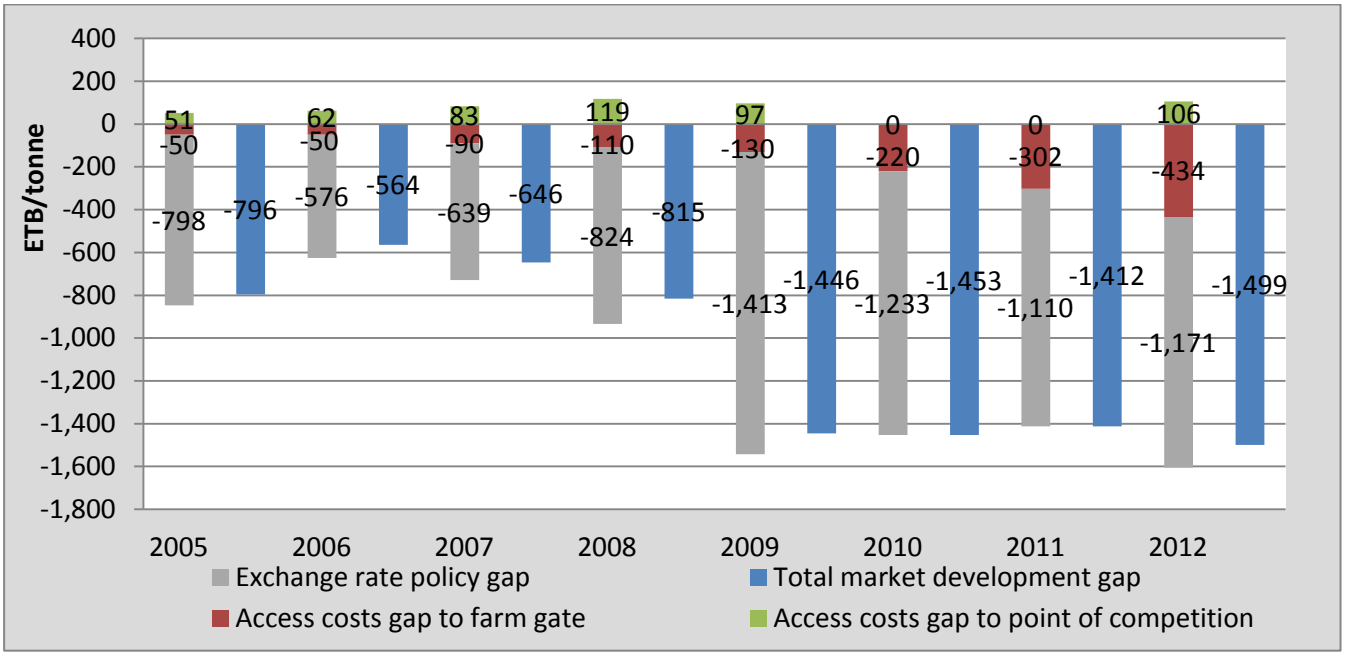
the disincentive was higher than in 2011 even without an export ban, since the exchange rate was overvalued. In this latter year, when the export ban was lifted (to neighboring countries) and the exchange rate was devalued, the disincentive for agents in the value chain declined compared to the one in 2010. Lastly, in 2012, the high volume of production in the country combined with the export ban and the overvalued exchange rate as well as a high international price have worsened the disincentives heavily.

Table 23: Components of Market Development Gap in Maize, 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Exchange policy gap	-798	-576	-639	-824	-1413	-1233	-1110	-1171
Access costs gap to point of competition	51	62	83	119	97	0	0	106
Access costs gap to farm gate	-50	-50	-90	-110	-130	-220	-302	-434

Source: Authors computation from the quantitative information in Annex I

Figure 20: Components of Market Development Gap for Maize in Ethiopia, 2005-2012 (ETB/tonne)



Source: Authors computation from the quantitative information in Annex I

Figure 20 indicates that the MDG, as a percentage of the adjusted reference price at farm gate, continuously decreased from -15 percent in 2005 to -26 percent in 2010, and then increased to -18 percent in 2011 and -13 percent in 2012, achieving a slight, but overall improvement. The maximum ratio between the MDG and the adjusted reference price occurred in 2010, mainly due to the overvalued exchange rate, contributing about 85 percent of the negative effect (Figure 20).

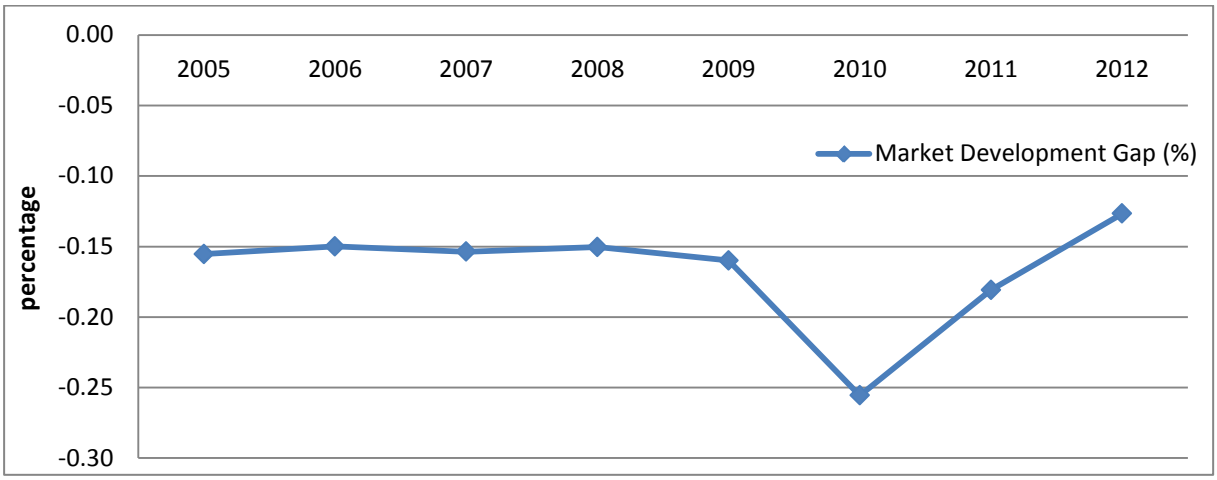
Therefore, the biggest share of the MDG gap estimated in this study emanates from the exchange rate policy misalignment[12] (Figure 18) and contributes on average about 87 percent to the MDG, although this effect declined over time, likely due to the devaluation in 2011.

Though a gap in positive access cost to the point of competition is still a market distortion, it played a positive role in counteracting the MDG trend during the years that maize was imported. In fact, the

[12] This study does not investigate the role of international market distortions.

surtax and withholding tax imposed on maize imports (EGTE, 2013) have somewhat protected the domestic market in those years. The efficient transport costs (the major component of the access cost) from Addis Ababa to Djibouti allowed the market to be well connected with the international market, and not positively or negatively distorted.

Figure 21: Trend of Market Development Gap (%of Adjusted Price Gap at Farm Gate)



Source: Authors computation from the quantitative information in Annex II

6. RECOMMENDATIONS

Based on the findings of the MAFAP price incentive/disincentive analysis for maize;

1) Policy makers must reconsider measures, such as export bans and policies, which affect the exchange rate levels and thus, international trade because they tend to result in the implicit taxation of the agriculture sector. More specifically, actions to be taken to reduce disincentives could include:

   (1.1) Carefully address currency overvaluation: the findings of the study indicate that currency overvaluation contributes on average at 81 percent to the Market Development Gap.
   However, a number of issues related to currency overvaluation can be raised, and these issues suggest the need for a careful exchange rate policy. First, since currency overvaluation contributes to such a large portion of the (MDG), the findings implicitly indicate that other factors contribute to the huge price gap at farm gate. On the other hand, in 2011, the devaluation of the Ethiopian Birr by about 25-30 percent did not help much in addressing the disincentive of maize producers while export bans continued. Moreover, devaluation of the currency is based on the overall macro-economic scenario, and not simply that of maize or grain trade alone, and as a result, alternative policies and review of this international price distortion could address the issue more directly than a continuous devaluation of currency. Finally, theoretical literature underlines that in developing countries, the expected effect of the devaluation of currency diminishes (j-curve effect) because developing countries cannot address their supply constraints in the short run, even if the currency is devaluated in order to lower the price of their tradable commodities (Dornbusch, 1998). Therefore, the question is whether the country can both produce and supply enough at the devalued exchange rate;

   (1.2) Adopt less restrictive trade policies: the findings strongly suggest that during the years of net export of maize, the reference price gap at farm gate declined. Thus, introducing less restrictive trade policy could improve the situation;
   (1.3) Encourage the participation of private traders in grain import and export;
   (1.4) Avoid non-targeted distribution of imported grain at subsidized prices;
   (1.5) Support the development of market structures and the grain value chain to stimulate economic efficiency;
   (1.6) Encourage the establishment of cooperatives to increase the bargaining power of producers, and enhance capacity for bulk transport through better joint capital. These kinds of measures could fill the investment gap of the private sector in storage, transport and distribution.

2) Ethiopia depends on imported maize to feed people under food shortages. As an option for importing, purchasing maize from domestic producers at a reasonable price can encourage producers. In addition, policies regarding the distribution of food aid and subsidized cereals should be handled in ways that do not negatively impact producers.
3) Current maize trade is limited to Addis Ababa and deficit areas. The Government should consider incentives to enhance investment (and value addition) in maize trading, milling and processing, as well as feed mill industries.
4) Government policy should be informed by the fact that low domestic prices are good for consumers only in the short-run. Long-term and sustained gain to consumers can only be achieved

through improved incentives for producers that translate into increased production, and hence lower prices.

5) Price risk management tools for maize producers need to be designed and mainstreamed into government investment plans and programs in agriculture.
6) Investment in bulk transport and storage facilities, along with grades and standards, would have a significant impact on the competitiveness of maize production in Ethiopia.
7) Investment in higher capacity trucks would improve bulk transport. Currently in Ethiopia, availing information about transport services to grain traders is carried out by brokers. Modernizing the information system through website facilities regarding service availability, as well as route and transport fee information, would decrease access costs for trucks.
8) So far, the establishment of the Ethiopian Commodity Exchange Authority (ECXA) has helped producers with accessing timely information on the prices of selected commodities. Price information on grain markets with a broader spectrum could help producers receive a better price than without this information.
9) The current rural investment on infrastructure by the Government is encouraging, and has to continue. Upgrading, maintenance and modernization of infrastructure stabilizes the cost of local and international transportation.
10) The cost of loading and unloading is increasing rapidly. With the growing economy, the cost of labour is expected to increase, exacerbating the problem. Modernization of loading and unloading activities with mechanized equipment could stabilize this cost.
11) Brokers determine the daily price of maize and other grains and the observed cost paid to these agents is not negligible. A mechanism of checks and balances in brokers' responsibilities must be put in place; otherwise, brokers are able to penalize producers, who are generally less business savvy in grain marketing. Often, individual producers raise the issue of unfair mediation of markets by brokers. To reduce price disincentives, establishing marketing cooperatives has been encouraged in Ethiopia. Enforcing the fair trade and ethics regulations for a fair market between private traders and cooperatives could help achieve the goal of marketing cooperatives in reducing the price disincentive towards producers.

7. CONCLUSION

MAIN MESSAGE

Even though differences exist in the benchmark prices used for the 2005-2010 MAFAP analysis of maize (Demeke, 2012) and this one (2005-2012), the findings are not so different. The difference in benchmark prices between the two technical notes mainly resulted from the magnitude of observed and adjusted price gaps and rate of protection, but they coincide on the finding that producers faced price disincentives in maize production. However, the overall trend is that disincentives declined during the later years of the analysis (except 2012) when compared to the earlier years, primarily due to the lifted export ban in 2010 and 2011 and the devaluation of the exchange rate in September 2010.

Based on the MAFAP price indicators, comparison of the observed and adjusted reference prices at wholesale and farm gate, with the actual prices at the respective maize trading points, indicates that in all years, both the observed and adjusted reference prices were higher than the actual domestic prices. Higher reference than domestic prices implies that domestically produced maize is cheaper compared to international price. A lower domestic price means that there is room for a better price for producers, if domestic market and trade policies were removed and overall market performance enhanced. Cheap domestic prices benefit consumers, but discourage producers.

The MAFAP price indicators specifically show that the level of disincentives for maize farmers is considerable, with an average implicit taxation of 53 percent (observed farm gate) and 60 percent (adjusted) during the period of 2005 to 2012. While producers have failed to fully gain from high world prices recently, consumers are protected, as they pay significantly less than the border price equivalent. Note that with a different benchmark price between the two studies, the taxation of producers increased on average to 53 percent (for 2005-2012) from 32 percent (for the period 2005-2010).

The MAFAP analysis indicates that two important policy measures play a role in the level of disincentives in the maize value-chain; namely, the exchange rate policy and bans on export. The level of disincentives varies depending on whether the two work together, or separately. In 2010, the disincentive for maize producers was still higher without an export ban than in 2011 because of the overvalued exchange rate. The lifting of the export ban in 2010, however, prevented a further decline of the domestic maize produced in 2010. In the end 2010, the exchange rate was devalued and the disincentives for the agents in the value-chain declined compared to the one in 2010. Conversely, in 2012 the disincentive increased when exporting was banned and the exchange rate was overvalued, relatively speaking (two restrictive policies work in the same direction).

The analysis indicates that the overvaluation of domestic currency contributed to lower export parity prices, hence less pressure on domestic prices (i.e. due to low demand for export). The export ban on maize and other cereals reinforced the downward pressure on prices by prohibiting the sale of domestic surplus. In the history of maize production, the best example of the depressing effects of an export ban on domestic price is the case from 2001. In 2000, there was a bumper harvest of maize in Ethiopia. The large surplus from the bumper harvest depressed the retail price of maize in the Addis Ababa market to a level of 470 Birr per tonne in 2001 from about 1200 Birr per tonne in 2000 (UNDP emergency unit of Ethiopia, 2001).

Another policy factor includes the distribution of imported cereals at subsidized prices (at times of high food prices), which have kept domestic prices relatively low. Food aid, which accounts for a significant share of cereal consumption, may have also contributed to the lower domestic price levels.[13]

The Government has succeeded in its policy of ensuring relatively lower prices for consumers, many of whom are poor and often live below the poverty line. However, this achievement has come at the cost of denying adequate incentives for producers, not to mention the cost to the Government in many cases.

Maize trade is also affected by high price volatility at domestic and international levels. As shown in Figure 10, the peaks and the troughs are more pronounced for maize than for wheat (Draft TN wheat, 2014), for instance.

On the other hand, high transaction and transport costs, together with the fact that the country is land-locked, have contributed to high reference prices. These problems have also meant a substantial gap between import and export parity prices. With limited regional trade, and no price stabilization program, maize prices have fluctuated widely between extreme import and export parity prices (see also Smith, 2003).

The policy environment must improve in order to enhance long-term investment in maize production and structural transformation of agriculture. Ethiopia has the potential to export maize to deficit neighboring countries of the region (as was done in 2010 and 2011), and expand the use of maize as a raw material for processing industries and as animal feed for the livestock sector. A recent study has found that countries that tax the agricultural sector stall both their structural change and their economic growth. The study concluded that discriminating against agriculture is detrimental to economic growth and the transformation of the sector (Dennis and Iscan, 2011), as cited in Demeke (2012).

There is no evidence that traders have engaged in monopolistic pricing, as trade margins appear to have declined, especially in years of very high prices. On the other hand, transport costs from farm gate to wholesale market in Addis Ababa were found to be high, and this can be attributed to the use of smaller trucks rather than bigger trucks and bulk transport systems. In addition to building roads, the Government should facilitate the transition from small-scale to large-scale grain transport and trading practices.

The maize market is characterized by small-scale operations with limited scale economies in distribution, transport and storage. Maize traders, millers and processors need to be supported to make the required investment in the value chain of maize.

Demand for maize is generally low in Ethiopia, since it is not a preferred staple in the urban areas where purchasing power is stronger. Urban use is limited to the use of maize for local beverages. Well-developed food processing and animal feed would have a positive impact on production

[13]The sale of food aid at subsidized price are estimated to have depressed domestic prices within the ranges of 2 to 26 percent for wheat, 3 to 13 percent for maize, and 2 to 11 percent for teff during the period 1981 to 2002 (Rashid, Assefa and Ayele, 2007).

incentives, especially when maize exports get low because of high competition from international maize suppliers. Maize can be used to transform the livestock sector, considering the fact that Ethiopia has yet to tap into the full potential of its livestock population. The livestock sector is a promising sector to complement crop production and indirectly decreases the pressure on land. Per capita land holding has been decreasing continuously in Ethiopia. Therefore, to expand the limited local demand of maize, investments on value-addition at the local level to process it for animal feed should be encouraged.

Given the low local demand, any significant increase in maize production could lead to price collapses and high price volatility, thus discouraging investment in maize production. Promoting maize exports should be given serious attention to increase production on a sustainable basis.

LIMITATIONS

Instead of using Jimma as the farm gate for the producer price, rural towns such as Limmu, where the producers sell their maize, could be more ideal for MAFAP analysis. But due to a lack of data and information (prices and access costs along this segment) in these rural towns, the analysis had to be based on the data from the bigger city of Jimma. With better access to data from producers, rural towns could provide more accurate findings about the price incentives/disincentives received by producers. MAFAP analysis is quite influenced by the chosen farm gate point, whether it is close to a big city such as Jimma, or far from it.

Conducting an annual, purposeful survey to come up with a reasonable farm gate price for maize (and other selected commodities of MAFAP analysis) would improve the farm gate price, as well as the access costs from farm gate to point of competition.

In addition, among access cost data, getting genuine profit (margin) data at all levels is a challenge. The margin is estimated based on trust in the research assistant and the source of information, rather than on objective data.

In the previous technical note, data limitation was discussed, and a series of validations were important after a research assistant collected the data. In this study, access to data was worse than previous years because the EGTE currently does not have the data on their website, and the lack of producer price data for maize from Jimma producers had still not been addressed by 2013, despite the recommendation. After collecting the data, a similar validation is carried out from ESLSE, EGTE and other traders.

The CIF and FOB benchmark prices of maize for this study were obtained from the Ethiopian Customs Authority. Compared to the CIF prices used by assuming Mombasa Port (Demeke 2012), the CIF obtained from ECA and UNComtrade were higher (by an average of 65 percent for 2005-2009). Though the reference prices seem high, the data used is at the Port of Djibouti, which Ethiopia uses for all its international trade. The advantage of this data is that maize CIF has a respective FOB in all years for the same kind of maize exported by Ethiopia (maize excluding seed) and it is comparable.

The study has not looked into distortions in input markets or public expenditures in support of agriculture and international market distortions, all of which would improve the analysis significantly. International distortions can be quota, special trade agreements between countries, etc. Importantly, with respect to international prices, the findings show that they substantially explain the

level of incentives/disincentives, and in addition to the restrictive trade policy and exchange rate gaps, comparing the domestic and international prices is essential. For instance, in 2008, the exchange rate misalignment (the observed vis-à-vis the adjusted) was relatively high and export was banned, but the disincentive to producers substantially declined (see the executive summary graph), which shows relative improvement.

FURTHER INVESTIGATION AND RESEARCH

Looking for farm gate prices, margins, and access costs to farm gate through a survey is essential. In this study and the previous technical note, average annual producer prices were estimated based on wholesale prices observed in a town (Jimma) located in a major maize producing area. Refinement of the results should include obtaining actual farm gate prices for Jimma, as well as other locations in different maize producing areas. More effort is also required to acquire CIF prices from importing companies, such as the parastatal EGTE. Research on the impact of price volatility on producers' incentives is also required as part of the effort to improve the overall incentive environment for producers.

As a component of the Market Development Gap, investigating the international market distortion in the maize market would reveal more interesting facts.

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ANNEX I: Data and Calculations Used in the Analysis

Name of product	MAIZE
International currency	USD

Local currency	ETB

				Year	2005	2006	2007	2008	2009	2010	2011	2012
DATA		*Unit*	*Symbol*	*trade status*	*m*	*m*	*m*	*m*	*m*	*x*	*x*	*m*
Benchmark Price												
1	*Observed*	XXX/TON	$P_{b(int\$)}$		**461.00**	**329.28**	**347.23**	**420.21**	**583.99**	**478.04**	**504.62**	**557.71**
1b	*Adjusted*	XXX/TON	P_{ba}									
Exchange Rate												
2	*Observed*	YYY/XXX	ER_o		8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
2b	*Adjusted*	YYY/XXX	ER_a		10.40	10.49	11.05	11.76	14.52	15.47	19.10	19.70
Access costs border - point of competition												
3	*Observed*	YYY/TON	ACo_{wh}		819.67	813.44	892.60	1,018.05	1,143.29	1,190.27	1,467.72	1,619.52
3b	*Adjusted*	YYY/TON	ACa_{wh}		768.27	751.84	809.84	899.19	1,045.89	1,190.70	1,468.12	1,513.52
4	**Domestic price at point of competition**	YYY/TON	P_{dwh}		1469.17	1463.33	1704.50	4151.86	3385.00	2622.50	4497.50	5013.33
Access costs point of competition - farm gate												
5	*Observed*	YYY/TON	ACo_{fg}		490.00	490.00	545.00	552.00	625.00	755.00	935.00	1,100.00
5b	*Adjusted*	YYY/TON	ACa_{fg}		440.00	440.00	457.50	445.00	497.50	540.00	693.00	666.00
6	**Farm gate price**	YYY/TON	P_{dfg}		1,118.00	1,220.00	1,328.00	3,781.00	3,309.00	1,989.00	3,621.00	4,788.00
7	Externalities associated with production	YYY/TON	E									
8	Budget and other product related transfers	YYY/TON	BOT									
	Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}									
	Quality conversion factor (border - point of competition)	Fraction	QL_{wh}									
	Quantity conversion factor (point of competition - farm gate)	Fraction	QT_{fg}									
	Quality conversion factor (point of competition - farm gate)	Fraction	QL_{fg}									

				2005	2006	2007	2008	2009	2010	2011	2012
CALCULATED PRICES		*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
Benchmark price in local currency											
9	*Observed*	YYY/TON	$P_{b(loc\$)}$	3,996.87	2,877.91	3,197.99	4,118.06	7,066.28	6,161.94	8,528.08	9,815.70
10	*Adjusted*	YYY/TON	$P_{b(loc\$)a}$	4,794.40	3,454.15	3,836.89	4,941.67	8,479.53	7,395.28	9,638.24	10,986.89
Reference Price at point of competition											
11	*Observed*	YYY/TON	RPo_{wh}	4,816.54	3,691.35	4,090.59	5,136.11	8,209.57	4,971.67	7,060.36	11,435.21
12	*Adjusted*	YYY/TON	RPa_{wh}	5,562.67	4,205.99	4,646.73	5,840.86	9,525.43	6,204.58	8,170.13	12,500.40
Reference Price at Farm Gate											
13	*Observed*	YYY/TON	RPo_{fg}	4,326.54	3,201.35	3,545.59	4,584.11	7,584.57	4,216.67	6,125.36	10,335.21
14	*Adjusted*	YYY/TON	RPa_{fg}	5,122.67	3,765.99	4,189.23	5,395.86	9,027.93	5,664.58	7,477.13	11,834.40

				2005	2006	2007	2008	2009	2010	2011	2012
INDICATORS		*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*
Price gap at point of competition											
15	*Observed*	YYY/TON	PGo_{wh}	(3,347.38)	(2,228.02)	(2,386.09)	(984.26)	(4,824.57)	(2,349.17)	(2,562.86)	(6,421.88)
16	*Adjusted*	YYY/TON	PGa_{wh}	(4,093.51)	(2,742.66)	(2,942.23)	(1,689.01)	(6,140.43)	(3,582.08)	(3,672.63)	(7,487.07)
Price gap at farm gate											
17	*Observed*	YYY/TON	PGo_{fg}	(3,208.54)	(1,981.35)	(2,217.59)	(803.11)	(4,275.57)	(2,227.67)	(2,504.36)	(5,547.21)
18	*Adjusted*	YYY/TON	PGa_{fg}	(4,004.67)	(2,545.99)	(2,861.23)	(1,614.86)	(5,718.93)	(3,675.58)	(3,856.13)	(7,046.40)
Nominal rate of protection at point of competition											
19	*Observed*	%	$NRPo_{wh}$	-69.50%	-60.36%	-58.33%	-19.16%	-58.77%	-47.25%	-36.30%	-56.16%
20	*Adjusted*	%	$NRPa_{wh}$	-73.59%	-65.21%	-63.32%	-28.92%	-64.46%	-57.73%	-44.95%	-59.89%
Nominal rate of protection at farm gate											
21	*Observed*	%	$NRPo_{fg}$	-74.16%	-61.89%	-62.55%	-17.52%	-56.37%	-52.83%	-40.89%	-53.67%
22	*Adjusted*	%	$NRPa_{fg}$	-78.18%	-67.60%	-68.30%	-29.93%	-63.35%	-64.89%	-51.57%	-59.54%
Nominal rate of assistance											
23	*Observed*	%	NRAo	-74%	-0.619	-0.625	-0.175	-0.564	-0.528	-0.409	-0.537
24	*Adjusted*	%	NRAa	-78.18%	-67.60%	-68.30%	-29.93%	-63.35%	-64.89%	-51.57%	-59.54%

Source: MAFAP Maize Excel Template 2005-2012

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