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

February 2015

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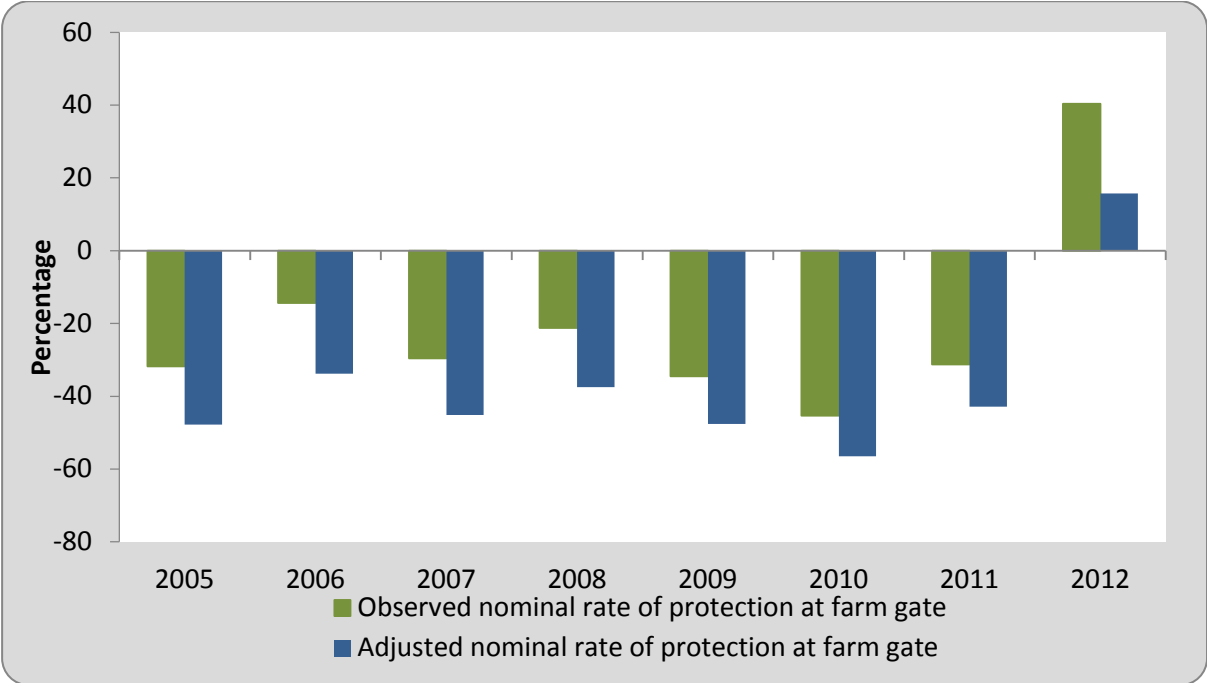
SUMMARY OF THE NOTE

Product: Teff
Period analyzed: 2005 - 2012
Trade status: Net Exporter

COMMODITY CONTEXT

- Teff is Ethiopia’s most valuable staple crop.
- Cultivated over approximately 2.8 million hectares, teff accounts for 28.5 percent of land area under cereal cultivation, the largest share of all staple grains in Ethiopia.
- Teff is indigenous to Ethiopia and is a fundamental part of the culture, tradition and food security its people.
- Teff is grown primarily as a cash crop.
- The teff value chain is long and involves too many small operators.

Observed and Adjusted Nominal Rate of Protection at Farm Gate for Teff 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 inefficiency on price incentives for producers. The adjusted NRP (blue bars) captures the same elements as the observed NRP but excludes the effects of distortions resulting from inefficiencies in the commodity’s value chain and exchange rate misalignment.

The observed Nominal Rate of Protection and the adjusted NRP indicates that teff producers were implicitly taxed between 2005 and 2012. The higher negative rate of protection in 2010 suggests that the policy environment that had shown some improvement between 2006 and 2008 worsened in 2010. However, it started to improve again in 2012.

DRIVING FACTORS

Our results show that disincentives are substantial and arose from (i) an export ban, especially on exports to Eritrea; (ii) an overvalued exchange rate; (iii) distribution of imported wheat at subsidized prices (with negative implications for substitute crops, such as teff); and, (iv) weak market structure and high transport costs;

Farmers are not yet adopting new technologies and agronomic practices, which could dramatically increase yields, owing to a lack of adequate incentives.

RECOMMENDATIONS

Less implicit taxation leading to improved teff prices would improve the livelihood of around 50 percent of small farmers in the country. Some of the measures that need to be taken to increase incentives include:

- Ensure a more competitive exchange rate and allow some level of teff grain/flour exports so that producers and domestic agents benefit from higher prices;
- Support the development of the whole value chain to reduce high market access costs; introduce formal grades and standards; support the development of improved market infrastructures; promote bulk transport facilities along the value chain and encourage the private sector to develop large-scale mills and one-stop shops to sell packaged/branded teff flour. This will also encourage teff to be traded through the Ethiopian Commodity Exchange;
- Reduce the distribution of non-targeted and subsidized grain that depressed overall domestic food prices;
- At farmer level, support the development of warehouse receipt systems for producers to store their harvest until they get a better price;
- In order for the currency devaluation to be more effective and ensure better incentives, teff has to be tradable on the international markets.

1. PURPOSE OF THE NOTE

This technical note is an attempt to measure, analyse and interpret price incentives for teff 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 at the national, regional or international level.

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.

COMMODITY CONTEXT

Teff is the most important cereal in terms of both production and consumption in Ethiopia, and is grown as food grain in only one other country, Eritrea. As the most preferred cereal among better off households, especially in urban areas, teff fetches a relatively high price in the market, making it an attractive cash crop for farmers. It is nutritionally rich with high levels of iron and calcium and has the highest amount of protein among cereals consumed in Ethiopia. It ranks low on the glycemic index (making it suitable for consumption by Type II diabetics), is gluten free and is high in fibre. Teff is relatively resistant to many biotic and abiotic stresses and can be grown under different agro-ecological conditions, ranging from lowland to highland areas. Teff can also be stored for many years without being seriously damaged by common storage insect pests.

PRODUCTION

Table 1 shows the total area, yield and production of the main crops cultivated for the period 2004/05-2010/11. Among cereals, teff accounts for the largest share of cultivated area with 28.5 percent in 2011, followed by maize with 20.3 percent. Because its market price is often two or three times higher than maize (the grain with the largest volume of production), teff accounts for the

largest share of the total value of cereal production. This higher and relatively more stable price is one of the main reasons that teff is grown by a total of 6.2 million farmers, primarily as a cash crop for urban consumers. Since teff farm operations, such as land preparation, weeding and harvesting are highly labour intensive with limited availability of suitable mechanical technology, there are no large-scale teff producers in the country.

According to data from the Central Statistical Agency (CSA), teff production expanded by 72 percent between 2004/05 and 2010/11. This growth was achieved owing mainly to a 29 percent expansion in area under cultivation and a 33 percent increase in yields (Table 1). The share of the total cultivated area of teff increased by 2 percent, compared to the decline in area of barley (25 percent) and wheat (12 percent), and rapid expansion in coarse grains (maize - 11 percent, and sorghum - 19 percent).

With only 1.3 tonnes per hectare, teff yield is the lowest among cereal crops, owing mainly to the limited use of improved seeds, inefficient agronomic practices and fragmented farm plots.

Table 1: Cereals Area and Production (Smallholder Farms, Meher Season) Ethiopia, 2004/05-2011/12

	2004/2005				2010/2011				2011/2012				Expansion rate			
	Area 000 ha	Production 000 tonnes	Yield (tonnes/ha)	Share in Total Cereals Area (%)	Area 000 ha	Production 000 tonnes	Yield (tonnes/ha)	Share in Total Cereals Area (%)	Area 000 ha	Production 000 tonnes	Yield (tonnes/ha)	Share in Total Cereals Area (%)	Area 000 ha	Production 000 tonnes	Yield (Tonnes/ha)	Share in Total Cereals Area (%)
Grain	9811	11907			11823	20349			1208.6	21857			20.5	70.9		
Cereals	7638	10031			9691	17761			9588.9	18809			26.9	77.1		
<i>Teff</i>	2136	2026	0.95	28.0	2761	3483	1.26	28.5	2731.1	3497	1.28	28.4	29.3	72.0	33.0	1.9
<i>Barley</i>	1095	1328	1.21	14.3	1047	1703	1.63	10.8	948.1	1585	1.67	9.8	-4.5	28.3	34.2	-24.7
<i>Wheat</i>	1398	2177	1.56	18.3	1553	2856	1.84	16.0	1437.5	2916	2.03	14.9	11.1	31.2	18.1	-12.4
<i>Maize</i>	1393	2394	1.72	18.2	1963	4986	2.54	20.3	2054.7	6069	2.95	21.4	40.9	108.3	47.8	11.1
<i>Sorghum</i>	1254	1716	1.37	16.4	1898	3960	2.09	19.6	1923.7	3951	2.05	20.0	51.4	130.8	52.4	19.3
<i>Finger millet</i>	313	333	1.06	4.1	408	635	1.56	4.2	432.6	651	1.51	4.5	30.4	90.8	46.3	2.8
<i>Oats / 'Aja'</i>	45	57	1.26	0.6	31	48	1.54	0.3	30.6	49	1.62	0.3	-31.6	-16.1	22.7	-46.1
<i>Rice</i>	-	-	-	-	30	90	3.03	0.3	30.7	88	2.9	0.3	-	-	-	-

Source: Author's computation using CSA data

*Total Area cultivated and total production includes: Grain, Vegetables, Root crops, Fruit crops, Chat, Coffee and Hops

Table 2 shows teff cultivation area and production by major administrative regions. Teff is grown mainly in Amhara and Oromia, which together accounted for 84 and 85.4 percent of the total cultivated area and production in 2011/2012. East and West Gojam in Amhara and East and West Shoa in Oromiya are known particularly as the teff producing areas of the country. A smaller quantity of teff is also produced in the Tigray and SNNP regions.

Table 2: Teff Area Cultivated and Production by Region, 2011/2012

Region	Area (ha)	% Share of total area planted	Production (Qt)	% Share of total production
Tigray	152740.04	5.59	1938456.9	5.54
Amhara	1003380.97	36.73	13102807.95	37.46
Oromia	1293514.25	47.36	16765432.75	47.93
SNNPR	257794.7	9.43	2937669.54	8.39
Benishangul	23615.03	0.86	232256.63	0.66
Total/average	2731044.99	100.00	34976623.77	100

Source: CountryStat, 2013

CONSUMPTION/UTILIZATION

Teff bread, locally known as *injera*, is a major staple food for many Ethiopians. Most prefer teff to other grains but is in general more widely consumed by the economically better off urban residents than by rural households. Teff contributes up to 600 kcal/day in urban areas, compared to only 200 kcal/day in rural areas. Cereal consumption in rural areas is dominated by less expensive grains such as maize and sorghum (Table 3).

Studies have shown that income elasticity of teff is the highest among cereals, and greater than one in both urban (1.1) and rural (1.2) areas: a one percent increase in income increases demand by more than one percent. Teff is more of a luxury food for rural households and the urban poor, while maize and wheat are necessity food grains. As teff prices have gone up, many urban households tend to mix teff flour with cheaper cereals such as sorghum, maize or rice in preparing *injera* (Berhane, et al, 2011). Hence, from a food security perspective, maize, sorghum and wheat are more critical than teff and so policy makers may need to consider higher teff prices as an opportunity for poor rural households to earn more income from the sale of the grain, which is often grown as a cash crop.

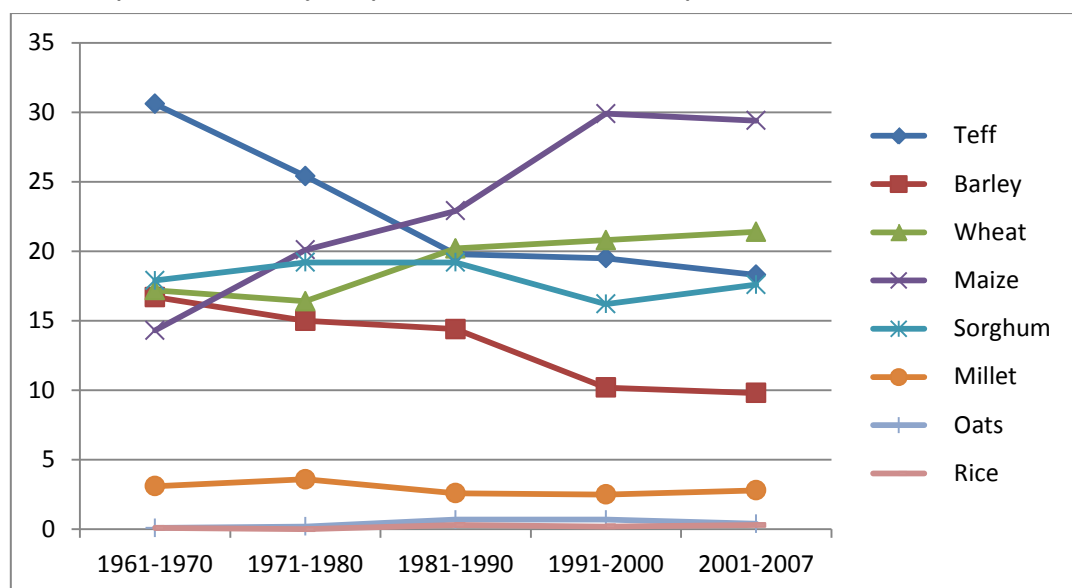
Table 3: Rural vs. Urban Per Capita Calorie Consumption of Food Items, 2004/05

Food item	Per capita calories			%
	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

The share of teff in total cereal consumption has sharply declined since 1961, moving from 31 percent in 1961-70 to 18 percent in 2001-2007 (Figure 1). There has been a considerable shift from teff to maize consumption, influenced by a number of factors but mainly owing to the relatively cheaper price of the latter.

Figure 1: Consumption Trends of Major Staples in the Total Cereal Consumption



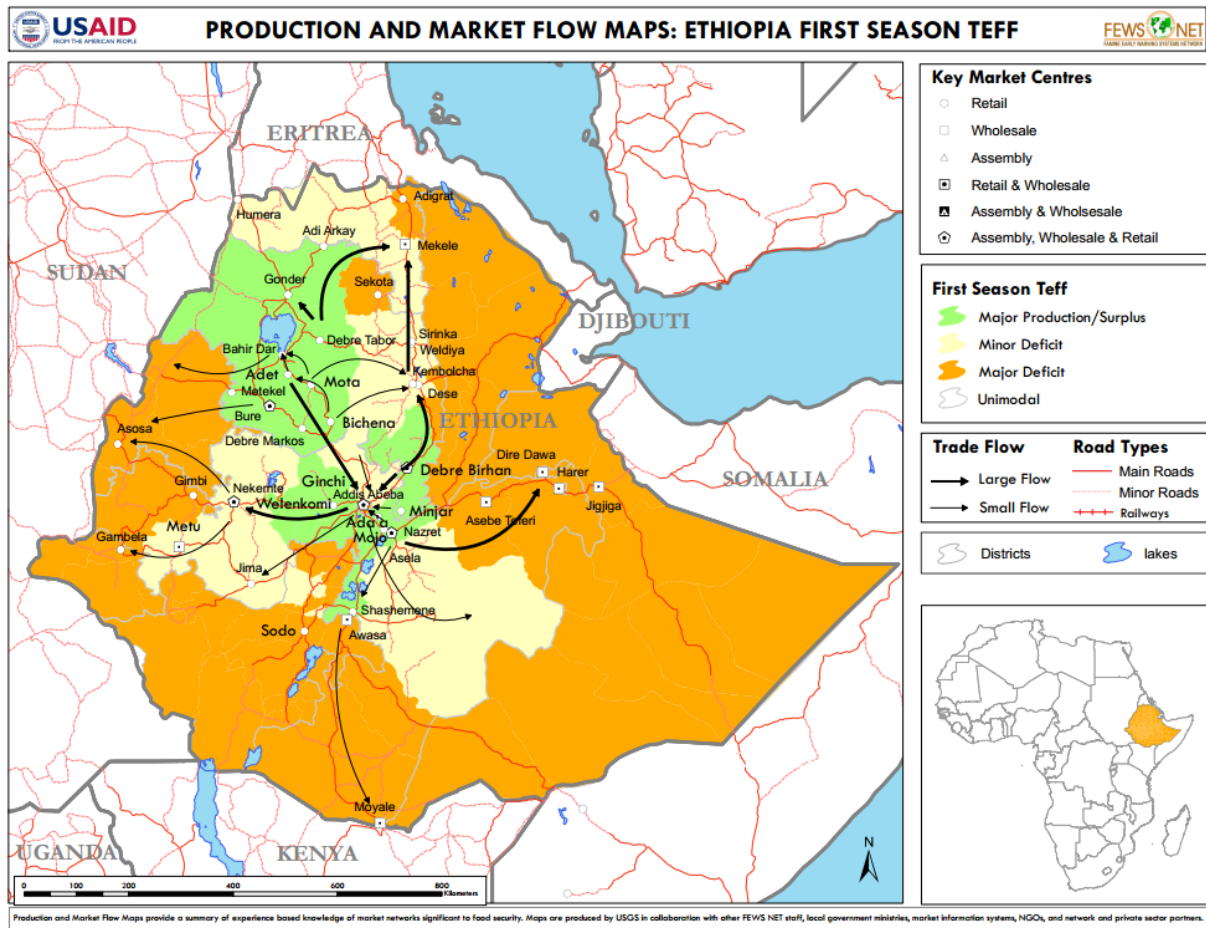
Source: Author's elaboration based on FAOSTAT data

MARKETING AND TRADE

Teff is a commercial crop mainly because of the high price it fetches and the absence of alternative cash crops (such as coffee, tea or cotton) in the major teff producing areas of Gojam (Amhara) and Shoa (Oromiya). Assemblers in village markets and wholesalers in regional markets pay close attention to the quality of teff. There are three general color-based grades for teff: white, mixed and red; white fetches the highest price and red the lowest. There are also important sub-grades, such as *magna* (very white), which is grown in East Shoa and sold at a premium price. Production area is a very important indicator of quality for each color, and Ada and Oloncomy (particular districts in East Shoa) teff types are often considered the best quality white teff.¹

While the bulk of the grains move through Addis Ababa, some urban consumption centers, such as Mekele and Dessie, get their supplies directly from production areas. Other urban centers, such as Harar and Dire Dawa, are supplied from Adama/Nazeret (East Shoa) (Figure 2).

Figure 2: Production and Market Flow Maps of Teff in Ethiopia



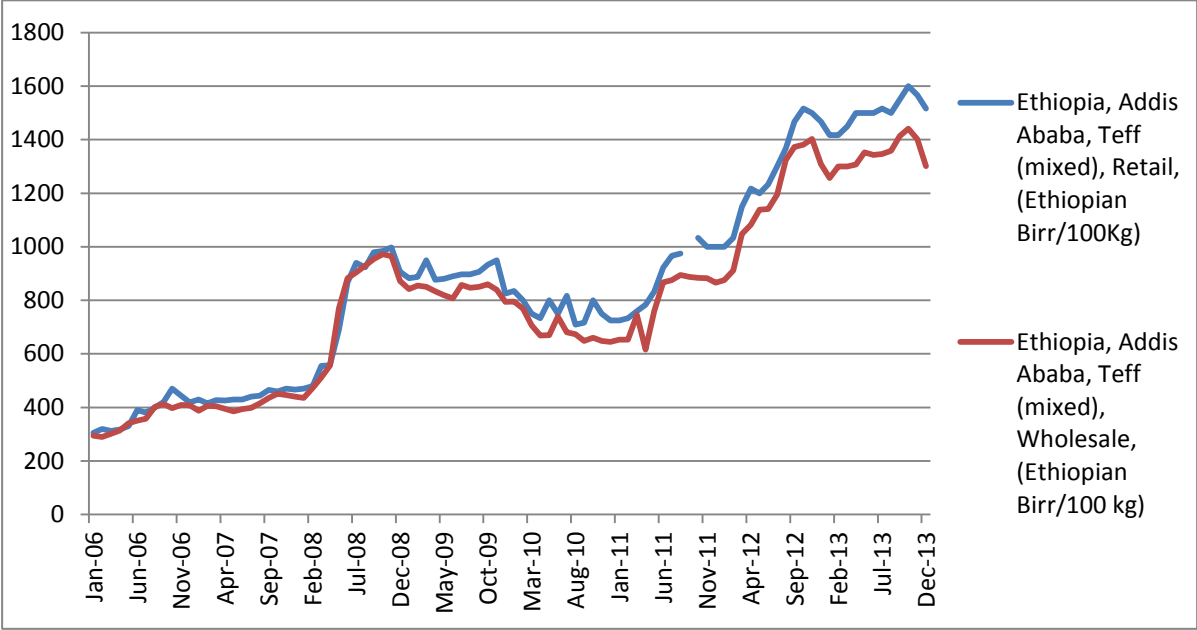
Source: FEWSNET, 2013

¹ Elleni Araya, Teff: Ethiopia's ancient grain not immune to rising food inflation, article in the **Ethiopia Observatory**, 2012: <http://ethiopiaobservatory.com/2012/04/02/teff-ethiopias-ancient-grain-not-immune-to-rising-food-inflation-addis-fortune/>

Traders in the central market in Addis play an important role in determining prices for the major production areas. In fact, traders in regional markets set prices based on information obtained from brokers in Addis Ababa. Between 2005 and 2007, the nominal price of teff in Addis increased continuously until the trend was interrupted in March 2008. In 2009 and 2010, prices fell from their peaks in October 2008 (Figure 3a). Nominal prices increased towards the end of 2011 and soared in 2012, surpassing the level reached in 2008 by over 40 percent in nominal terms. Traders at the main grain market in Addis Ababa reported a decline in the supply of teff probably because of smuggling (with better price) to Djibouti and Sudan, and eventually to Eritrea, which was the main reason for the price hike in 2012.² On the other hand, the increases in real prices were less pronounced and largely unpredictable. Real prices increased in 2006 and 2008, declined significantly between 2009 and 2011, and rose again in 2011 and 2012 but remained well below the levels of 2008 and 2009 (Figure 3b).

Compared to other staples, the price of teff has increased at a faster rate in recent years; hence, the price gap between teff and other staples is widening. In particular, the price gap between teff and maize has widened considerably since 2008 (Fufa, et al, 2011). Poor farmers growing teff have benefited in recent years, as the relative price of teff (which they sell) has increased.

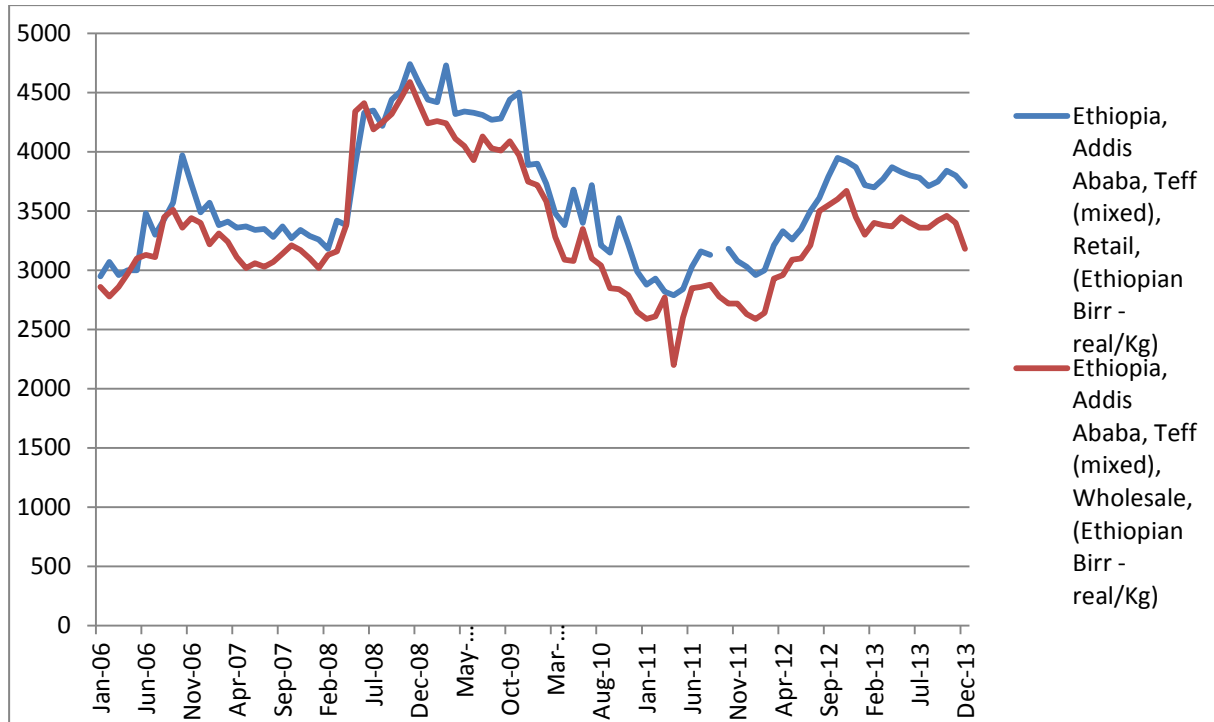
Figure 3a: Nominal Prices of Teff (mixed) in Addis Ababa, 2006-2013 (ETB/tonne)



Source: GIEWS, 2013

² Elleni Araya, Teff: Ethiopia’s ancient grain not immune to rising food inflation, article in the Ethiopia Observatory, 2012: <http://ethiopiaobservatory.com/2012/04/02/teff-ethiopias-ancient-grain-not-immune-to-rising-food-inflation-addis-fortune/>

Figure 4b: Real Prices of Teff (mixed) in Addis Ababa, 2006-2013 (ETB/tonne)



Source: GIEWS, 2013

Although teff has been consumed in the Horn of Africa for millennia, it has not been known to the outside until very recently. With increased globalization and labour migration, teff began to be exported to the Middle East, North America and Europe to satisfy the demand of Ethiopians abroad. Furthermore, because of its nutritional properties – high in fibre, calcium, iron and protein, low glycemic index and ‘gluten-free’ nature – teff has been dubbed the new super food, increasing demand in European and North American markets.³ Eritrea was once a major trading partner and importer of teff from Ethiopia but since the war between the two countries (1998-2000), formal trade relations have not resumed. Trade prohibition is not limited to Eritrea; since 2006, the government has maintained an official ban on the export of teff. Djibouti on the other hand, being a major trading port, reportedly still receives relatively high volumes of informal teff exports. Large quantities of this grain are then routed to the port of Ashdod in Israel,⁴ where some 80 000 Ethiopian Jews live. During the period 2000 to 2010, Israel accounted for one of the largest shares of Ethiopian teff exports, together with United Arab Emirates and Yemen (Figure 4). It is believed that many Ethiopian restaurants in the Middle East import fresh *injera* (made of teff).⁵ *Injera* exports are not affected by the ban on teff grain and the business is reported to have been expanding, especially exports to the United States.⁶

³ <http://www.daynews.com/lifestyle/food-and-beverage/2014/01/introducing-teff-new-super-grain-ethiopia-23530>

⁴ Ethiopian bread virtually worth own weight in gold: By Ayanawo Farada Sanbetu <http://www.haaretz.com/print-edition/news/ethiopian-bread-virtually-worth-own-weight-in-gold-1.226237>.

⁵ Fresh *injera* is transported by air, mainly by the Ethiopian Airlines. See Fufa, et al., 2011.

⁶ See for instance: <http://www.thereporterethiopia.com/Interview/that-booming-injera-business.html>

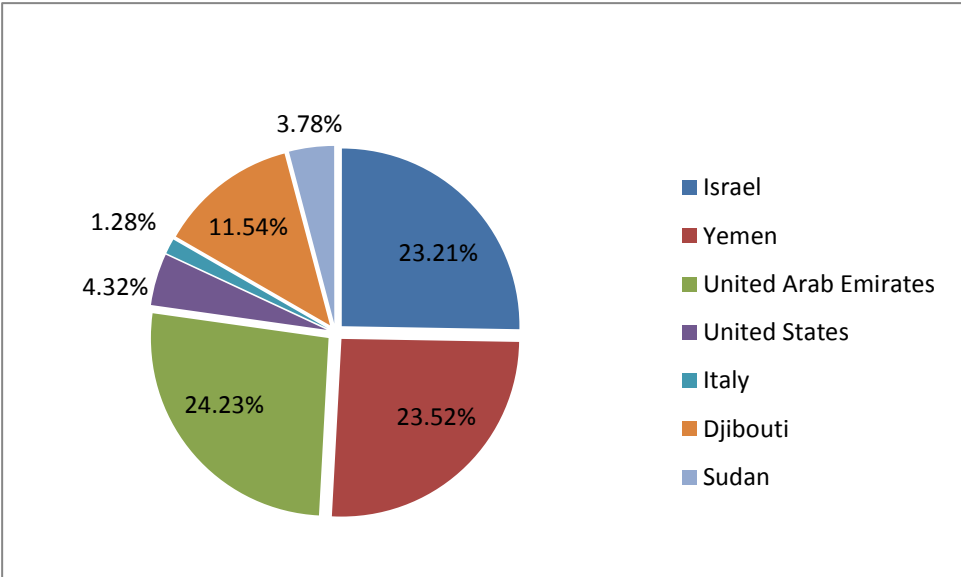
Export volumes of teff have sharply declined since 2006 due to the ban on grain exports in 2007 (Table 4). However, the price of teff has remained relatively high because of the high demand resulting from rising incomes (as a result of the booming service and industry sector, particularly the construction sector), high rates of urbanization (Minten, et al., 2013), rapidly increasing export demand for fresh injera and smuggling to neighbouring countries.

Table 4: Teff Trade in Ethiopia, 2000-2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Export (tonnes)	2,885	9,981	16,605	12,912	10,849	2512	2727	69	40	16	18	34	15
Export values (1000 USD)	3,073	17,961	11,681	10,930	7,078	9,419	2,657	259	39	33	429	63	11

Source: Global Trade Atlas. Teff considered as Other Cereals (Including wild rice, buckwheat, millet and canary seeds)

Figure 5: Share of Ethiopian Teff Exports by Destination, 2000 to 2012



Source: Global Trade Atlas (teff considered as Other Cereals (Including wild rice, buckwheat, millet and canary seeds))

Looking at fresh injera, export volumes have followed a very different path. From 2008, injera exports have soared to 2.5 million kg in 2012, a +270 percent increase (see Table 5). Due to the increasing demand of fresh *injera* worldwide, Ethiopian firms (e.g. Mama Fresh) have expanded fresh *injera* exports to benefit from the lucrative business opportunity abroad. The United Arab Emirates is among the most preferred destinations of exports, absorbing more than 65 percent of the volumes, followed by the United States of America, Bahrain and Sweden (all at 10 percent of the market). Though a smaller quantity of *injera* was probably exported before 2008, no data was recorded in the ERCA series.

Table 5: Export Volumes of Fresh Injera, 2005 to 2012

	2005	2006	2007	2008	2009	2010	2011	2012
Volume of fresh injera (in kg)	Na	Na	Na	679,966.3	967,682.1	1,286,325.0	1,813,479.0	2,519,638.0

Source: Ethiopian Revenue and Customs Authority, ERCA, 2013

DESCRIPTION OF THE VALUE CHAIN

The teff value chain in Ethiopia is not very different from maize as it involves input suppliers, producers, traders (local assemblers and wholesalers), retailers, processors, and consumers (Figure 5). As the vast majority of farmers use their own seeds, teff growers rarely require the services of the Ethiopian Seed Enterprise (ESE). However, they are heavily dependent on fertilizer supplied through the Agricultural Input Supply Enterprise (AISE); teff accounts for the highest share (54 percent) of the total fertilizer consumed in grain production (Fufa, et al., 2011). Since teff is not one of the staples distributed as food aid, the parastatal, the Ethiopian Grain Trade Enterprise (EGTE) does not intervene in the teff market under the present government.

Teff supply chains are long and complex. The regional markets in surplus producing areas receive their supplies from farmers and assemblers. Farmers often use animals (e.g. donkeys) to transport grain to villages or regional markets. They also sell to rural assemblers who transport the grain using small trucks to sell in the regional markets such as Debre Zeit / Bishoftu in East Shoa. Brokers in regional markets work as agents of traders and negotiate prices and grade levels with farmers who often have limited bargaining power (Fufa, et al., 2011).

Major wholesale markets in surplus producing regions of Shoa and Gojam supply the central market in Addis Ababa (Ehil Berenda). Brokers at the central market play an important role in linking the regional sellers to buyers at the central market and are paid fees, ranging from one to three Birr per 100 kg. In the absence of large-scale teff milling firms, the main buyers in the central markets are small retailers and millers. The number of small flour mills that retail teff has increased substantially in recent years and most consumers in Addis Ababa nowadays buy teff from these millers (Woldu, et al., 2013). Some regional traders in deficit areas also buy from the central market.

Small-scale traders dominate the regional and central teff markets because there are no large traders with bigger storage and trucking capacities. Significant price differences between different grades of teff have not encouraged bulking and large-scale operations. Grades and quality have to be checked visually throughout the supply chain every time the commodity changes hands. Like other cereals, high marketing costs and risk have contributed to inefficient teff markets. The market is affected by lack of formal grades and standards, lack of adequate warehouse facilities, lack of reliable market information and inadequate contract enforcement mechanisms.

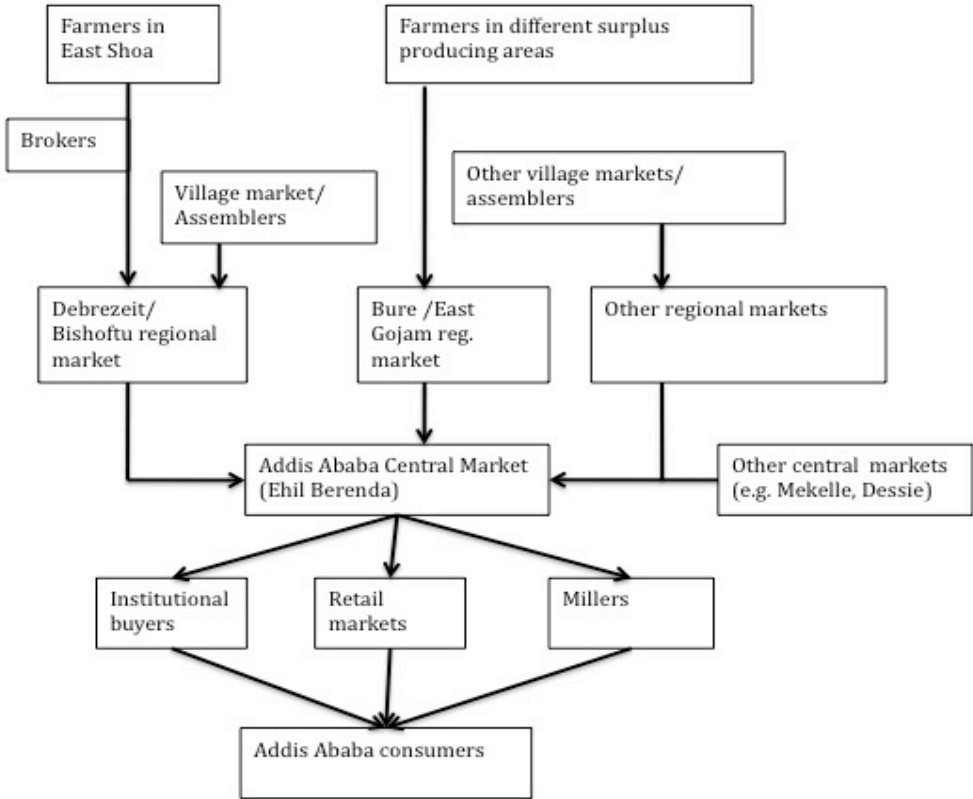
According to a recent study (ATA, MOA and EIAR, 2013), some five or more handovers take place between producers and consumers in the teff market, with each trader or broker taking a profit margin as well as incurring transport and storage costs. Another recent study (Minten, et al., 2013) also noted the impact of uncertainty on quality rewards for producers as well as quality demands on the part of buyers. The absence of formal grades and standards in the teff market has resulted in several problems: (i) mistrust between farmers and traders; (ii) difficulty finding quality teff in urban areas unless retailers go to teff production zones themselves and link directly with producers; and (iii) consumers are often unaware of teff being mixed with other cereals. Consumers spend a lot of

time and incur additional costs trying to verify the quality of teff they buy. In contrast with other countries, the direct sale of cereal flour is limited in Ethiopia (Woldu, et al., 2013). The common practice for consumers is to buy teff directly from a nearby cereal retailer or a miller, and then to have it cleaned and milled at their own expense before the flour is brought home, which is often an amount expected to meet the household's requirement for a month (Fufa, et al., 2011). The cost of verification to consumers has gone up in recent times, as the practice of mixing teff with cheaper cereals has increased and consumers find it difficult to trust millers. The final price paid by consumers, especially when they buy from millers or small cereal retailers and when the various grades and sub-grades are taken into account, is likely to be higher than the retail prices observed in the major grain market centers of the city.

On the other hand, a recent survey (Minten, 2013) found that the teff value chains are relatively shorter and that, on average, farmers obtain a high share (80 percent) of the final consumer price in the major terminal markets of Addis Ababa. It is true that the value chain has become more competitive over the years but mistrust among the major players has also increased with the rise in teff prices. Prices are often individually negotiated and are likely to vary from one transaction to another. Given the higher price charged by millers and small cereal retailers as well as the significant variations in the retail prices of different grades of teff, it may not be easy to get precise information on the final price paid by consumers or the actual price received by farmers. Only small traders and millers with limited capital seem to thrive under such an environment. Further investigation with a focus on the challenges of verifying quality and grades along with the retail prices of millers may shade light on the extent of margins and market inefficiencies.

Processing teff grain into flour is carried out exclusively by small-scale millers (using hammer mills). While this could be a better option for lower income groups who need to mix teff with cheaper cereals and use small mills to produce mixed or lower quality teff flour, better off consumers may prefer one-stop shopping (e.g. supermarkets) that reduces search costs and guarantees the quality and convenience of a modern retail outlet for which they are often willing to pay more, which also means improved incentives for farmers producing high quality teff (see also Woldu, et al., 2013). Technological improvement is also required in making *injera*. At the moment, a traditional clay pan is the only technology available to those making and selling *injera*, a source of livelihood for a growing number of people in the major towns and cities.

Figure 6: Teff Value Chain, Ethiopia



Source: Based on Fufa et al., 2011

POLICY DECISIONS AND MEASURES

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 the food grain it purchased to urban consumers, mainly in the city of Addis Ababa, through food ration shops (Gabre-Madhin, 2001).⁷ The former government attempted to discourage teff production because of its low yield, but its high demand and adaptation to various ecological conditions of the country has sustained it.

Following the overthrow of the former military government and the introduction of policy reforms in 1991, private trade was restored 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 to (i) stabilize prices for producers and consumers; (ii) earn foreign exchange through exporting grain; and, (iii) facilitate the purchase and distribution of grain for the Emergency Food Security Reserve. Over the years, the public enterprise has moved away from its price stabilization role to exporting pulses and oilseeds (Rashid and Negassa, 2011). The number of traders at primary, secondary or central market levels has increased considerably and many operate

⁷ Gabre-Madhin, E. (2001) Market Institutions, Transaction Costs, and Social Capital in the Ethiopian Grain Market, Research Report 124, IFPRI, Washington D.C.

without licenses, undercutting formally registered traders (Demeke, et al. 2012). Teff is the most preferred trade commodity in the market place because of its high demand.

The most recent and important attempt towards market development in Ethiopia has been the establishment of the Ethiopian Commodity Exchange (ECX) with a vision to transform agricultural trade through creating a new marketplace that better serves farmers, 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 the agricultural commodity business. ECX currently operates warehouses in major market centers, including Addis Ababa, Adama, Shashemene, Nekempte, Humera, Metema and Bure. However, teff is not among the major commodities traded at the ECX thus far; trade is largely limited to coffee, sesame and pea beans at the moment (Rashid and Negassa, 2011). Along with these commodities, the Agricultural Transformation Agency (ATA) has identified teff as one of Ethiopia's key products for supportive value chain programs.

Following the 2008 price surge, the government responded with several measures: (i) imposition of an export ban on cereals; (ii) re-introduction of urban food rationing; (iii) informal suspension of local procurement by WFP and others; and, (iv) direct government imports for open market sales and price stabilization. The government officially banned teff exports in January 2006 on the grounds that exporting is the main reason for the price surge.

Another policy factor affecting teff production is input support. Public provision of R&D services, extension advice, inputs and credit, have been the dominant sets of policy instruments. The government initiated a 100 percent credit guarantee scheme on fertilizer purchases in 1994, allowing farmers to purchase fertilizer at below-market interest rates. However, the program has been gradually scaled down and farmers are being encouraged to buy on cash or credit provided through cooperatives. The extent of interest rate subsidies is expected to be very small.

The exchange rate in Ethiopia is characterized by managed floating with 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, especially in 2008, 2009 and 2010. 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).⁸ As a result, ETB depreciated by about 30 percent between 2010 and 2011. Another study (Dorosh, et al., 2009)⁹ showed that the real exchange rate appreciated by 9.7, 12.8, 14.9 and 33.8 percent in July 2005, July 2006, July 2007, July 2008 and by 26.3 percent in June 2009. High rates of inflation (relative to the low inflation rate among its trading partners) and increasing pressure on foreign exchange reserve are among the major causes of currency appreciation in Ethiopia.

⁸Rashid S. (2010). Staple food prices in Ethiopia, prepared for the COMESA policy seminar on "Variation in staple food prices: Causes, consequence, and policy options", Maputo, Mozambique, 25-26 January 2010.

⁹Dorosh P, S. Robinson and H. Ahmed (2009), Economic Implications of Foreign Exchange Rationing in Ethiopia, IFPRI/EDRI ESSP2 Discussion Paper 009.

Between 2005 and 2008, inflation rates registered in the double digits and then declined to 8.5 and 7 percent in 2009 and 2010. In 2011, another high inflation rate of 33.2 percent was recorded, followed by a lower but still very high rate of 24.1 percent in 2012 (CSA data). In 2007 and 2008, the foreign currency reserve fell short of the critical requirement of 12 weeks' worth of imports and so the government implemented foreign exchange rationing (Rashid, 2010). In March 2008, access to foreign exchange for imports was restricted (rationed) to curb the excessive drawdown of foreign exchange reserve.

2. 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' value chain¹⁰ 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:

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

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

¹⁰ 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.

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

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.¹¹ Mathematically, the Nominal Rate of Assistance is defined by the following equation:

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

¹¹ 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.

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

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:

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

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 at www.fao.org/in-action/mafap.

3. DATA REQUIREMENTS AND CALCULATION OF INDICATORS

To calculate MAFAP's price incentive 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

Despite the government imposed export ban that has been in place since 2006, small yet significant quantities of teff were exported unofficially each year during the study period. However the export market is very small, consuming less than 0.5 percent of production. Teff is not imported even in small amounts and is only grown in Ethiopia and Eritrea (aside from insignificant experimental crops in other countries). For the purpose of the analysis, the country is thus defined as a net exporter throughout the reference period (see MARKETING AND TRADE).

MARKET PATHWAY ANALYSED

The main teff growing areas in Ethiopia are the Oromia and Amhara regions, accounting for 47 and 36 percent of the total volume of teff production. The town of Bura is located in the Gojjam zone of the Amhara region, a major teff-producing area about 410 km north of Addis Ababa, and was chosen as the farm gate for our analysis (see Figure 6).

Teff produced in Gojjam and other teff-producing areas of the country is largely traded in the major market centers of Addis Ababa. Therefore, Addis Ababa is considered as the point of competition for teff produced in various regions of Ethiopia.

Official teff exports are almost non-existent owing to the export ban in all but one year during the reference period, yet significant quantities of the cereal were smuggled through the port of Djibouti to Israel and the USA, where important Ethiopian Diaspora communities reside (also see MARKETING AND TRADE). The Port of Djibouti was therefore considered as the point of export for teff and hence, the reference border price for this analysis.

Figure 7: Market Pathway Analysed for Teff in Ethiopia: Bure, Production Area, Addis Ababa, Point of Competition, and Port Djibouti, Point of Exit



Source: Authors, from Google Maps, 2014

BENCHMARK PRICES

Observed

The basis for calculating a reference parity price to determine whether teff producers receive market incentives or disincentives is to establish a benchmark (border) price, which represents the market price for teff that would prevail in the absence of domestic policy interventions and market inefficiencies. Since Ethiopia is considered a net exporter of teff in our analysis, the nominal FOB price is used as the benchmark price (Table 6).

The FOB price for teff has been derived from the international price of *injera*, which is a form of flatbread made from processed teff, a dish very appreciated in Ethiopia and among the Ethiopian Diaspora. *Injera* is thus exported and consumed worldwide, especially in the United States, Israel, neighbouring Arabic countries and Europe.

Due to a lack of price data on informal teff trade through the Port of Djibouti, the FOB price for teff was computed by:

- (i) Transforming the international price of *injera* (obtained from the Ethiopian Revenue and Customs Authority from 2008 to 2012, and deflated for the earlier years) into an international price of teff. A conversion rate of 1.666 (*injera* to teff) was applied. A rate determined through several group discussions with agents along the value chain.
- (ii) Deducting the costs of processing teff into *injera* from the international price of teff. These costs include (a) the costs of transportation from collectors (Addis Ababa) to mills and from the bakery to Bole airport (main exit point of *injera*) (b) the labour costs to process 1 tonne of teff into *injera* and (c) the margins from processors (see Table 6). The total costs for 2013 have been deflated for the previous years, using the inflation rates of the Central Statistical Agency (CSA).

**Table 6: Processing Costs from
Teff to Injera in Ethiopia for 2013, in ETB/tonne**

	2013
Transport costs Collectors-Mills	400
Impurity losses and weight losses in mills	400
Labor costs in mills	400
Milling service	500
Labour at the bakery	1000
Water costs at bakery	100
Power costs at bakery	1500
Transport from bakery to Bole	500
Margins of bakers	4500
Total costs	9300

Sources: Group discussion with collectors in Addis Ababa, millers and bakers, 2014

The final FOB prices that are used in the analysis are presented in Table 7 below. They are considered the best proxy prices that could be determined for teff smuggled through the Port of Djibouti. However, it must be acknowledged that (i) they do not include the risk premium that is surely applied by teff smugglers and (ii) they do not sufficiently reflect the likely impact of various marketing costs from Addis Ababa to Djibouti because they are derived from *injera* prices, which are exported by plane from Addis Ababa and not Djibouti.

Table 7: International Prices of Injera in USD/tonne and Exchange Rates in Ethiopia, 2005-2012

		Unit	2005	2006	2007	2008	2009	2010	2011	2012
1	International price of injera	USD/T	1042	1188	1402	2020	2068	1907	1811	1717
2	Conversion rate		1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
3	International price for teff (1/2)	USD/T	625.2	712.8	841.2	1212	1240.8	1144.2	1086.6	1030.2
4	Total costs of processing	USD/T	112.9	128.8	151.9	218.7	238.43	257.5	343.0	425.3
5	Final FOB prices for teff (3-4)	USD/T	512.2	584	689.2	993.2	1002.3	886.6	743.6	604.8

Sources: ERCA data (2013) and interviews with key informants

The FOB prices for teff may appear high, as seen in Table 7, but it should be noted that teff FOB prices (unit values) were above 1 000 USD per tonne in 2000 and 2001, when relatively larger quantities of teff were exported, according to UNComtrade data.

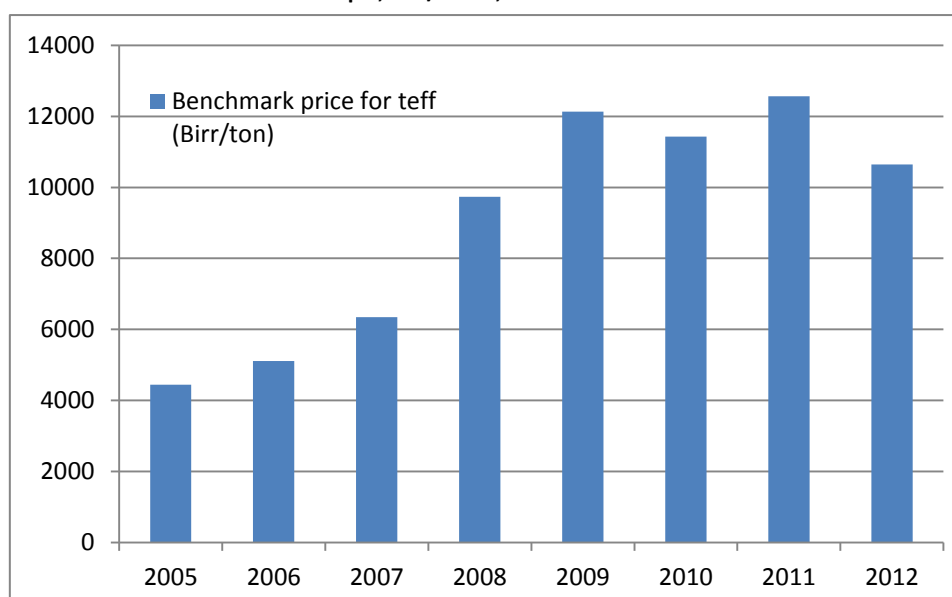
Table 8: International Prices for Teff in ETB and USD and Exchange Rate in Ethiopia for 2005 - 2012

	2005	2006	2007	2008	2009	2010	2011	2012
International price (USD/tonne)	512.2	584	689.2	993.2	1002.3	886.6	743.6	604.8
Exchange rate (ETB/USD)	8.67	8.74	9.21	9.8	12.1	12.89	16.9	17.6
Benchmark Price (ETB/tonne)	4,441	5,105	6,348	9,734	12,129	11,429	12,567	10,646

Sources: National Bank of Ethiopia and ERCA

From 2008 to 2009, the FOB price for teff increased from 689.2 to 993.2 USD/tonne (Figure 7). The causes of the price increase for exported teff are difficult to investigate owing to the lack of a real teff international price. They could be because of shifts in the demand pattern for *injera* from the Ethiopian Diaspora, general food price increase in Ethiopia following the 2007-2008 crisis and a rise in fuel prices in the country.

Figure 8: Estimated FOB Prices for Teff in Ethiopia, ETB/tonne, 2005-2012



Source: Author's elaboration based on ERCA and group discussions data

Adjusted

No adjustments were made.

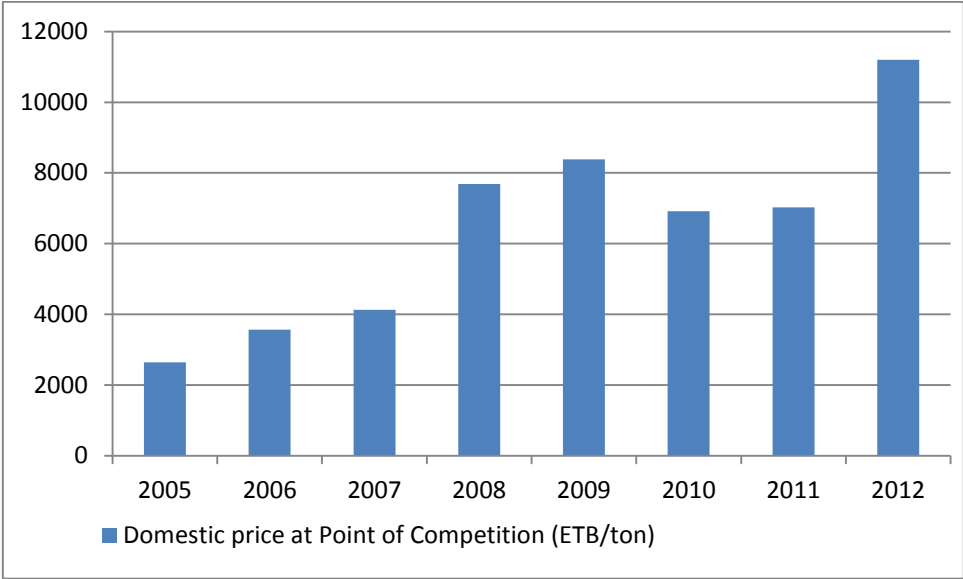
DOMESTIC PRICES

Observed prices at point of competition

Average annual wholesale prices for teff in Addis Ababa were used in this analysis. These prices were derived from monthly wholesale prices available on the Ethiopian Grain Trade Enterprise’s (EGTE) website (<http://egtemis.com/marketstat.asp>).

Wholesale prices increased throughout the entire 2005-2012 period, with an average annual growth of 27 percent. Incredibly, teff prices almost doubled at the wholesale level in 2008(see Figure 8).

Figure 9: Domestic Price at Point of Competition (Addis Ababa) for Teff in Ethiopia, ETB/tonne, 2005 - 2012



Source: Ethiopian Grain Trade Enterprise (EGTE)

The price of teff was substantially affected by the high food price inflation rate that followed the 2007-2008 food crisis. Furthermore, middle class urban households for teff are inelastic compared to barley, maize, sorghum and wheat price elasticity (Tafere et al., 2010). On the other hand, the price decrease in 2010 and 2011 was influenced by the successive devaluations of the Ethiopian Birr that depressed domestic prices (which thwarted the 33 percent inflation rate in the country in 2011). In 2012, the price peaked again, primarily because of the 24 percent inflation rate, which was not curbed down this time by a strong intervention on the exchange rate. As shown in Table 5, the quantity of injera exports increased significantly in 2012 (by 39 percent compared to 2011), exerting additional demand pressure on the supply of teff.

Observed prices at farm gate

Bure represents one of the major teff producing areas of Ethiopia (see MARKET PATHWAY ANALYSED). The farm gate price in Bure was not available from existing market information systems, and was thus computed from the wholesale price for teff in Bure. The marketing costs between the Bure wholesale market and the Bure farm gate were deducted from the Bure wholesale price. After

discussions with key informants, prices were estimated as half of the net margin obtained by traders selling in Addis (Table 9).

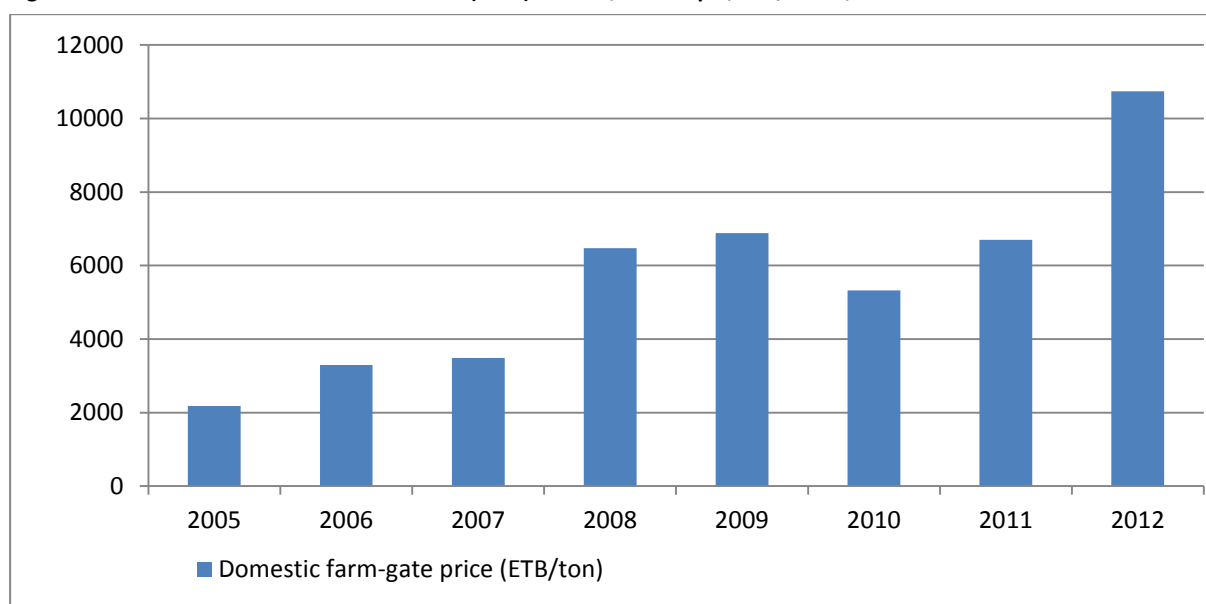
Table 9: Observed Wholesale and Farm Gate Prices for Teff in Ethiopia, ETB/tonne, 2005 – 2012

	Unit	2005	2006	2007	2008	2009	2010	2011	2012
Wholesale purchase price observed at the market of A.A (point of competition).	ETB/tonne	2641	3567	4132	7690	8382	6921	8009	11479
Bure observed wholesale price	ETB/tonne	2256	3365	3564	6524	6933	5369	7023	11202
Gross margin of Bure traders (estimated as half of the Addis Ababa traders)	ETB/tonne	75	75	75	50	50	50	50	50
Producer Prices Bure	ETB/tonne	2,181	3,290	3,489	6,474	6,883	5,319	6701	10736

Source: EGTE and interviews with key traders, 2014

Over the period, the farm gate prices increased steadily (Figure 9). From 2005 to 2008, prices increased three-fold and doubled from 2010 to 2012. In 2008 and 2010, the observed prices at farm gate registered an impressive jump of 85 percent and 60 percent, respectively.

Figure 10: Domestic Prices at Farm Gate Level (Bure) for Teff, in Ethiopia, ETB/tonne, 2005-2012



Source: Authors, from EGTE and interviews with key traders, 2014

EXCHANGE RATES

Observed

The observed annual exchange rates are derived from daily exchange rates applied in inter-bank transactions by the National Bank of Ethiopia.¹² The rates increased from Birr 8.67 to 17.60 Birr per USD between 2005 and 2012 (Table 10).

Table 10: 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

¹²<http://www.nbe.gov.et/market/dailyexchange.html>

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 now commonly understood that the domestic currency (Birr) was overvalued over the 2008-2012 period, especially in 2008, 2009 and 2010 (Demeke, 2012). The extent of overvaluation was estimated at 40 percent during this period, according to one study (Rashid, 2010). Another study (Dorosh, et al., 2009) showed that the real exchange rate appreciated by 9.7, 12.8, 14.9 and 33.8 percent in July 2005, July 2006, July 2007, July 2008 and by 26.3 percent in June 2009, respectively. The IMF estimated that the Ethiopian real exchange rate was about 11 to 23 percent overvalued in May 2012 (IMF 2012). In 2014, the World Bank concluded that the real effective exchange rate has appreciated by more than 50 percent over the past 3.5 years (World Bank Group, 2014). The major causes of currency appreciation in Ethiopia are the high rates of inflation (relative to the low inflation rates among the country's trading partners) and the increasing pressure on foreign exchange reserves. Inflation rates remained in the double digits between 2005 and 2008, and then declined to 8.5 and 7 percent in 2009 and 2010. More recently, the rates increased again, climbing to 35 and 21 percent in 2011 and 2012 (CSA).

In 2007 and 2008, the foreign currency reserve fell short of the critical requirement of 12 weeks' worth of imports and so the government instituted foreign exchange rationing (Rashid, 2010). In March 2008, access to foreign exchange for imports was indeed rationed to curb the excessive drawdown of foreign exchange reserve. In September 2010, the government devalued the Birr by 17 percent and in July 2014, the World Bank called for the devaluation of the real exchange rate to boost exports.¹³

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, a respective adjustment rate of 13 and 12 percent was taken in 2011 and 2012, as per the information from the IMF and the World Bank. The adjustment factor approximates the depreciation of the local currency, had a more liberal fiscal policy been pursued.

Table 11: Observed and Adjusted Exchange Rate (Ethiopian Birr per 1 USD), 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Official Exchange rate ETB/USD	8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
Adjustment factor	1.20	1.20	1.20	1.20	1.20	1.20	1.13	1.12
Adjusted Exchange rate	10.40	10.49	11.05	11.76	14.52	15.47	19.10	19.70

Source: NBE (2014), Rashid (2010) and IMF (2014)

¹³ See for instance Bloomberg News: <http://www.bloomberg.com/news/2014-07-22/world-bank-urges-ethiopia-to-devalue-birr-to-lift-export-revenue.html> (Jul 22, 2014)

ACCESS COSTS

Observed

Point of competition to border

Observed access costs from Addis Ababa (wholesale) to the Djibouti Port (border) include a surtax and withholding tax, port handling, transport, unloading and miscellaneous costs (equal to 5 percent of the CIF price). These cost estimates (Table 16) were based on a USAID Bellmon study (USAID, 2010). Margins for traders are included under miscellaneous costs. The variations over the years in the costs from the USAID study correspond to access costs obtained from major grain traders and trade associations for 2005-2010, confirming their reliability. These costs were updated for 2011 and 2012 through interviews with traders.

Table 12: Observed Access Costs from Djibouti to Addis Ababa for Teff, ETB/tonne, 2005-2012

	Unit	2005	2006	2007	2008	2009	2010	2011	2012
Surtax & Withholding tax	ETB/T	51.4	62	82.7	118.5	97.4	92.2	107	107
License fee	ETB/T	17.1	20.6	27.5	39.5	32.4	30.7	53.5	59.6
Port Handling	ETB/T	233	233	233	233	233	233	350	350
Transport costs	ETB/T	380	380	386.7	437.5	527.5	570	865	1000
Unloading	ETB/T	32	32	32	32	32	32	32	32
Miscellaneous (including margin)	ETB/T	85.7	103.4	137.9	197.6	162.3	153.7	267.8	298.1
Total costs	ETB/T	782.1	810.4	872.2	1018.6	1052.2	1080.8	1621.8	1787.1

Source: USAID, USAID Office of Food For Peace Ethiopia, Bellmon Estimation, Annex II Economic Data and Trends, September, 2011

Port transport and handling costs represent the bulk of access costs between the border and point of competition. Transport costs have increased in nominal terms from 2005 to 2012, partly owing to the inflation rate, although the transport cost increase was not proportional to inflation (see Table 13). Another factor increasing the cost of transportation was the surge in fuel prices in 2008.

Table 13: Comparison of MAFAP Teff Transport Costs Increase and Inflation Rate (%) in Ethiopia, 2006-2012

	Unit	2006	2007	2008	2009	2010	2011	2012	Flat average
Transport costs increase (MAFAP)	%	0	2	13	21	8	52	16	16
Inflation rate	%	12	17	44	8	8	33	23	21

Source: MAFAP, World Development Indicators, 2014

Farm gate to point of competition

Marketing costs from Bure to Addis Ababa were obtained from group discussions with traders/brokers and traders' associations at the Addis Ababa central grain market. They include costs, such as loading, transport, brokers' fees for trucks, unloading, storage, losses, as well as brokers' fees and margins for traders selling teff in Addis Ababa (Table 14). Some of these costs are incurred only under rare occasions, e.g. when brokers are unable to sell the grain directly off the truck (arriving from Bure) and decide to unload at a nearby warehouse, incurring unloading and storage costs, as well as losses owing to rodents and other pests. As per discussions with traders, the margins have

been lowered from 2008 to 2012 to reflect the decline in margins from 2008 that were reported by traders and a recent study (Rashid and Negassa, 2011). Traders have indicated that their profits declined with soaring prices, especially in 2011 and 2012, as most customers cut back on their purchases.

Brokers' fees on the other hand, significantly increased in 2011, reaching 100 ETB/tonne, from a previous amount of 15 ETB/tonne. This is due to an increase of informal fees along the trade corridors and must be further investigated.

Table 14: Observed Access Costs from Bure to Addis Ababa for Teff, ETB/tonne, 2005-2012

	Unit	2005	2006	2007	2008	2009	2010	2011	2012
Loading	ETB/T	20	20	20	20	30	30	54	60
Transportation costs	ETB/T	200	190	250	300	350	400	900	900
Bure to Addis	ETB/T								
Broker fees for trucking	ETB/T	6	6	10	10	15	15	100	100
Broker fees for selling grain in Addis	ETB/T	10	10	15	20	25	30	0	0
Estimated margins for traders	ETB/T	150	150	150	100	100	100	100	100
Total costs	ETB/T	386	376	445	450	520	575	1100	1100
Farm gate to Bure	ETB/T								
Gross margin for traders for buying at farm gate and selling at Bure (half of traders' margin)	ETB/T	75	75	75	50	50	50	50	50
Total costs from Farm Gate to Addis Ababa	ETB/T	461	451	520	500	570	625	1204	1210

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

Transport costs, the major component of total access costs, have increased significantly between 2005 and 2012, mainly because of the high fuel cost and high rate of inflation in the country. In terms of USD/km/tonne, the price has increased from 0.087 in 2005 (8.7 cents) to 0.154 (15.4 cents) in 2012 (Table 15). The observed transport costs are thus well above the costs reported along the Djibouti-Addis Ababa road and the international transport costs rates. The high cost is also related to the use of smaller trucks (often less than 10 tonne capacity) rather than bigger trucks with lower costs per unit.

Table 15: Transport Costs Between Addis Ababa and Bure for Teff, in USD/t/km, 2005-2012

		2005	2006	2007	2008	2009	2010	2011	2012
1	Distance Addis-Bure	410	410	410	410	410	410	410	410
2	Access costs (less margins)	311	301	370	400	470	525	1104	1110
3	Transport costs in ETB/T/Km (1/2)	0.76	0.73	0.90	0.98	1.15	1.28	2.69	2.71
4	Exchange rate USD/ETB	8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
5	Transport costs in USD/T/Km (3/4)	0.087	0.084	0.098	0.100	0.095	0.099	0.159	0.154

Source: Authors, from MAFAP, 2014

For the years 2006, 2011 and 2012, the access costs between Bure and Addis Ababa exceeded the price differential between the Bure farm gate and the Addis Ababa wholesale market. This suggests that for those 3 years, on average, (i) traders sold at a loss; (ii) prices for a given year did not fully reflect the actual transaction costs; (iii) traders overestimated access costs during interviews with the

analysts; and (iv) there were inaccuracies in the farm gate and/or wholesale prices. As discussed in the Description of the Value Chain above, it is more likely that prices were individually negotiated for different grades and quality and that the average market prices may not fully capture the actual prices used in buying and selling teff. The negative differential could thus very well be due to noise in the price data used in the analysis, at least for 2006 and 2012.

Table 16: Comparison of the Price Differential Between the Addis Ababa Wholesale and the Bure Farm Gate Prices for Teff, and the Access Costs Between Addis Ababa and Bure for Teff, in ETB/tonne, 2005-2012

	2005	2006	2007	2008	2009	2010	2011	2012
Price differential	460	277	643	1216	1499	1602	322	466
Access costs	461	451	520	500	570	625	1204	1210
Total differential	-1	-174	123	716	929	977	-882	-744
Ratio differential over wholesale price	0%	11%	6%	16%	26%	31%	17%	9%

Source: Authors calculations from MAFAP, 2014

Adjusted

Point of competition to border

Adjusted access costs reflect the costs that would prevail in an efficient value chain. The teff market is more competitive than other cereals markets as teff is the main cereal that is consumed in urban centers. Nevertheless, excessive fees, such as broker and informal trade fees are rampant in the teff value chain. Hence, taxes and fees were removed in the adjusted access costs because it is considered that there was an overcharge of the services that were rendered against those fees (Table 17).

Since transport costs used in this analysis (as obtained from the USAID study) were less than 0.06 USD/tonne/km, which is considered reasonable by African standards¹⁴ (though not by the Ethiopian Government's standards¹⁵), no adjustments were made to the observed transport costs.

¹⁴Transport prices in Africa are, on average, higher than in South Asia or Brazil. In 2007, prices (per ton-kilometer (t/km)) on the Central African Douala–N'Djame'na route (linking Cameroon with Chad) are more than three times higher (11 US cents/ per ton/km) than in Brazil (3.5 cents per ton per km) and more than five times higher than in Pakistan (2 cents per ton per km). Only the Durban–Lusaka corridor (6 cents per ton per km) in Southern Africa approaches the price level of other regions of the world. Our observed cost varied between 4.5 and 4.8 cents, which is not too high, given the inefficiency and long delays at the points of loading and unloading, the recent high cost of fuel, and poor road conditions, among other factors. See for instance, Teravaninthorn, S. and Gaël Raballand, Transport Prices and Costs in Africa: A Review of the Main International Corridors, Africa Infrastructure Country Diagnostic (AICD), Working Paper 14, July 2008 (http://www.infrastructureafrica.org/system/files/WP14_Transportprices.pdf).

¹⁵ A recent government report indicated that the price/ton/km of transporting commodities via the Djibouti corridor is very high compared to other countries: the price/tonne/km in Ethiopia is 6 US cents, compared to 2.3 cents in Pakistan or 4 cents in Brazil. The high cost is associated with excessive downtime and high inefficiency in fuel consumption. On average, a vehicle can make a maximum of 3 round trips per month, while it is possible to do 5. See for instance, The Reporter (newspaper), 11 February, 2012: <http://www.thereporterethiopia.com/News/govt-to-tighten-grip-on-trade-logistics.html>

Table 17: Adjusted Access Costs from Djibouti to Addis Ababa for Teff, ETB/tonne, 2005-2012

	Item	Unit	2005	2006	2007	2008	2009	2010	2011	2012
1	Observed access costs	ETB/T	782.1	810.4	872.3	1018.6	1052.2	1080.9	1621.8	1787.1
2	Surtax & Withholding tax	ETB/T	51.4	62	82.7	118.5	97.4	92.2	107	107
3	Adjusted access costs (1-2)	ETB/T	730.7	748.4	789.6	900.1	954.8	988.7	1514.8	1680.1

Source: Authors

Farm gate to point of competition

Brokers' fees between Bure and Addis Ababa markets were adjusted to reflect a more efficient teff value chain, as it is considered that brokers overcharged for the services they provided (see Table 18). From discussions with traders in Addis Ababa, these costs were adjusted downward by 25 percent throughout the period (Table 18).

Transport costs from Bure to Addis Ababa have also been adjusted by reducing the observed transport cost by 20 to 25 percent (Demeke, 2012). The adjustment was intended to reduce transport costs to figures between 6.7 and 8.9 USD cents/km/tonne, which are slightly higher than the rates charged along the Djibouti-Addis Ababa road.

Table 18: Adjusted Access Costs from Addis Ababa to Bure for teff, ETB/tonne, 2005-2012

		2005	2006	2007	2008	2009	2010	2011	2012
1	Observed access costs	461	451	520	500	570	625	1204	1210
2	Inefficiencies in transport costs	40	38	50	75	88	100	225	225
3	Inefficiencies in broker fees for grains	4	4	6.25	7.5	10	11.25	25	25
4	Adjusted access costs (1-2-3-4)	417	409	463.75	417.5	472	513.75	1179	1185

Sources: Authors' calculation based on information collected from traders and trader association at the central grain market, Ehil Berenda, Addis Ababa, 2014

BUDGET AND OTHER TRANSFERS

Budget transfers to teff were not identified in the write-up of this note, but may be revised based on MAFAP agricultural expenditure analysis.

QUALITY AND QUANTITY ADJUSTMENTS

Neither quality nor quantity adjustments were made.

DATA OVERVIEW

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

Table 19: Data Sources and Methodological Decisions

Concept		Description	
		Observed	Adjusted
Benchmark price		<i>FOB price calculated as the unit value of teff, derived from the FOB price for injera (from the Ethiopian Revenue and Custom Authority) and processing costs from teff to injera.</i>	
Domestic price at point of competition		<i>Average annual wholesale price of teff in Addis Ababa as reported by the Ethiopian Grain Trade Enterprise (EGTE).</i>	N.A.
Domestic price at farm gate		<i>Average annual farm-gate price in Bure calculated from the wholesale price in Bure. Data obtained from EGTE.</i>	N.A.
Exchange rate		<i>Annual average of exchange rate as reported by the National Bank of Ethiopia.</i>	<i>Adjustment between 12 and 20 percent, assuming an overvaluation as reported by Rashid (2010) from 2005 to 2010 and adjustment factor from IMF for 2011 and 2012 (Table 11).</i>
Access cost from the point of competition to the border		<i>Transport, margins, processing (loading and unloading), port handling, taxes and fees. From USAID, USAID Office of Food For Peace Ethiopia, Bellmon Estimation, Annex 1 Economic Data and Trends, 2010 and group discussions at Ehil Berenda</i>	<i>Adjustment of surtax & withholding tax.</i>
Access costs from the point of competition to farm gate		<i>Loading, Transportation costs, Broker fees for truck - per tonne, Broker's fees, trader's margin as estimated by a group of traders in the Addis Ababa wholesale market</i>	<i>Transportation costs adjustment to reduce transport cost (6.7-8.9 USD cents/km/tonne); adjustment of the broker fees by 25 percent</i>
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 20: Summary of the Data for MAFAP Calculations

		Year	2005	2006	2007	2008	2009	2010	2011	2012
		trade status								
DATA	<i>Unit</i>	<i>Symbol</i>								
Benchmark Price										
Observed	USD/tonne	$P_{b(int\$)}$	512.28	584.07	689.29	993.26	1002.37	886.69	743.60	604.88
Adjusted	USD/tonne	P_{ba}	-	-	-	-	-	-	-	-
Exchange Rate										
Observed	ETB/USD	ER_o	8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
Adjusted	ETB/USD	ER_a	10.40	10.49	11.05	11.76	14.52	15.47	19.10	19.70
Access costs border - wholesale										
Observed	ETB/tonne	AC_{owh}	782.10	810.40	872.30	1018.60	1052.20	1080.90	1621.80	1787.10
Adjusted	ETB/tonne	AC_{awh}	730.70	748.40	789.60	900.10	954.80	988.70	1514.80	1680.10
Domestic price at wholesale	ETB/tonne	P_{dwh}	2,641.0	3,566.53	4,132.08	7,690.21	8,381.91	6,920.75	7,023.26	11,202.56
Access costs wholesale - farm gate										
Observed	ETB/tonne	AC_{ofg}	461	451	520	500	570	625	1204	1210
Adjusted	ETB/tonne	AC_{afg}	417.00	409.00	463.75	417.50	472.00	513.75	954.00	960.00
Farm gate price	ETB/tonne	P_{dfg}	2,181	3,290	3,489	6,474	6,883	5,319	6,701.16	10,736.17
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 21: MAFAP Price Gaps for Teff in Ethiopia, (ETB/tonne), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	x	x	x	x	x	x	x	x
Observed price gap at point of competition	(1,018)	(728)	(1,344)	(1,025)	(2,695)	(3,428)	(3,922)	2,344
Adjusted price gap at point of competition	(1,956)	(1,812)	(2,695)	(3,090)	(5,218)	(5,808)	(5,665)	967
Observed price gap at farm gate	(1,017)	(553)	(1,467)	(1,741)	(3,623)	(4,405)	(3,040)	3,087
Adjusted price gap at farm gate	(1,999)	(1,679)	(2,874)	(3,889)	(6,245)	(6,896)	(5,033)	1,460

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

Table 22: MAFAP Nominal Rates of Protection and Assistance for Teff in Ethiopia, (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	x	x	x	x	x	x	x	x
Observed NRP at point of competition	-28%	-17%	-25%	-12%	-24%	-33%	-36%	26%
Adjusted NRP at point of competition	-43%	-34%	-39%	-29%	-38%	-46%	-45%	9%
Observed NRP at farm gate	-32%	-14%	-30%	-21%	-34%	-45%	-31%	40%
Adjusted NRP at farm gate	-48%	-34%	-45%	-38%	-48%	-56%	-43%	16%
Observed NRA at farm gate	-32%	-14%	-30%	-21%	-34%	-45%	-31%	40%
Adjusted NRA at farm gate	-48%	-34%	-45%	-38%	-48%	-56%	-43%	16%

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

Table 23: MAFAP Market Development Gaps for teff in Ethiopia, (%), 2005-2013

	2005	2006	2007	2008	2009	2010	2011	2012
Trade status for the year	x	x	x	x	x	x	x	x
Access costs gap to competition point (ACGwh)	(51.4)	(62.0)	(82.7)	(118.5)	(97.4)	(92.2)	(107.0)	(107.0)
Access costs gap to farm gate (ACGfg)	(44.0)	(42.0)	(56.3)	(82.5)	(98.0)	(111.3)	(250.0)	(250.0)
Exchange rate policy gap (EXRP)	(886)	(1,022)	(1,268)	(1,947)	(2,426)	(2,288)	(1,636)	(1,270)
International markets gap (IMG)	-	-	-	-	-	-	-	-

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

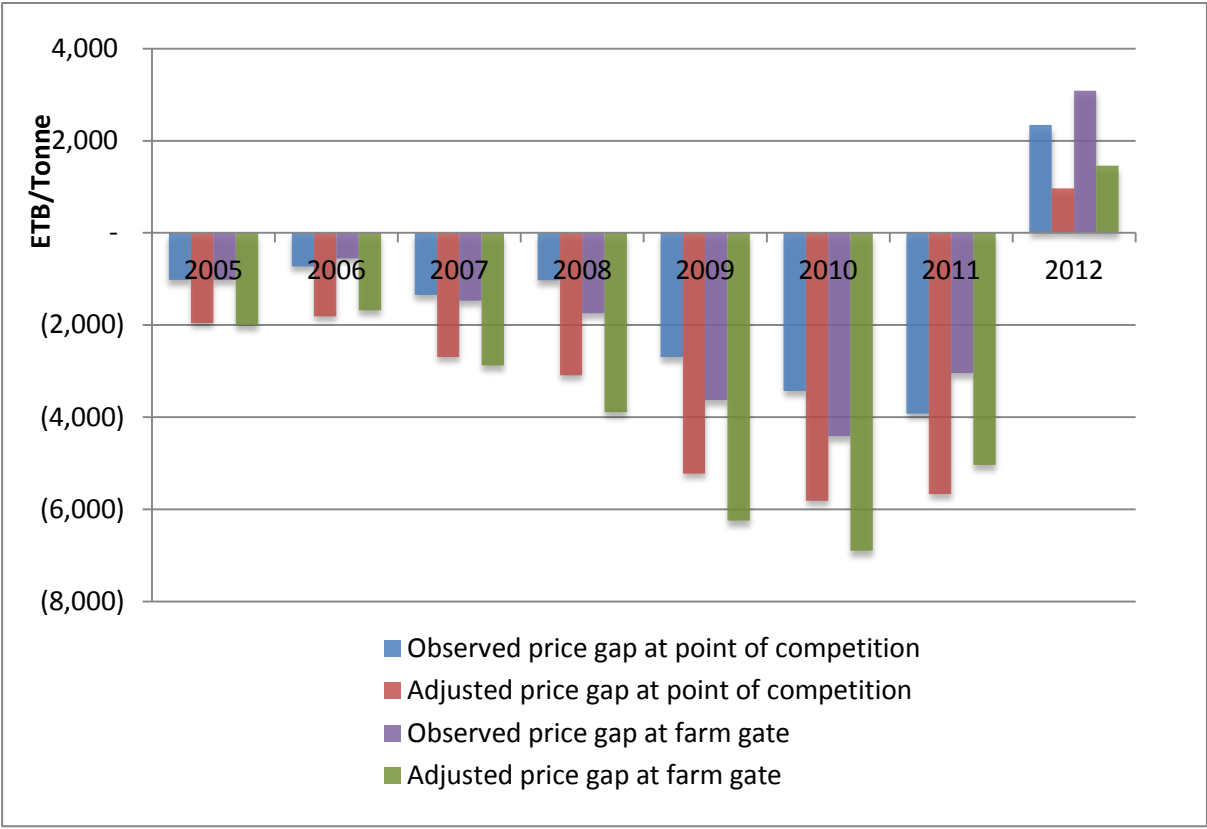
4. RESULTS AND INTERPRETATION

MAFAP analysis is based on the comparison of domestic prices with reference prices, both at farm gate and wholesale levels. Reference prices reflect prices that producers could get in the absence of domestic policy interventions and market inefficiencies. Indicators of price differences between domestic and reference prices are calculated at wholesale and farm level (see details of the methodology used to calculate the different indicators).

Figure 10 (extracted from Annex II of the complete excel sheet) shows that the price gaps between domestic and reference prices were negative on average. Prices at the wholesale level or at the farm gate were well below the reference prices in all years, except 2012. The price gaps sharply increased between 2009 and 2011 (Figure 10).

The extent of farmers’ disincentives is more clearly explained by the price wedge at farm gate level; observed price gaps (PGofg) were negative in all years except 2012, and ranged from Birr 553 per tonne in 2006 to Birr 4 405 per tonne in 2010. In 2012, farmers received higher prices than they should have as the PGofg peaked at 3 087 ETB/tonne (positive) (Figure 10). The high domestic prices in 2012 could be related to the growing demand for formal and informal *injera* exports, in addition to rising income and high rates of urbanization. ERCA data shows that the quantity of *injera* exports increased to 2 519 tonnes in 2012, compared to 1 813 tonnes in 2011 (39 percent increase). A similar increase is also expected to occur with regard to informal exports, which refers to *injera* carried (in checked baggage) by Ethiopians traveling abroad.

Figure 11: MAFAP Price Gaps for Teff in Ethiopia, 2005-2012 (Birr/tonne)



Source: MAFAP, 2014

Nominal Rate of Protection

Overall, the trends for the Nominal Rates of Protection (NRPs) are the same as the Price Gaps. We can see that the observed NRPs at wholesale are negative except in 2012, which means that the agents (wholesalers) are getting disincentives and receiving a lower price than the Reference Price (based on the international market). The adjusted NRPs reflect that incentives would have been lower in a more efficient value chain. The level of disincentives is greater when negative, primarily owing to a higher ratio between the Price Gaps and the adjusted Reference Prices (see

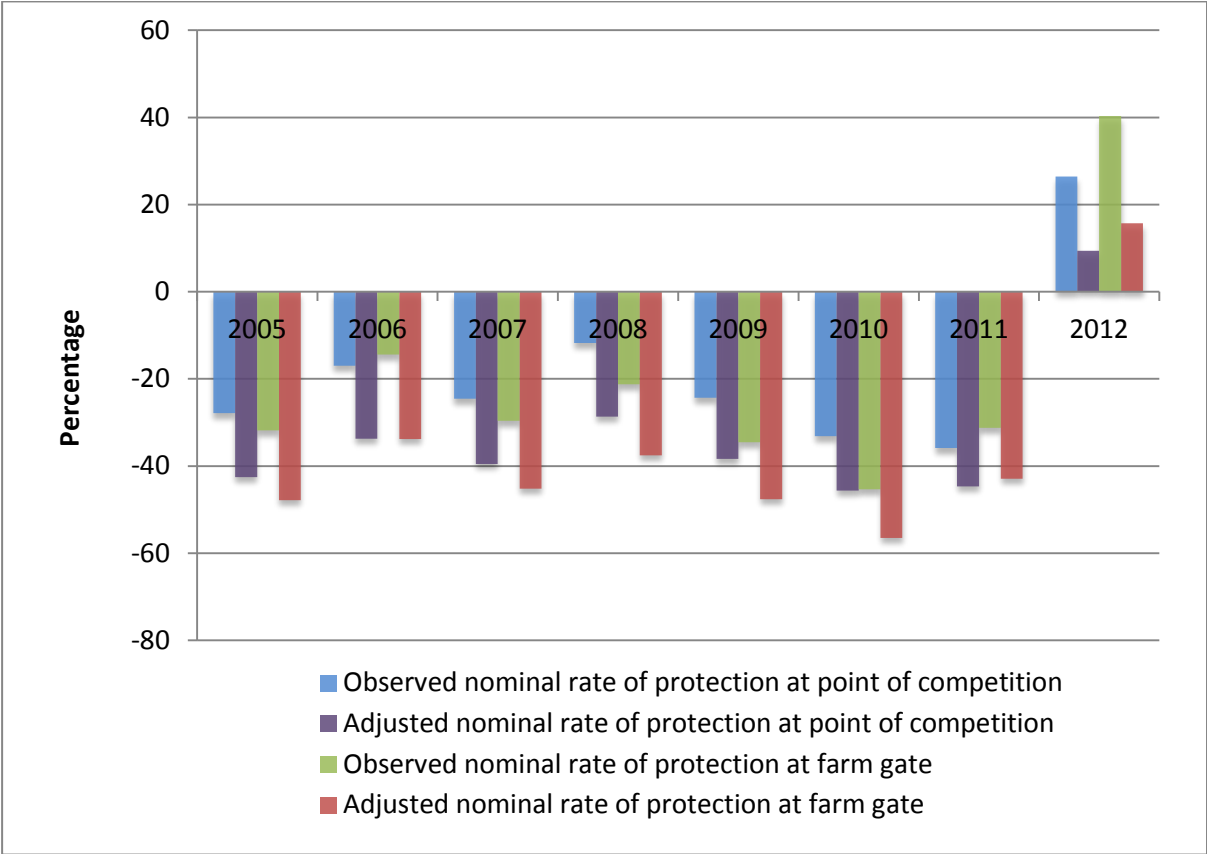
METHODOLOGY) and thus, results in a wider gap between the domestic price received and the adjusted reference price.

At farm gate level, the situation is the same; farmers received disincentives in all years except 2012. Observed NRPs were negative, ranging from -14 percent in 2006 to -45 percent in 2010 (see Figure 11). In 2006, the export prices increased by 14 percent, but domestic prices jumped by 35 percent at wholesale and 50 percent at farm gate. In these years, domestic prices surged because of the high food price inflation in the country (ATA, 2013). This could explain the reduction in the level of disincentives from 2005 to 2006, both at wholesale and farm gate levels. However, the levels of disincentives worsened in 2007 but improved slightly in 2008 following the high food price inflation in the country.

In almost all years, the NRPs at farm gate were worse than those at wholesale, which means that farmers incurred greater disincentives to produce. In 2012, however, the NRPs increased both at wholesale and farm gate levels, leading to a positive incentive environment. In fact, domestic prices rose by 60 percent. As noted above, a sharp increase in formal and informal exports of teff *injera* seems to have resulted in high domestic prices.

To conclude, it is important to recall that teff trade is banned but exports of teff *injera* is allowed and increasing. A high domestic price has improved the incentive to produce teff in 2012, but it remains to be seen if the positive incentive can be sustained in the future.

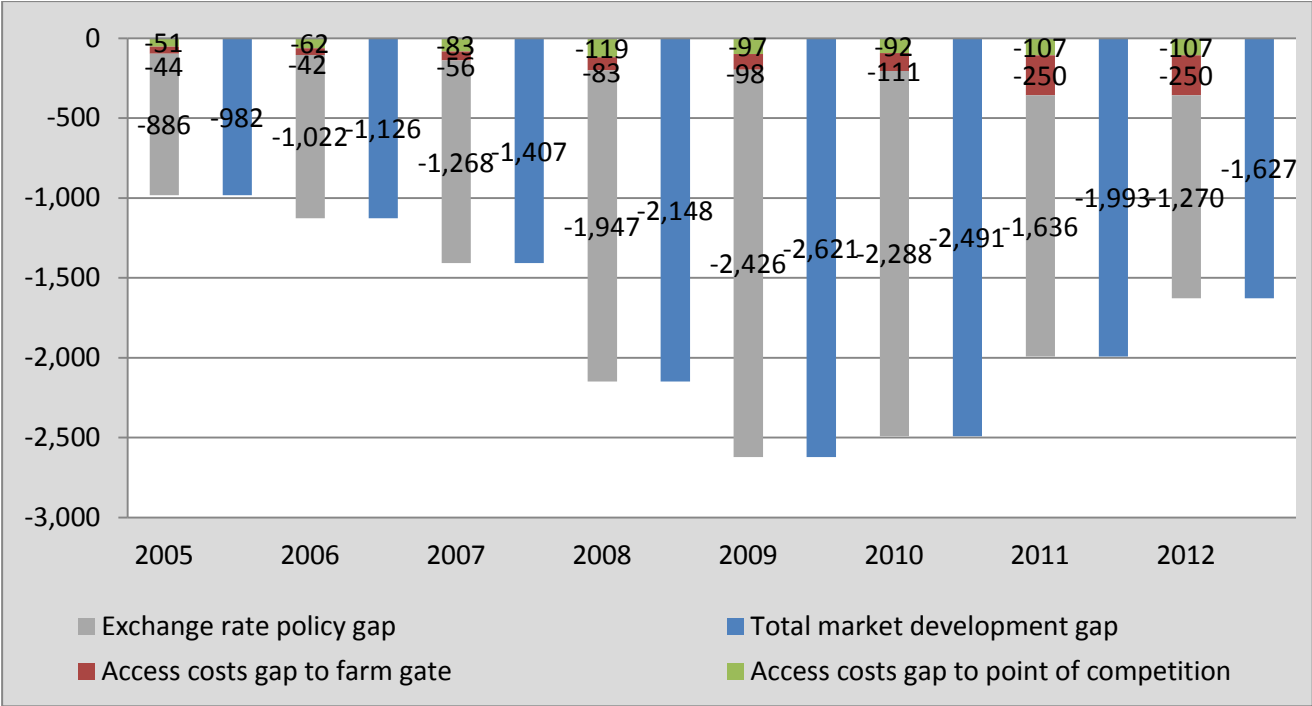
Figure 12: Observed and Adjusted Nominal Rate of Protection at Wholesale and Farm Gate for Teff in Ethiopia, 2005 – 2012



Sources: MAFAP, 2014

The Market Development Gap breakdown shows that the greatest gap is the exchange rate policy (Figure 12). At least 80 percent of the MDG is composed of the exchange rate policy gap. A higher rate was recorded in 2009 (92 percent of the MDG was coming from the Exchange policy gap), most likely owing to the substantial inflation rate together with an overvalued exchange rate. The higher the international price, the more the overvaluation affects the market. The slight decrease of the MDGs from 2010 mainly owes to the relatively lower exchange rate gap, partly because of the devaluation of the local currency over these years.

Figure 13: Market Development Gap Breakdown for Teff in Ethiopia (ETB/tonne), 2005-2012



Sources: MAFAP, 2014

5. RECOMMENDATIONS

The continued export ban on teff cannot be justified on the grounds of supporting the poor and ensuring food security. In fact, right after the export ban in 2006, domestic prices dramatically increased. Moreover, teff is not a food security crop, as it is rarely consumed in rural poor households. Teff is also the only cereal crop in which the country has a comparative trade advantage, and from which it could substantially gain by exporting the grain.

Policy makers must also recognize that nominal prices of teff are high but real teff prices are not. In fact, real prices have declined significantly between 2008 and 2011. The increase in teff prices in 2012 has resulted in positive NRPs for the first time in eight years (between 2005 and 2012).

It is important for policy makers to reconsider export bans that have resulted in the implicit taxation of agriculture. The lack of opportunity for farmers to receive higher prices on the international market (due to global demand) has hindered investment that could improve yields, reduce post-harvest losses and increase value additions. Currency overvaluation is also identified as a major obstacle.

Investment in bulk transport, storage and processing facilities, along with a formal system of grades and standards, would have a significant impact on competitiveness of teff production in Ethiopia; this would also improve opportunities for teff to be traded at the Ethiopian Commodity Exchange.

It should be noted that low domestic prices are good for consumers only in the short run. Long-term and sustained gain for consumers can only be achieved through improved producers' incentives that translate into increased production, and hence lower prices in the long term. The government needs to take into account the fact that teff, the basis of the national dish *injera*, is a major food item in the country. Mainly consumed in urban areas, teff is a unique source of protein and iron. Nevertheless, a more open trade policy could help teff farmers increase their revenues, which could lead to increased investment and expansion of production.

6. CONCLUSION

MAIN MESSAGE

Grown only in Ethiopia and Eritrea as a food crop, teff is the most valuable cereal crop in Ethiopia. It also accounts for one of the largest shares of land and fertilizer use among staple crops in the country. Demand for teff is very high because of its nutritional value and cultural preferences, especially in urban areas. The export ban has restricted trade, but the export potential is very high, especially in neighbouring countries such as Eritrea and Djibouti. Demand is also very high in Israel (where many Ethiopian immigrants live) and a local newspaper reported “Ethiopian bread [i.e. teff injera] virtually worth own weight in gold,¹⁶” following the export ban. Demand for teff is also growing among Ethiopian-origin groups, as well as non-Ethiopians, in North America and Europe because the grain is considered to have a lot of health benefits, especially as a gluten-free food grain, and is rich in amino acids, protein, iron and calcium. Some farms in the United States have started growing and selling teff flour at very high prices.¹⁷

The results of the MAFAP price indicators show that the level of disincentives for teff farmers is high, especially in the period 2009-2011. While producers failed to fully gain from recent high world prices, consumers were protected as they pay significantly lower prices than the border price equivalent. The ban of cereal exports, overvalued exchange rates, underdeveloped markets and distribution of imported cereals at subsidized prices (at times of high food prices) have kept domestic prices below the reference prices. Food aid may have also contributed to the lower domestic price levels.¹⁸ In recent years, traders have shifted to the export of processed teff products (injera or bread), which is not affected by the ban, and the volume is reported to be increasing.

The government is concerned about high prices, and has taken measures to keep teff prices lower for consumers than they would otherwise have been. However, unlike maize and other cereals, teff consumers are largely middle and high-income urban dwellers. Results of the income elasticity analysis have shown that teff is more of a luxury food item for rural and poor urban people. As teff prices rise, low-income families often switch to maize, sorghum and other cereals. Mixing teff with other less expensive cereals has also become a common practice.

The government policy needs to focus on improving the incentives for teff, which is increasingly considered as a cash crop by producers. Farmers have continued to grow teff, which is probably because of its relatively higher and more stable prices.

¹⁶ See for instance, Haaretz, July 26, 2007 (<http://www.haaretz.com/print-edition/news/ethiopian-bread-virtually-worth-own-weight-in-gold-1.226237>).

¹⁷ A company by the name of Bob’s Red Mill in Oregon (USA) is selling 6.5 lb of teff flour for \$26.19, which is equivalent to \$8882.84 per ton, making teff possibly the most expensive cereal in the world.

¹⁸ Food aid flows 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).

With improved policy environment and enhanced investment to increase teff productivity, the country has the capacity to meet high domestic and export demands. Teff can be grown profitably in a large part of the country, from lowland to highland areas. Recent research works have shown that transplanting young seedlings of teff at 20x20 cm spacing with organic and inorganic fertilization can increase the current yield of a little over 1 tonne per ha to 3-5 tonnes per ha. These yields can be almost doubled with small amendments of micronutrients (Zn, Cu, Mg, Mn).¹⁹ Such innovative yield improvement measures, as being promoted by the Agricultural Transformation Agency, require an attractive price incentive to cover the high cost of the labour intensive operations of transplanting, fertilization, weeding and threshing. Promoting teff exports is thus the best strategy to ensure a remunerative return on investment in new teff technologies and cultural practices. Otherwise, the increase in production can result in lower prices and disincentives for producers. Higher income from better prices and increased teff productivity can transform the livelihood of more than 50 percent of rural households (about 6.2 of the 12 million small farmers grow teff).

Addressing explicit or implicit taxes that teff producers face can benefit the rural poor and lead to increased investment in the production of other cereals, improving food availability and accessibility for poorer consumers in general. Policy makers need to recognize that countries that tax the agricultural sector stall both their structural change and their economic growth (Dennis and Iscan, 2011).

There is no evidence of monopolistic pricing by traders, as trade margins appear to have declined in recent years. On the other hand, transport costs from farm gate to wholesale market in Addis Ababa were found to be high, and this is attributed to the use of smaller trucks rather than bigger trucks and bulk transport systems. Visual inspection to establish differences in quality has limited the amount that an individual trader and processor can handle. In addition to building roads, the government should take measures to institutionalize teff grades and standards that facilitate the transition from small scale to large scale grain transport, storage, processing and trading practices, and provide buyers and sellers with a transparent system for communicating prices and product information.

Like other cereals, the teff market is characterized by small-scale operations with limited scale economies in distribution, transport, storage and processing. Teff traders, millers and processors need to be supported to make the required investment to improve the efficiency of the value chain.

Our results are broadly consistent with the Anderson and Masters (2008) study on distortions of agricultural incentives, in which the case study on Ethiopia showed that while taxation of the agricultural sector has declined since the 1990s, three forms of distortions still persist: control over input markets, ad hoc government interventions in cereal markets and disincentives through depressed prices owing to inflow of food aid (Rashid, Assefa and Ayele, 2007).

¹⁹ **Independent Science News**, [How Millions of Farmers are Advancing Agriculture For Themselves](http://independentsciencenews.org/un-sustainable-farming/how-millions-of-farmers-are-advancing-agriculture-for-themselves/), December 3, 2012:

<http://independentsciencenews.org/un-sustainable-farming/how-millions-of-farmers-are-advancing-agriculture-for-themselves/>

LIMITATIONS

Care has been taken to use data that provides a reasonable reflection of the situation on the ground. Nonetheless, there were limitations that could not be fully addressed with the available time. In particular, data on FOB prices and access costs are hard to come by. The research team had to rely on indirect estimates and an assistant who collected primary data through interviews with a small number of traders and representatives of trader associations. The available data reveals a lot of interesting features of the teff market, but further investigation and consultations with relevant government and private organizations are required to validate some of the data.

Teff is categorized as cereal (nes) (not elsewhere mentioned) in the FAO and UNComtrade database. We believe teff is the single most important item under cereal (nes), but further checking is required if there are other cereals included in the export and import data.

FURTHER INVESTIGATION AND RESEARCH

Farm gate prices were estimated based on wholesale prices observed in the town of Bure, located in a major teff producing area. Refinement of the results should include obtaining actual farm gate prices for the Bure area, as well as other locations in different teff producing areas. Similarly, the retail prices of millers and small retailers need to be systematically collected and analysed. More effort is also required to acquire FOB prices from cross-border trade.

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ANNEX I: Data and Calculations Used in the Analysis

DATA		Unit	Symb ol	Year trade status	2005	2006	2007	2008	2009	2010	2011	2012
					x	x	x	x	x	x	x	x
Benchmark Price												
1	Observed	XXX/T ON	P _{b(int\$)}		512.28	584.07	689.29	993.26	1,002.37	886.69	743.60	604.88
1 b	Adjusted	XXX/T ON	P _{ba}									
Exchange Rate												
2	Observed	YYY/XX X	ER _o		8.67	8.74	9.21	9.80	12.10	12.89	16.90	17.60
2 b	Adjusted	YYY/XX X	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/T ON	AC _{o_{wh}}		782.10	810.40	872.30	1,018.60	1,052.20	1,080.90	1,621.80	1,787.10
3 b	Adjusted	YYY/T ON	AC _{a_{wh}}		730.70	748.40	789.60	900.10	954.80	988.70	1,514.80	1,680.10
4	Domestic price at point of competition		P _{dwh}		2,641.00	3,566.53	4,132.08	7,690.21	8,381.91	6,920.75	7023.26	11202.56
Access costs point of competition - farm gate												
5	Observed	YYY/T ON	AC _{o_{fg}}		461.00	451.00	520.00	500.00	570.00	625.00	1,204.00	1,210.00
5 b	Adjusted	YYY/T ON	AC _{a_{fg}}		417.00	409.00	463.75	417.50	472.00	513.75	954.00	960.00
6	Farm gate price		P _{d_{fg}}		2,181.00	3,290.00	3,489.00	6,474.00	6,883.00	5,319.00	6,701.16	10,736.17
7	Externalities associated with production		E									
8	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}								
CALCULATED PRICES					2005	2006	2007	2008	2009	2010	2011	2012

				<i>ol</i>									
Benchmark price in local currency													
9		Observed	YYY/T	$P_{b(loc\$)}$	4,441.47	5,104.77	6,348.36	9,733.95	12,128.68	11,429.43	12,566.84	10,645.89	
1			ON	$P_{b(loc\$)}$									
0		Adjusted	YYY/T	$P_{b(loc\$)}$	5,327.71	6,126.89	7,616.65	11,680.74	14,554.41	13,717.09	14,202.76	11,916.14	
			ON	_a									
Reference Price at point of competition													
1			YYY/T										
1		Observed	ON	$RP_{o_{wh}}$	3,659.37	4,294.37	5,476.06	8,715.35	11,076.48	10,348.53	10,945.04	8,858.79	
1			YYY/T										
2		Adjusted	ON	$RP_{a_{wh}}$	4,597.01	5,378.49	6,827.05	10,780.64	13,599.61	12,728.39	12,687.96	10,236.04	
Reference Price at Farm Gate													
1			YYY/T										
3		Observed	ON	$RP_{o_{fg}}$	3,198.37	3,843.37	4,956.06	8,215.35	10,506.48	9,723.53	9,741.04	7,648.79	
1			YYY/T										
4		Adjusted	ON	$RP_{a_{fg}}$	4,180.01	4,969.49	6,363.30	10,363.14	13,127.61	12,214.64	11,733.96	9,276.04	

INDICATORS		Unit	Symb <i>ol</i>	2005	2006	2007	2008	2009	2010	2011	2012	
Price gap at point of competition												
1			YYY/T									
5		Observed	ON	$PG_{o_{wh}}$	(1,018.37)	(727.84)	(1,343.98)	(1,025.14)	(2,694.57)	(3,427.78)	(3,921.78)	2,343.77
1			YYY/T									
6		Adjusted	ON	$PG_{a_{wh}}$	(1,956.01)	(1,811.96)	(2,694.97)	(3,090.43)	(5,217.70)	(5,807.64)	(5,664.70)	966.52
Price gap at farm gate												
1			YYY/T									
7		Observed	ON	$PG_{o_{fg}}$	(1,017.37)	(553.37)	(1,467.06)	(1,741.35)	(3,623.48)	(4,404.53)	(3,039.88)	3,087.38
1			YYY/T									
8		Adjusted	ON	$PG_{a_{fg}}$	(1,999.01)	(1,679.49)	(2,874.30)	(3,889.14)	(6,244.61)	(6,895.64)	(5,032.80)	1,460.13
Nominal rate of protection at point of competition												
1												
9		Observed	%	$NRPO_{wh}$	-27.83%	-16.95%	-24.54%	-11.76%	-24.33%	-33.12%	-35.83%	26.46%
2												
0		Adjusted	%	$NRPa_{wh}$	-42.55%	-33.69%	-39.47%	-28.67%	-38.37%	-45.63%	-44.65%	9.44%
Nominal rate of protection at farm gate												
2												
1		Observed	%	$NRPO_{fg}$	-31.81%	-14.40%	-29.60%	-21.20%	-34.49%	-45.30%	-31.21%	40.36%
2												
2		Adjusted	%	$NRPa_{fg}$	-47.82%	-33.80%	-45.17%	-37.53%	-47.57%	-56.45%	-42.89%	15.74%
Nominal rate of assistance												
2												
3		Observed	%	NRA_o	-31.81%	-14.40%	-29.60%	-21.20%	-34.49%	-45.30%	-31.21%	40.36%
2												
4		Adjusted	%	NRA_a	-47.82%	-33.80%	-45.17%	-37.53%	-47.57%	-56.45%	-42.89%	15.74%

- 0.00% 0.00% 0.00% 0.00% 0.00%

Decomposition of PWAfg			2005	2006	2007	2008	2009	2010	2011	2012
	Unit	Symb ol								
2	YYY/T									
5	ON	IRG	-	-	-	-	-	-	-	-
2	YYY/T									
6	ON	ERPG	(886.24)	(1,022.12)	(1,268.29)	(1,946.79)	(2,425.74)	(2,287.66)	(1,635.92)	(1,270.25)
2	YYY/T	ACG _w								
7	ON	h	(51.40)	(62.00)	(82.70)	(118.50)	(97.40)	(92.20)	(107.00)	(107.00)
2	YYY/T									
8	ON	ACG _{fg}	(44.00)	(42.00)	(56.25)	(82.50)	(98.00)	(111.25)	(250.00)	(250.00)
2	YYY/T									
9	ON	EG	-	-	-	-	-	-	-	-
	YYY/T									
	ON	MDG	(981.64)	(1,126.12)	(1,407.24)	(2,147.79)	(2,621.14)	(2,491.11)	(1,992.92)	(1,627.25)
	%	MDG	(0.23)	(0.23)	(0.22)	(0.21)	(0.20)	(0.20)	(0.17)	(0.18)

Total values			2005	2006	2007	2008	2009	2010	2011	2012
	Unit	Symb ol								
3										
0	tons									
3										
1	Observed	YYY	MPSo	-	-	-	-	-	-	-
3										
2	Adjusted	YYY	MPSa	-	-	-	-	-	-	-



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