MAFAP
SPAAA

Monitoring African Food and Agricultural Policies

Suivi des politiques agricoles et alimentaires en Afrique

ANALYSIS OF INCENTIVES AND DISINCENTIVES FOR MAIZE IN ETHIOPIA

Draft version

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This technical note is a product of the Monitoring African Food and Agricultural Policies project (MAFAP). It is a technical document intended primarily for internal use as background for the eventual MAFAP Country Report. This technical note may be updated as new data becomes available.

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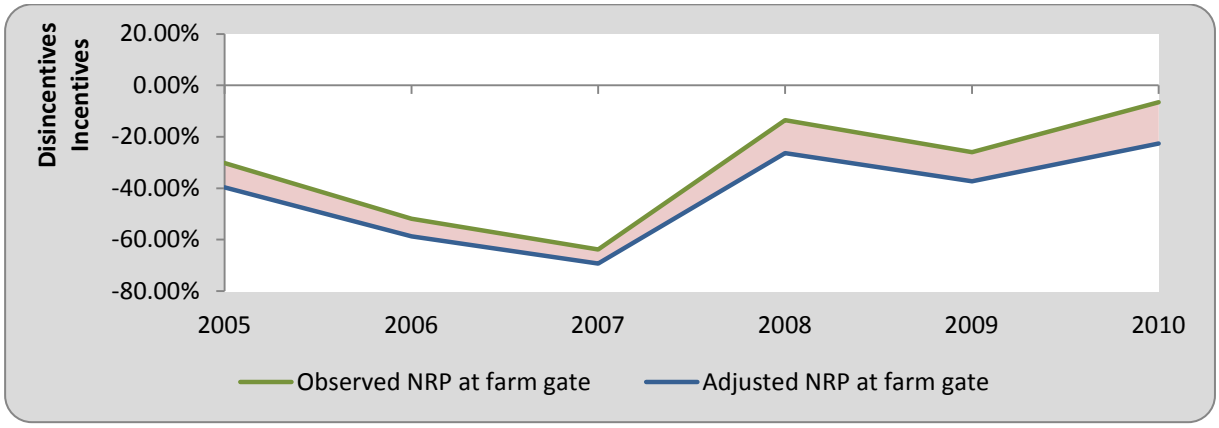
SUMMARY OF THE NOTE

Product: Maize
Period analyzed: 2005 – 2010
Trade status: Import in all years

- Maize accounts for the largest share in total cereal production.
- Maize is the single most important cereal, accounting for 17 percent of the per capita calorie intake in 2004/05.
- Per capital calorie consumption of maize in rural areas is over four times that of urban areas
- Production expanded from 2.5 million tonnes in 2003/04 to 5 million tonnes in 2010/11.
- Ethiopia's import of maize was reported as 54 466 tonnes in 2009, compared to an average of 35 016 tonnes in previous five years.
- Most of the maize import is in the form of food aid.
- The maize value chain is very long and involves too many small operators who rarely provide marketing services beyond transport and storage.



The observed Nominal Rate of Protection (NRP) (green line) and the adjusted NRP (blue line) indicate that farmers were implicitly taxed and have not received price incentives under the prevailing market structure in the value chain. The adjusted NRP captures the effects of policy distortions and market inefficiencies. The area in pink shows the cost that these inefficiencies represent for producers.

- Our results show that disincentives are considerable and arise from: 1) overvalued exchange rate; 2) export ban on cereals and restriction on private import (restricted access to foreign exchange); 3) distribution of imported cereals at subsidized prices; and 4) underdeveloped market structure and high transport costs.
- Despite the disincentives, maize production has increased in recent years probably due to improved access to seeds, fertilizers and technical assistance.
- Actions to be taken to reduce disincentives could include: 1) address currency overvaluation; 2) adopt less restrictive trade policies; 3) encourage the participation of private traders in grain import and export; 4) avoid non-targeted distribution of grain at subsidized prices; 5) support the development of market structure and the grain value chain; and 6) promote the use of bulk transport system.

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1. PURPOSE OF THE NOTE

This technical note aims to describe the market incentives and disincentives for maize in Ethiopia.

For this purpose, yearly averages of 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 the reference prices and the prices along the value chain indicate to which extent incentives (positive gaps) or disincentives (negative gaps) are present at farm gate and wholesale level. In relative terms, the price gaps are expressed as Nominal Rates of Protection. These key indicators are used by MAFAP to highlight the effects of policy and market development gaps on prices.

The note starts with a brief review of the production, consumption, trade and policies affecting the commodity and then provides a detailed description of how the key components of the price analysis have been obtained. The MAFAP indicators are then calculated with these data and interpreted in the light of existing policies and market characteristics. The analysis that has been carried out is commodity and country specific and covers the period 2005-2010. The indicators have been calculated using available data from different sources for this period and are described in Chapter 3.

The outcomes of this analysis can be used by those stakeholders involved in policy-making for the food and agricultural sector. They can also serve as input for evidence-based policy dialogue at country or regional level.

This technical note is not to be interpreted as an analysis of the value chain or detailed description of production, consumption or trade patterns. 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.

All information is preliminary and still subject to review and validation.

2. POLICY CONTEXT

Agriculture continues to be the dominant sector in Ethiopia's economy, accounting for 51 percent of the GDP (2009)[1]. Within agriculture, cereals play a central role, accounting for roughly 60 percent of rural employment, 80 percent of total cultivated land, more than 40 percent of a typical household's food expenditure, and more than 60 percent of total caloric intake.

PRODUCTION

Among cereals, maize accounts for the largest share in total production and the total number of farm holdings involved. In 2010/11, maize accounted for 28 percent of the total cereal production, compared to 20 percent for teff and 22 percent for sorghum, the second and third most cultivated crops (Table 1). About eight million smallholders were involved in maize production in 2010/11, compared to 6.2 million for teff and 5.1 million for sorghum[2]. It should be noted that in Ethiopia, smallholder farms account for 95 percent of the total agricultural production, with large farms contributing to only 5 percent of total production and to only 2.6 percent of cereal production in particular. The average farm size is less than one hectare, with 40 percent of the farmers cultivating less than 0.52 hectares[3].

Maize is the largest and most productive crop in Ethiopia (Table 1). According to the data of the Central Statistical Agency (CSA), in 2007/08, maize production was 3.75 million tonnes, 25 percent higher than teff and 41 percent higher than sorghum. At 2.5 tonnes per ha, maize yield is the highest among cereal crops. The fastest growth rates in area cultivated, production and yield were also recorded in the case of maize: between 2003/04 and 2007/08, maize production expanded by 103 percent; and area under maize increased by 51 percent while yield increased by 32 percent. The share of maize in total area increased by 6 percent between 2003/04 and 2007/08. It should, however, be noted that maize production and yield figures are lower, according to the FAOSTAT database (Figure 1).

Maize is the only crop with significant use of commercial inputs. In 2008, about 37 percent of the maize farmers used fertilizer, compared to the national average of 17 percent for all cereal farmers. An estimated 26 percent of the maize growers used improved seed, which is again about twice the national average for all cereal farmers (Rashid, Getnet and Lemma, 2010).

[1] World Bank, Ethiopia at a glance: http://devdata.worldbank.org/AAG/eth_aag.pdf.

[2] CSA, Agricultural Sample Survey 2010/2011 (September – December 2010), Vol. 1, Report on Area and Production of Major Crops, Addis Ababa, April 2011.

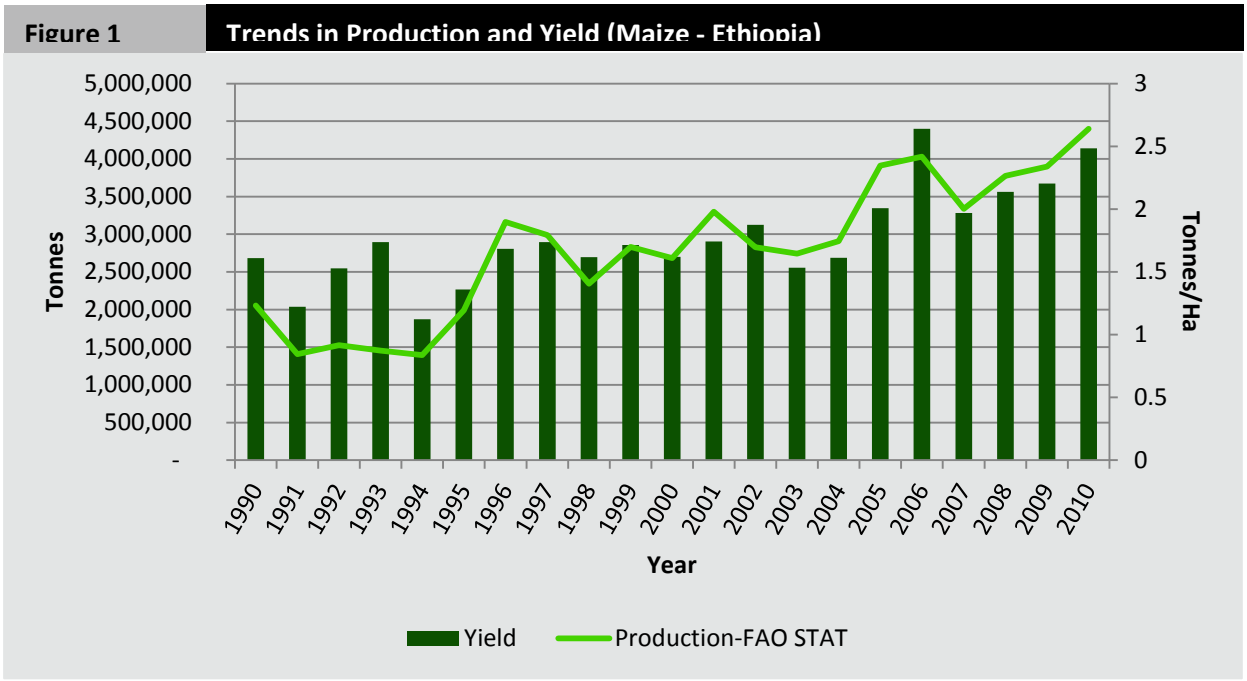
[3] Alemayehu Seyoum, et al. (2011), Crop Production in Ethiopia: Regional Patterns and Trends Ethiopia Strategy Support Program II (ESSP II), ESSP II Working Paper No. 0016.

Table 1: Area, production and yield of cereals in Ethiopia, 2003/04 and 2007/08

	2003/04				2010/11				Expansion rate			
	Area 000 ha	Prod. 000 tonnes	Yield tonnes /ha	Area share	Area 000 ha	Prod. 000 tonnes	Yield tonnes /ha	Area share	Area 000 ha	Prod. 000 tonnes	Yield tonnes /ha	Area share
Barley	911	1071	1.2	13.4	1046.6	1703	1.6	10.80	14.9	59.0	33.3	-19.4
Maize	1300	2455	1.9	19.1	1963.2	4986	2.5	20.26	51.0	103.1	31.6	6.1
Millet	303	304	1.0	4.5	408.1	634	1.6	4.21	34.7	108.6	60.0	-6.4
Sorghum	1242	1695	1.4	18.2	1897.7	3960	2.1	19.58	52.8	133.6	50.0	7.6
Teff	1985	1672	0.8	29.1	2761.2	3483	1.3	28.49	39.1	108.3	62.5	-2.1
Wheat	1075	1589	1.5	15.8	1553.2	2856	1.8	16.03	44.5	79.7	20.0	1.5
Other	35	44	1.3	0.5	60.7	138	2.3	0.63	73.4	213.6	76.9	26.0
Total cereal	6816	8786	1.3	100	9690.7	17761	1.8	100.00	42.2	102.2	38.5	

Source: Authors' calculation using CSA Agricultural Sample Survey data (various years)

Figure 1: Trends in production and Yield (maize-Ethiopie)



Source: FAOSTAT

According to data obtained from FAOSTAT, Ethiopia is the second largest producer ofmaize in Eastern and Southern Africa, following South Africa. Between 2000 and 2010, it accounted for 12.3 percent of the total maize production in the region, compared to 36.3 percent for South Africa. Tanzania, the third largest producer, accounted for 11.7 percent of the total maize production (Annex II). With improved infrastructure and expanded use of improved production technology, Ethiopia has the potential of exporting maize to the region.

Consumption

Six major staples, maize, teff, wheat, sorghum, barley and enset (false banana), dominate the national food basket in Ethiopia. Maize is the single most important cereal, accounting for 17 percent of the per capita calorie intake, followed by sorghum (14 percent) and teff (11 percent) (Table 2). Maize dominates rural consumption baskets, with 436 per capita calories, compared to only 107 per capita calories in urban areas.

Figure 2 shows that the share of maize in the total cereal consumption has been rapidly increasing since 1961. Its share has increased from 14% in 1961-70 to 29% in 2001-07. Maize consumption has expanded mainly at the expense of teff.

Maize is an important food security crop in Ethiopia, with the cheapest cost caloric source among all major cereals. It has been shown that the unit cost of calories per US dollar for maize is 'one-and-a-half and two times lower than wheat and teff, respectively'. Maize is also a cheaper source of protein relative to other cereals: 'maize provides 0.2 kg of protein per USD, compared to 0.1 kg of protein per USD from teff and 0.2 kg of protein from wheat and sorghum (Rashid, et al., 2011).

Medium or large scale milling and processing in Ethiopia is largely limited to wheat with very few companies involved in processing maize (Rashid, et al. 2010). Households get their maize grain milled in a nearby small miller (hammer mill). Despite having the largest number of livestock in Africa, the use of maize grain as animal feed is very limited in Ethiopia.

Figure 2: Trends in the share of major staples in the total cereal consumption

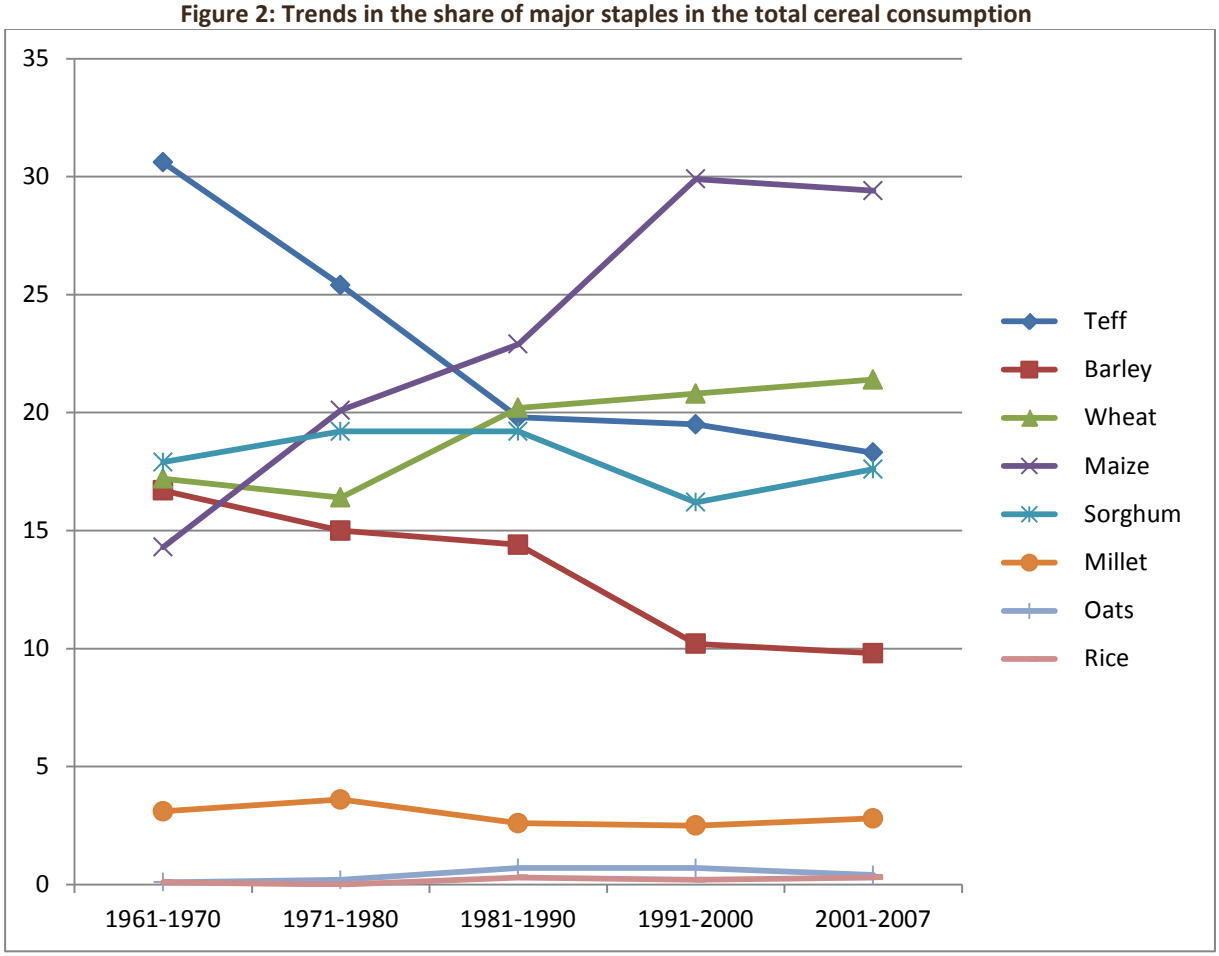


Table 2: Rural vs. urban per capita calorie consumption of food items (2004/05)

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

Source: Guush Berhane, et al., Foodgrain Consumption and Calorie Intake Patterns in Ethiopia, ESSP II Working Paper 23, IFPRI/ EDRI, May 2011.

Marketing, trade and prices

Grain marketing has long been constrained by the relative remoteness of many areas and by the lack of all-weather feeder roads as well as a marked shortage of motorized transport in many rural areas. Since the late 1990s, however, public investment in road network has significantly increased. The Government, with the support of donors, launched the road sector development program (RSDP) as part of the effort to accelerate growth within the framework of the broader strategy of agricultural development led industrialization (ADLI). In 2008, Ethiopia had almost 24 000 kilometers of rural roads, almost five times the length or rural roads that existed in 1992.

Mobile phone ownership grew from almost zero in 1999 to about two million in 2008. Private investment in trucks has also increased significantly, with the number of small trucks (up to 7 tonnes capacity) increasing by eight fold, from 5 590 in 1993 to 48 197 in 2008.

Progress in the area of marketing arrangements and institutions seems to have lagged behind the development in infrastructure. Farmers still sell their surplus maize in the open market to local consumers, assemblers or to regional traders. Farm level storage facilities are inadequate and pproducers often sell their marketable surplus immediately after harvest when prices are lowest.

Trade takes place as a “cash-and-carry” transaction. Buyers and sellers meet personally, negotiate price, inspect the grain on the spot and complete transaction with cash payment to the seller/farmer. As there are no reliable market information and organized exchange systems, buyers and sellers have to bargain and negotiate to arrive at mutually agreed prices.

With no standardization and quality assurances, grains have to be inspected visually and repackaged every time they change hands.

With limited access to capital, most traders have to sell the produce they bought as quickly as possible rather than store it for sale later during the lean season. Such a system is obviously highly inefficient as it involves several levels of marketing and introduces huge overheads on the final market price (Rogstadius, 2009)[4].

Unlike teff and other cereals, the domestic demand for maize (as staple food) is limited in urban areas where the purchasing power is relatively better. Hence prices are often low and maize is grown for home consumption with only around 20 percent of production sold in the market[5].

The supply market is also fragmented as a result of the small volume handled by traders and limited number of large scale buyers. Large buyers also face the challenges of procuring uniform and consistent supply of quality maize since there are no formal quality control infrastructures such as instruments for checking level of moisture content or color or size, resulting in concerns about the presence of aflatoxins (Rashid, et al., 2010). The market for maize does not provide price incentive to better quality and safe maize production and handling practices. More importantly, maize prices collapse considerably whenever there are bumper harvests as was the case in 1995/96, 1996/97, 1999/00, and 2001/02 (The RATES Center, 2003).

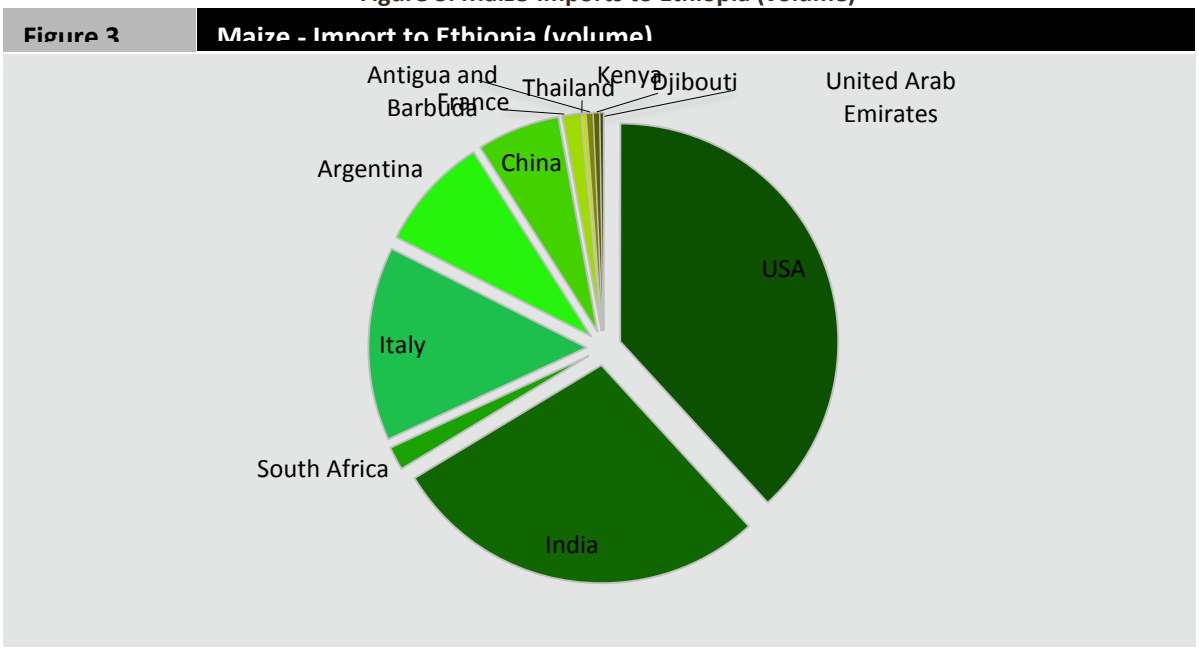
Ethiopia's import of maize was reported as 54 466 tonnes in 2009, compared to an average of 35 016 tonnes in previous five years. According to FAO database, the volume of official maize import has grown by an annual average of 33 percent in the last five years. Nevertheless, the quantity of import is small and the share of imported maize in the total maize production is very small in Ethiopia: imports accounted for less than one percent of total production in 2000-2009 (see Annex IV). Moreover, most of the import is part of food aid shipments coming from donors such as the United States of America (USA).

Indeed, Ethiopia's largest maize trading partner is the USA (the largest food aid donor to the country), accounting for 38 percent of the total maize import during the period 2000-2011. Maize import from India and Italy, the second and third most important partners, occurred mainly in one specific year, 2009 (with almost no import in other years during 2000-2011)(see figure 3). Commercial import of maize is not feasible as import parity prices are often significantly above domestic prices (Figure 5).

[4] Rogstadius J. (2009). Visualizing the Ethiopian Commodity Market, Department of Science and Technology Institutionen för teknik och naturvetenskap Linköping University Linköpings Universitet SE-601 74 Norrköping, Sweden 601 74 Norrköping

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

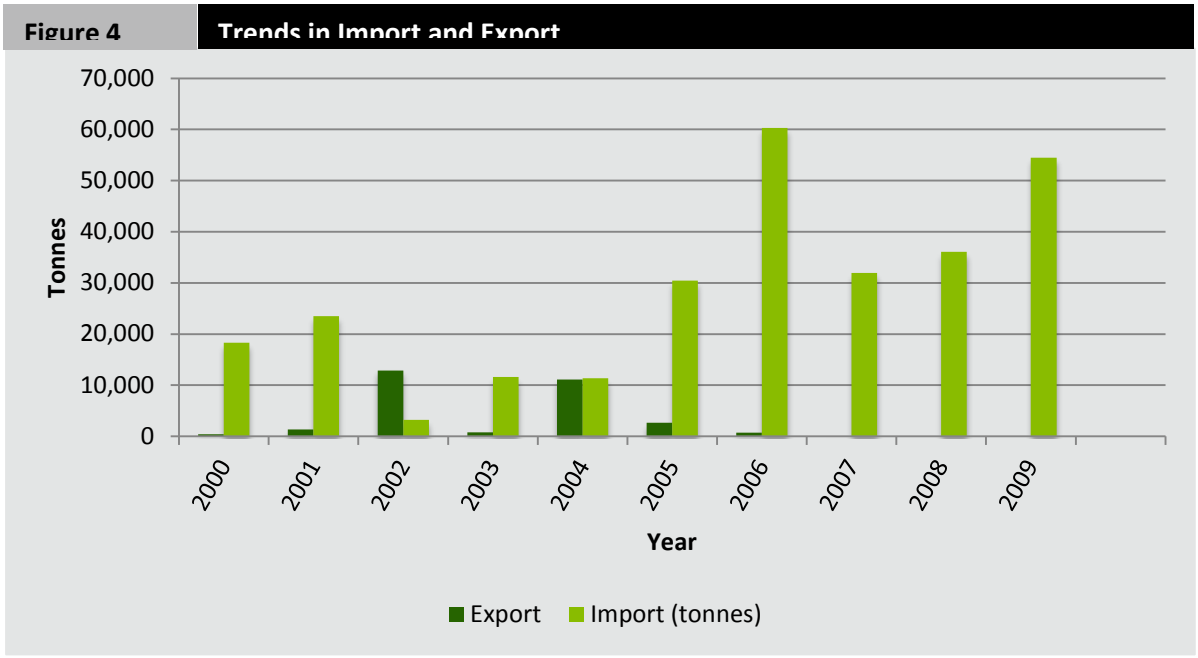
Figure 3: Maize-Imports to Ethiopia (volume)



Source:UNCOMTRADE, 2011

Export promotion has been sought as a solution to maize surplus and price collapse but there has been limited success in exporting the commodity to neighbouring countries directly or indirectly through the World Food Programme. The volume of official maize export remained low and erratic as shown in Figure 4 (for further details see Annex III). Maize export exceeded maize import only in one occasion (2002) during the period 2000 to 2009. Apart from limited surplus and export bans (see below), low export parity prices (see Figure 5) have discouraged commercial export of maize.

Figure 4: Trends in Import and export

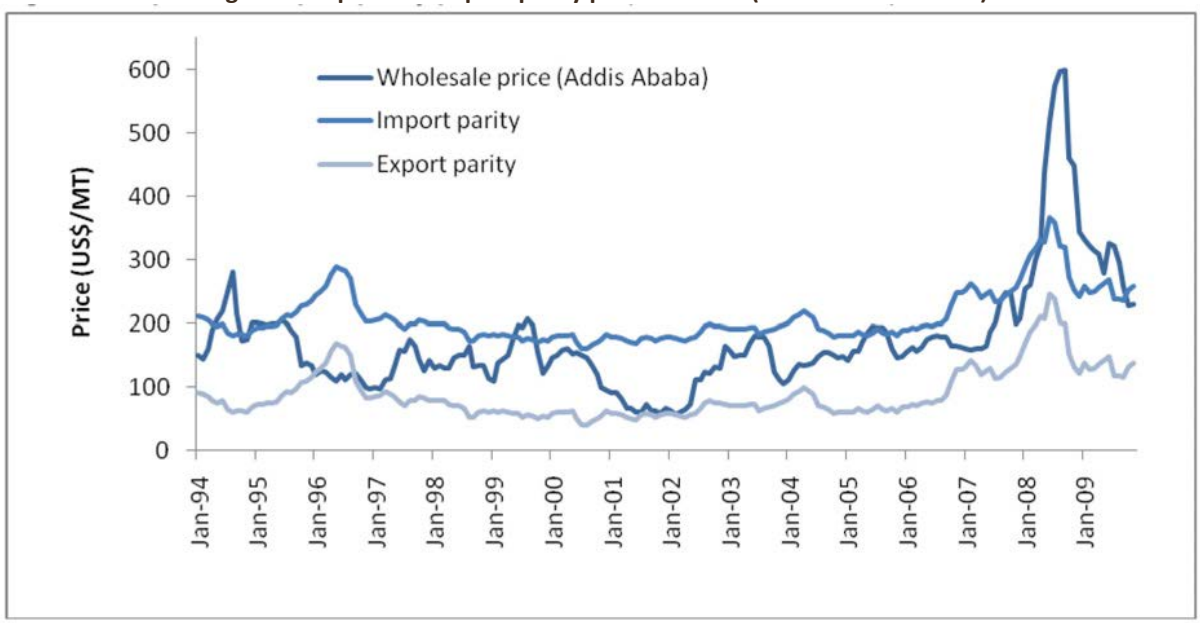


Source: FAOSTAT

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

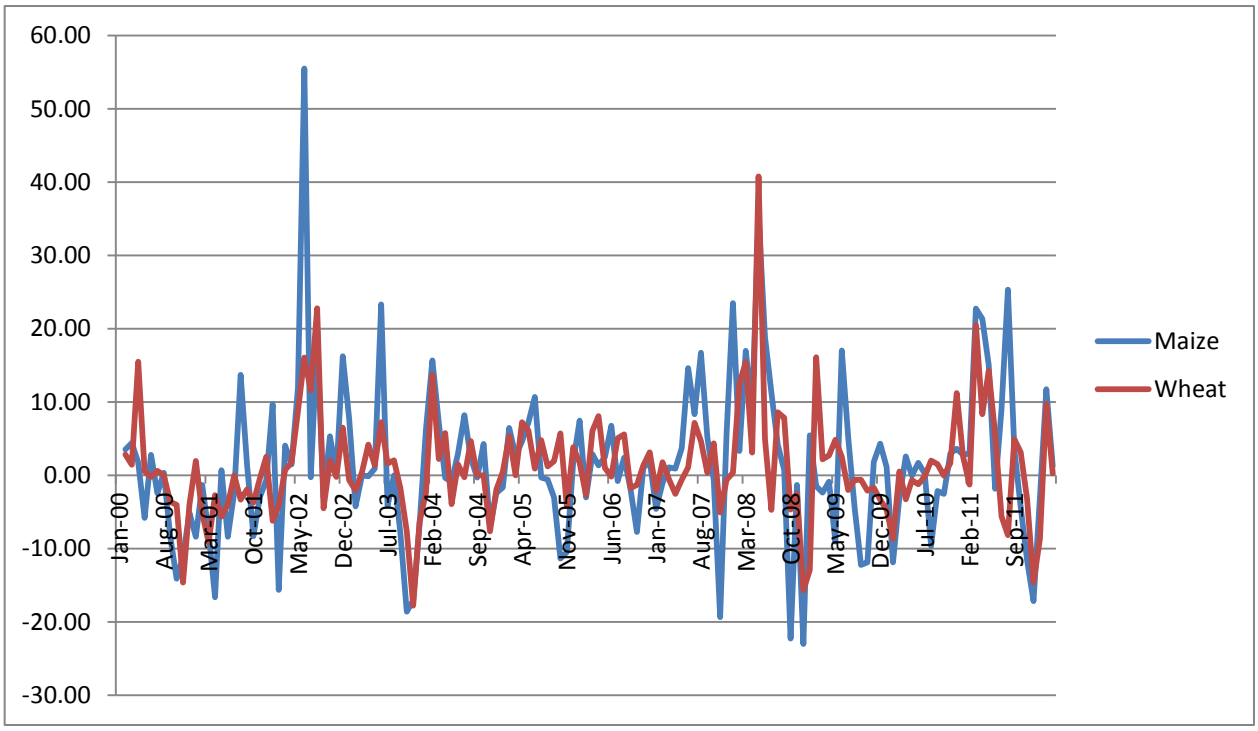
Because of high transportation costs, domestic prices are often within export and parity prices, implying that maize cannot be exported or imported profitably (Figure 4). Observed access costs (mainly transport) accounted for 35% of the CIF price during the period 2005-10 (see Annex IV). The exceptions are rare occasions (e.g. 1996/97 and 2002) when domestic prices matched export parity prices and made export a profitable option. These isolated situations, however, lasted for a short period with no real incentive for exporters to consider maize export as a viable business. In most cases, export parity prices were below domestic prices, implying that traders cannot export maize at a profit. Moreover, overvaluation of domestic currency (see the section on exchange rates below) contributed to lower export parity prices, hence less pressure on domestic prices to increase (i.e. little or no demand for export means low prices). The export ban on maize and other cereals (see below) has also discouraged export and added to the downward pressure on prices. Maize trade is also affected by high price volatility. As shown in Figure 6, the peaks and the troughs are more pronounced in the cases of maize than wheat.

Figure 5: Import and export parity price of maize (Jan 1994 - Nov 2009)



Source: Rashid, et al., 2010

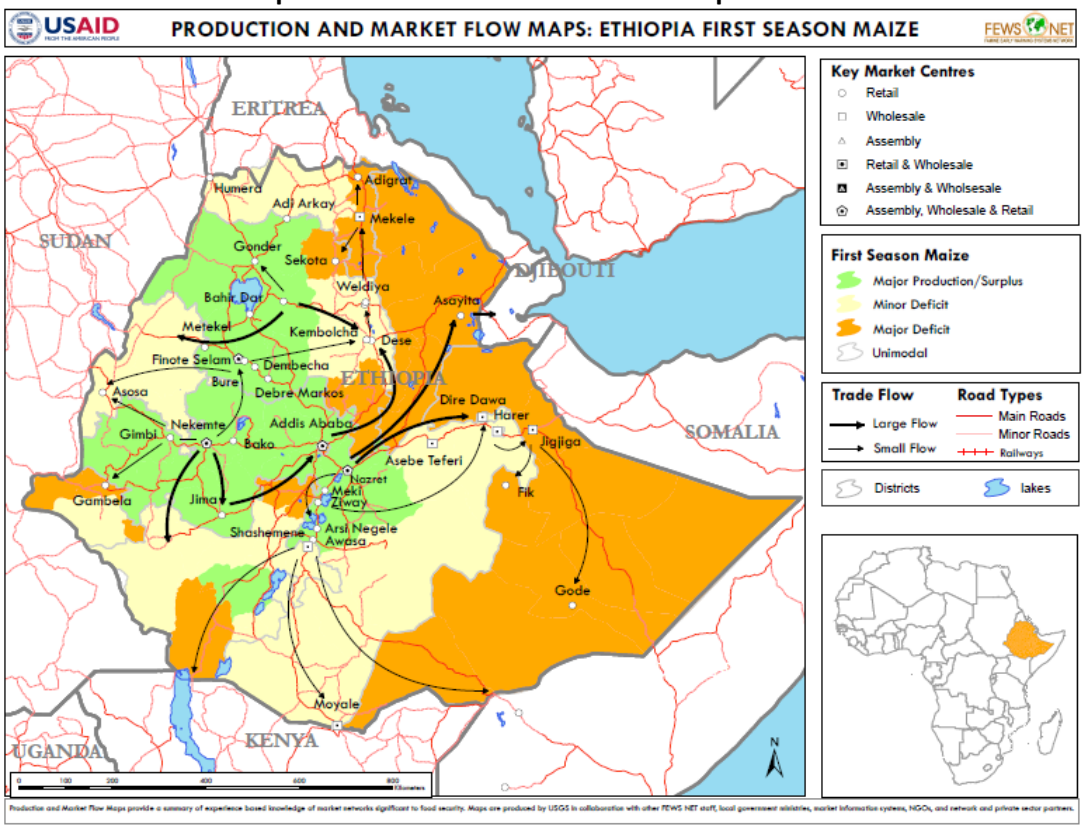
Figure 6: Monthly changes in wholesale prices (Aug. 2001 – Dec. 2009)



Source: Calculated based on GIEWS data

A closer look at the maize production and market flow map (see Map 1) shows that production takes place in geographically dispersed locations, which has important implication on maize trade. Small volumes from spatially dispersed locations involve high cost of marketing, thus discouraging trade.

Map 1: Production and market flow maps of maize



Source: FEWSNET

Description of the Value Chain and Processing

The maize value chain in Ethiopia involves input suppliers, producers, traders (local assemblers and wholesalers), retailers and processors, and consumers (Figure 7). The marketing chains are long and involve too many operators who rarely provide marketing services beyond transport and storage. There is very limited linkage between input suppliers and output traders. Input supply is dominated by two parastatals, the Ethiopian Seed Enterprise (ESE) and the Agricultural Input Supply Enterprise (AISE). Unlike the input market, the parastatal, Ethiopian Grain Trade Enterprise (EGTE), has limited role in the domestic grain market under the present Government.

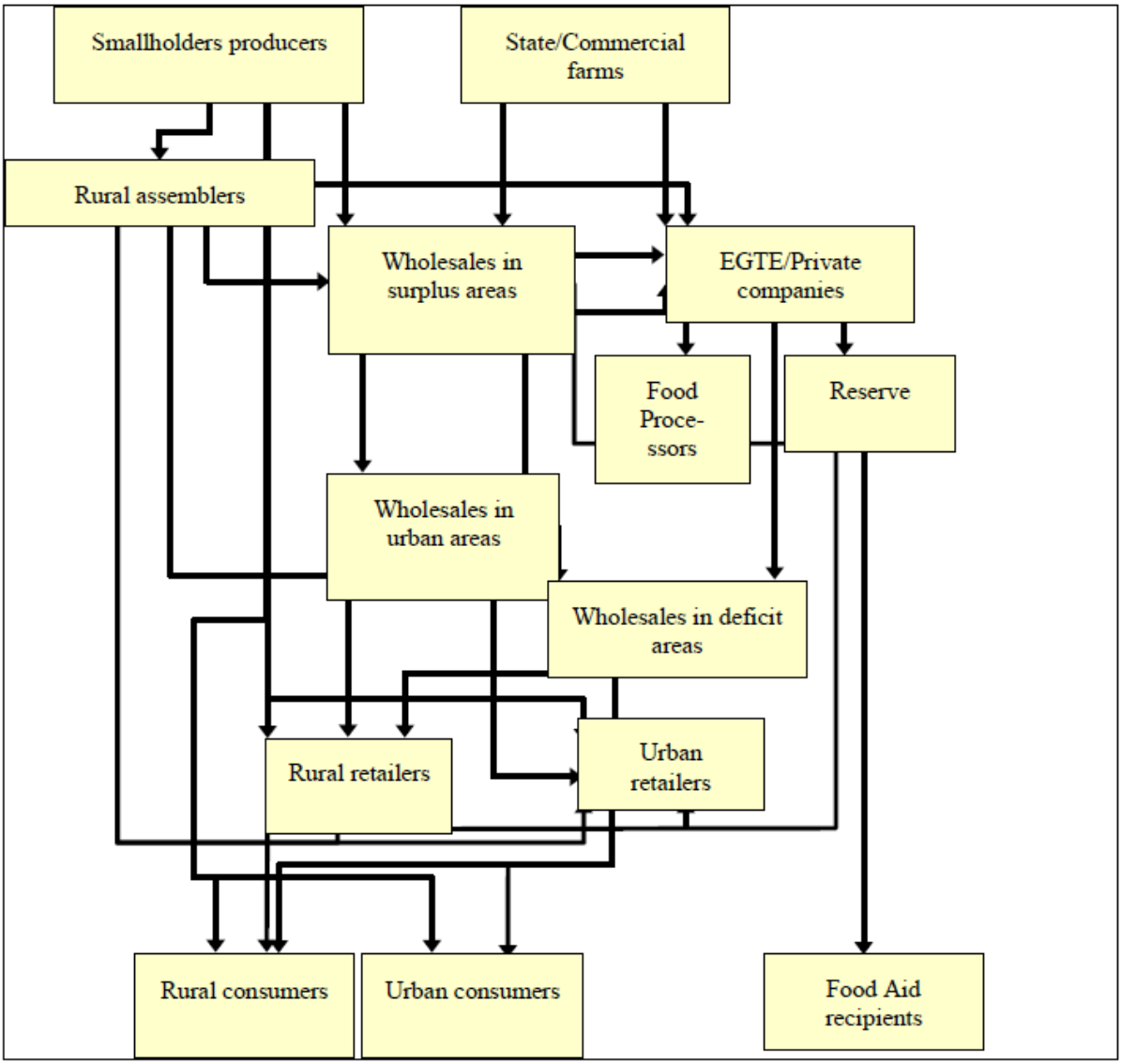
Farmers use transport animals (e.g. donkey) or own labor (carrying sacks) to transport their grain to the nearest regional market. They may also sell to rural assemblers, mostly independent operators at primary markets, who assemble and transport the grain using pack animal and small trucks for sale in secondary or urban markets.

Local markets in surplus producing areas often include a number of regional traders who transport and sell grain in Addis Ababa to wholesalers and processors through brokers. Brokers receive truck load of grain, through the truck driver, which they sell on behalf their regional client (Rashid and Negassa, 2011).

The grain is commonly unloaded at the warehouse of the buyer and the money is sent to the regional trader through a bank of the truck driver. Brokers are paid fees which range between one and three Birr per 100 kg.

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

Figure 7: Maize marketing chain



Source: The RATES Center, 2003

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 food grain it purchased to urban consumers, mainly in the city of Addis Ababa, through food ration shops (Gabre-Madhin, 2001)[6].

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 objective of: (i) stabilizing prices for producers and consumers; (ii) earning foreign exchange through exporting grain; and (iii) facilitating the purchase and distribution of Emergency Food Security Reserve. Over the years, the public enterprise has 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 without licenses, undercutting formally registered traders (Demeke, et al. 2012).

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 revolutionize agricultural trade through creating a new marketplace that 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 businesses. ECX currently operates warehouses in major market centers, including Addis Ababa, Adama, Shashemene, Nekempte, Humera, Metema, and Bure. However, maize is not among the major commodities traded at ECX: trade is largely limited to coffee, sesame and pea-bean at the moment (Rashid and Negassa, 2011).

The Government has responded with several measures following the 2008 price surge: (i) imposition of 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 ban on cereal export was imposed in February 2008. Ethiopia lifted a two-year ban on the export of cereals such maize and sorghum in July 2010. However, seven months later, in March 2011, a decision was made to re-impose the restriction on maize export as rising food prices started to take a toll in the general inflation[7].

Another policy factor affecting maize production is input support. Public provision of R&D services, extension advice, inputs and credit has been the dominant set 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.

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

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

3. DATA REQUIREMENTS, DESCRIPTION AND CALCULATION OF INDICATORS

To calculate the indicators needed to estimate incentives or disincentives to production (NRP, NRA) as well as the Market Development Gaps (MDGs), several types of data are needed. They were collected and are presented and explained hereafter.

Trade status of the product

As shown above, Ethiopia has been a net importer of maize during the period 2005 to 2009 (FAOSTAT has no trade data for 2010). Grain import is largely carried out through the parastatal, EGTE, in years of serious shortages (e.g. 2008) with the main objective of selling grain (mainly wheat) to low income groups in urban areas at subsidized prices.

Benchmark prices

With little or no commercial import, local sources of CIF prices are hard to come by. Benchmark prices are CIF prices thus calculated on the basis of FOB South Africa (Durbin) prices plus ocean freight and insurance to Djibouti port.[8] Djibouti Port is the principal transit point for cargo in and out of Ethiopia. Consistent with international prices, CIF prices have increased since 2005 with a peak of USD417 per tonne in 2008 (Table 3).

Table 3: Maize benchmark price (USD/MT)

	2005	2006	2007	2008	2009	2010
South Africa (FOB) USD/MT	125	221	320	374	252	225
Ocean Freight (USD/MT)	24.66	29.49	34.66	39.83	45.00	47.59
Insurance (USD/MT)	1.25	2.21	3.20	3.74	2.52	2.25
Benchmark Price USD/MT	**151**	**252**	**358**	**417**	**299**	**275**
Exchange rate Birr/USD	8.67	8.74	9.21	9.80	12.10	2.89
Benchmark Price Birr/MT	1,311.38	2,206.72	3,296.05	4,087.76	3,622.25	3,542.39

Source: Based on Preliminary analysis of incentives and disincentive for Kenya (MAFAP, 2012)for ocean freight and insurance; the National Bank of Ethiopia for the exchange rate;

Exchange rates

The observed exchange rate change very little between 2005 and 2008. It increased from an average of Birr 8.67 to US$1 in 2005 to 9.80 in 2008. The rate increased to Birr 12.10 in 2009 and Birr 12.89 in 2010.

[8] The ocean freight and insurance from Durbin to Mombasa, Kenya, has been used for Djibouti port. The research team was unable to find direct charges from Durbin to the port of Djibouti.

The stability of the exchange rate in Ethiopia due to the policy of 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 Birr by 25 percent in September 2010 (Rashid, 2010)[9]. Another study (Dorosh, et al., 2009)[10], showed that real exchange rate appreciated by 9.7, 12.8, 14.9 and 33.8, 26.3 percent in July 2005, July 2006, July 2007, July 2008 and June 2009, respectively. High rate of inflation (relative to the low inflation rate among its trading partners) and increasing pressure on foreign exchange reserve are among the major cause of currency appreciation in Ethiopia. Between 2005 and 2008, inflation rates hit double digits and then declined to 8.5 and 7 percent in 2009 and 2010, respectively. In 2007 and 2008, the foreign currency reserve fell short of the critical requirement of 12 weeks worth of imports and the Government instituted foreign exchange rationing (Rashid, 2010).

In March 2008, access to foreign exchange for imports was restricted (rationed) to curb excessive drawdown of foreign exchange reserve. It is assumed that the local currency was, on average, 20 percent overvalued during the period 2005- 2010 and the exchange rate has been adjusted accordingly in our calculation of adjusted reference prices. The adjustment factor approximates the depreciation of the local currency had a more liberal policy been pursued. The adjusted exchange rate has thus increased from Birr 10.40 in 2005 per US$1 to Birr 15.47 in 2010 (Table 4).

Table 4: Observed and adjusted exchange rate Birr to US$ (annual average)

	2005	2006	2007	2008	2009	2010
Observed (Birr per US$1)	8.74	9.21	9.80	12.10	12.89	8.74
Adjusted (Birr per US$1)	10.40	10.49	11.05	11.76	14.52	15.47

DOMESTIC PRICES

The Ethiopian Grain Trade Enterprise (EGTE) collects prices for Addis Ababa and several major markets in the country. Monthly wholesale[11] price data of major cereals, pulses and oilseeds are posted in EGTE's website (http://egtemis.com/marketstat.asp). The average annual wholesale price of Addis Ababa is considered as the wholesale price at the point of competition.

Located some 300 km south west of Addis, Jimma represents one of the major maize producing areas of Ethiopia. Maize traders in Jimma buy from farmers and assemblers and sell at the central market in Addis (see production and market flow Map 1). The wholesale maize price in Jimma is reduced to arrive at farm gate price. Regional traders offer a lower price to farmers and assemblers with the aim of either selling at a wholesale price within Jimma or transporting to Addis to sell at wholesale Addis

[9] Rashid 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.

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

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

Ababa price. Their gross margin (marketing costs and net margins) when selling in Jimma (at wholesale price) is assumed to be half of the estimated net margin obtained by selling in Addis. We have deducted this gross margin from the observed wholesale price in Jimma to arrive at the observed farm gate price of Jimma (Table 5).

Table 5: Observed wholesale and farm gate prices

	Unit	2005	2006	2007	2008	2009	2010
Wholesale purchase price observed at the market of A.A.	ETB/tonne	1465	1469	1740	4107	3368	4726
Jimma wholesale observed price	ETB/tonne	1248	1344	1438	4039	3103	3726
Producers' Prices Jima	ETB/tonne	1123	1219	1313	3989	3003	3626

Source: Ethiopian Grain Trade Enterprise (EGTE), http://eqtemis.com/priceone.asp

Access costs

From port to point of competition (observed and adjusted)

Addis Ababa is the wholesale market for maize as well as other agricultural commodities. The central grain market in Addis, traditionally known as Ehil Berenda, has a network of brokers who sell grain they receive from client traders in the surplus production areas.

Access cost from port to the point of competition (Addis Ababa) includes surtax and withholding tax, port handling, transport, unloading and miscellaneous costs (5 percent of CIF). It is assumed that traders' margin is included in the miscellaneous costs. The cost estimate is based on a recent USAID Bellmon study (USAID, 2010)[12]. Among the major costs are port transport and port handling costs. Transport costs have increased but not by as much as the inflation in the country or fuel price increases in the international market (Table 4). Access costs obtained from major grain traders and trader associations are broadly consistent with the USAID cost estimates.

A recent Government report[13] indicated that the price/tonne/km of transporting commodities via the Djibouti corridor is very high compared to other countries: the price/tonne/km in Ethiopia is 6 USD 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 three round trips per month, while it is possible to do five. However, the transport cost used in this analysis (as obtained from the USAID study) is less than 6 USD cents per tonne per km, varying between 4.5 and 4.8 cents (Table 6). Hence, no adjustment is made in the transportation cost. It should also be noted that no margin/ profit for importers is included in the access cost from port to point of competition. However, surtax and withholding tax has been deducted from the observed total cost to arrive at the adjusted total adjusted access cost from port to point of competition.

[12] USAID (2011), USAID Office of Food For Peace Ethiopia, Bellmon Estimation, Annex 1 Economic Data and Trends, September.

[13] See for instance, The Reporter (newspaper), 11 February, 2012: http://www.thereporterethiopia.com/News/govt-to-tighten-grip-on-trade-logistics.html

Table 6: Access costs (observed and adjusted) from Djibouti to Addis Ababa – price/tone or price/km (nominal prices)

		2005	2006	2007	2008	2009	2010
Surtax & Withholding tax	ETB/quintal	5.14	6.20	8.27	11.85	9.74	9.22
Port Handling	ETB/quintal	23.30	23.30	23.30	23.30	23.30	23.30
Transport costs	ETB/quintal	38.00	38.00	38.67	43.75	52.75	57.00
Unloading	ETB/quintal	3.20	3.20	3.20	3.20	3.20	3.20
Miscellaneous (5% of CIF)	ETB/quintal	8.57	10.34	13.79	19.76	16.23	15.37
Total costs	ETB/quintal	78.21	81.04	87.22	101.86	105.22	108.08
Total costs - observed	ETB/tonne	782	810	872	1,019	1,052	1,081
Total costs – adjusted (less surtax and withholding tax)	ETB/tone	730.68	748.37	789.52	900.05	954.81	988.65
Transport cost – given 925 km distance b/n Djibouti and Addis	USD/km/tonne	0.047	0.047	0.045	0.048	0.047	0.048

Source: USAID, USAID Office of Food For Peace Ethiopia, Bellmon Estimation, Annex 1 Economic Data and Trends, September 2011

From farm to point of competition (observed and adjusted)

Marketing costs from Jimma to Addis are obtained from group discussion with traders/ brokers and trader associations at the Addis Ababa central grain market, and include costs such as loading, transport, fees for brokers of truck, unloading, storage, losses, fees for brokers selling maize in Addis and margins for traders (Table 7).

Transport cost, the major component of the total access cost, has more than doubled between 2005 and 2006 in nominal terms, 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 0.077 (7.7 cents) to 0.123 (12.3 cents). The observed transport cost is well above the cost reported along the Djibouti-Addis Ababa road and the international rates (as indicated above). The high cost is also related to the use of smaller trucks (often less than 10 tonnes capacity) rather than bigger trucks with lower costs per unit. Transport cost from Jimma to Addis Ababa has been adjusted by reducing the observed transport cost by 30 to 40 percent. The adjustment is intended to reflect a situation of a more efficient transport system, thus reducing transport cost to between 6.1 and 7.4 USD cents/km/tonne, which is only slightly higher than the rates charged along the Djibouti-Addis Ababa road.

Estimated margins[14] are relatively high but have tended to decline between 2005 and 2010. Trade margins were also calculated as a residual that regional traders receive after paying farm gate prices and incurring access costs (common practice) and selling at Addis Ababa wholesale price (on truck). The result showed that calculated profit (not shown in Table 6) is very small (compared to the estimated profit) and traders rather incurred losses in 2008 and 2009, when maize prices were very high. One recent study also found that net margins declined significantly in 2008 compared to 1996 and 2002 (Rashid and Negassa, 2011). One possible reason is that prices are already too high and

[14] Traders believe that actual profit margins are not well known as purchase prices vary by the day and so is the sales price.

traders find it difficult to increase their margins. It is also possible that trade has become more competitive and margins have been squeezed. Traders have also indicated that profits decline with soaring prices as most customers cut back on their purchases. Profits increased sharply in 2010 but it appears that trade margins have not increased in proportion with increase in prices.

Table 7: Access costs (observed and adjusted) from Jimma to Addis Ababa (nominal prices)

	Unit	2005	2006	2007	2008	2009	2010
Loading	ETB/tonne	20	20	20	20	30	30
Transportation costs	ETB/tonne	200	200	250	300	350	475
Broker fees for accessing truck - per tonne	ETB/tonne	5	5	5	7	10	10
Broker fees for selling grain in Addis	ETB/tonne	10	10	15	20	25	30
Estimated margins for traders	ETB/tonne	250	250	250	200	200	200
Total costs	ETB/tonne	485	485	540	547	615	745
Jimma wholesale observed price	ETB/tonne	1,248	1,344	1,438	4,039	3,103	3,726
Marketing cost deducted to arrive at farm gate	ETB/tonne	125	125	125	100	100	100
Jimma farm gate observed price	ETB/tonne	1,123	1,219	1,313	3,939	3,003	3,626
Addis Ababa observed wholesale	ETB/tonne	1,465	1,469	1,740	4,107	3,368	4,726
Transportation costs	USD/km/tonne	0.077	0.076	0.091	0.102	0.096	0.123
Adjustment factor (to reduce transport cost to 6.1 to 7.4 US cents/km/ton		20%	20%	30%	30%	30%	40%
Transport cost difference (unadjusted less adjusted)	ETB/tonne	40.0	40.0	75.0	90.0	105.0	190.0
Adjusted total cost	ETB/tonne	445.0	445.0	465.0	457.0	510.0	555.0

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

EXTERNALITIES

No externalities are taken into consideration at this stage of the analysis.

BUDGET AND OTHER TRANSFERS

There are no fertilizer subsidies in Ethiopia as the Government removed input subsidy in 1997.

QUALITY AND QUANTITY ADJUSTMENTS

No indications of significant quality differences between domestic or foreign produce have been found. Therefore no adjustments are applied in our analysis

CALCULATION OF INDICATORS

The indicators and the calculation methodology used are described in Box 1. A detailed description of the calculations and data requirements is available on the MAFAP website or by clicking here.

Box 1 : MAFAP POLICY INDICATORS

MAFAP analysis uses four measures of market price incentives or disincentives. *First*, are the two observed nominal rates of protection one each at the wholesale and farm level. These compare observed prices to reference prices free from domestic policy interventions.

Reference prices are calculated from a benchmark price such as an import or export price expressed in local currency and brought to the wholesale and farm levels with adjustments for quality, shrinkage and loss, and market access costs.

The ***Nominal Rates of Protection - observed (NRPo)*** is the price gap between the domestic market price and the reference price divided by the reference price at both the farm and wholesale levels:

$$NRPo_{fg} = {(P_{fg} - RPo_{fg})}/{RPo_{fg}}; \quad NRPo_{wh} = {(P_{wh} - RPo_{wh})}/{RPo_{wh}};$$

The $NRPo_{fg}$ captures all trade and domestic policies, as well as other factors which impact on the incentive or disincentive for the farmer. The $NRPo_{wh}$ helps identify where incentives and disincentives may be distributed in the commodity market chain.

Second are the ***Nominal Rates of Protection - adjusted (NRPa)*** in which the reference prices are adjusted to eliminate distortions found in developing country market supply chains. The equations to estimate the adjusted rates of protection, however, follow the same general pattern:

$$NRPa_{fg} = {(P_{fg} - RPa_{fg})}/{RPa_{fg}}; \quad NRPa_{wh} = {(P_{wh} - RPa_{wh})}/{RPa_{wh}};$$

MAFAP analyzes market development gaps caused by market power, exchange rate misalignments, and excessive domestic market costs which added to the NRP*o* generate the NRP*a* indicators. Comparison of the different rates of protection identifies where market development gaps can be found and reduced.

4. INTERPRETATION OF THE INDICATORS

MAFAP analysis is based on comparison between domestic prices, both at farm gate and wholesale levels, and reference prices. Reference prices reflect prices that producers could get in the absence of policies. Indicators of price difference between domestic and references prices are calculated at wholesale and farm level (see Box 1 for details of the methodology used to calculate the different indicators).

Figure 3 (extracted from Annex IV of the complete excel sheet) shows that the price gaps between domestic and reference prices are huge and negative (see also table 8). Domestic prices at wholesale level or at the point of competition were very much below the reference prices in all the years except 2010.

The observed wholesale price shortfall (PGowh) increased between 2005 and 2007, from Birr 629 per tonne in 2005 to Birr 2 428 in 2007. The deficit declined in 2008 but increased again in 2009. A small positive gap at wholesale level was observed in 2010.

The price deficits for adjusted wholesale price (PGawh) were greater in all the years, including 2010. The negative price wedge confirms that buyers or consumers benefited since they paid much lower price for maize than the equivalent international prices. On the other hand, maize producers lost as they were paid a very low price compared to international levels. The extent of this disincentive for farmers is more clearly explained by the price wedge at farm gate level: observed price gaps (PGofg) were negative in all the years and ranged from Birr 253 per tonne in 2010 to Birr 2,316 per tonne in 2007. The gaps were much more negative with adjusted price (PGafg). The losses to farmers were exceptionally very high in 2007 (Figure 8).

Figure 8: Price gap between domestic and reference prices – observed and adjusted

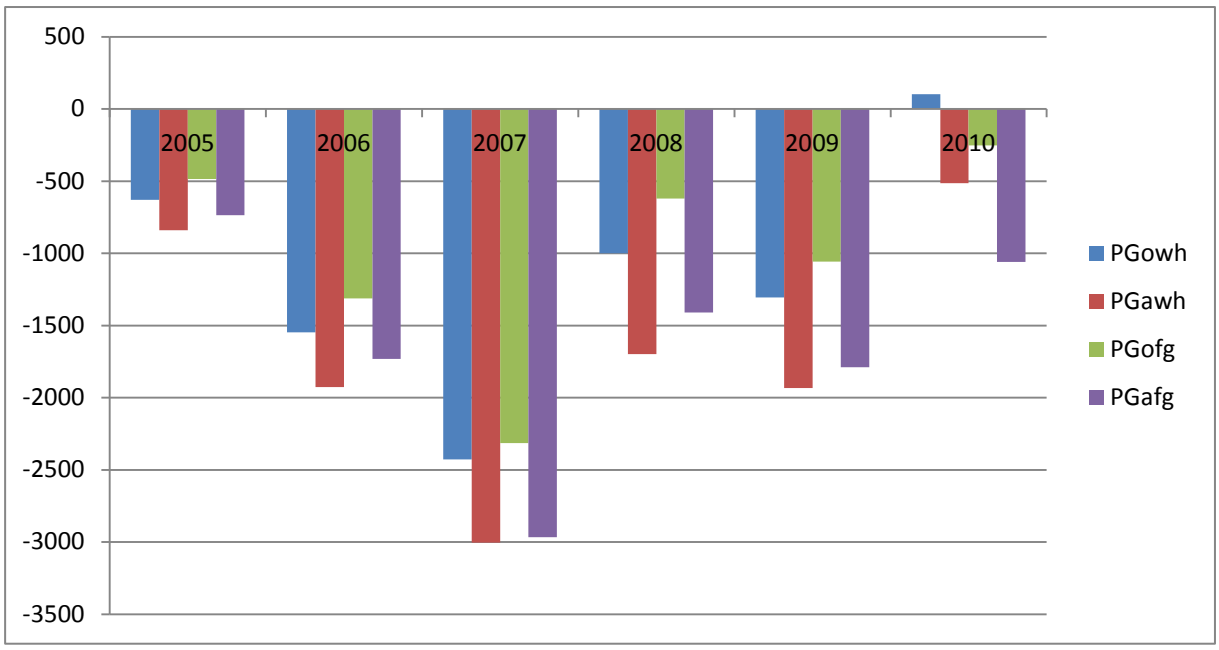


Table 8: MAFAP price gaps for maize in Ethiopia 2005-2010 (Birr/tonne)

	2005	2006	2007	2008	2009	2010
Trade status for the year	m	m	m	m	m	m
Observed price gap at wholesale PGo_{wh}	-629	-1548	-2428	-999	-1306	103
Adjusted price gap at wholesale PGa_{wh}	-840	-1927	-3005	-1698	-1934	-513
Observed price gap at farm gate PGo_{fg}	-486	-1313	-2315	-620	-1057	-253
Adjusted price gap at farm gate PGa_{fg}	-737	-1732	-2967	-1409	-1789	-1059

Source: Own calculations using data as described above.

Consistent with the negative price wedge, the nominal rate of protection (NRP) is negative at the wholesale as well as the farm gate levels (Figure 4 and Table 9, based on Annex IV). The observed (unadjusted) NRP at wholesale level (NRPowh) varied from -20 percent in 2005 to -58 percent in 2007, with a small positive value (2 percent) in 2010. The adjusted NRP (NRPawh) was more negative, ranging from -10 percent in 2010 to -63 percent in 2007. This means maize buyers or consumers at the wholesale level were paying less than the equivalent border prices: they paid 10 percent less in 2010 and 63 percent less in 2007. By contrast, producers of maize were implicitly taxed for selling maize: the observed NRP at farm gate (NRPofg) and the adjusted NRP (NRPafg) averaged -32 percent and -42 percent, respectively, during the study period (2005-10). In other words, farmers were being implicitly taxed at a rate of 44 percent for growing and selling maize (at the adjusted rates). The rate of implicit taxation was 69 percent (adjusted) in 2007. In 2010, the level of implicit taxation declined to 7 percent possible due to the temporary lifting of the export ban in July 2010.

Figure 9: Nominal rate of protection

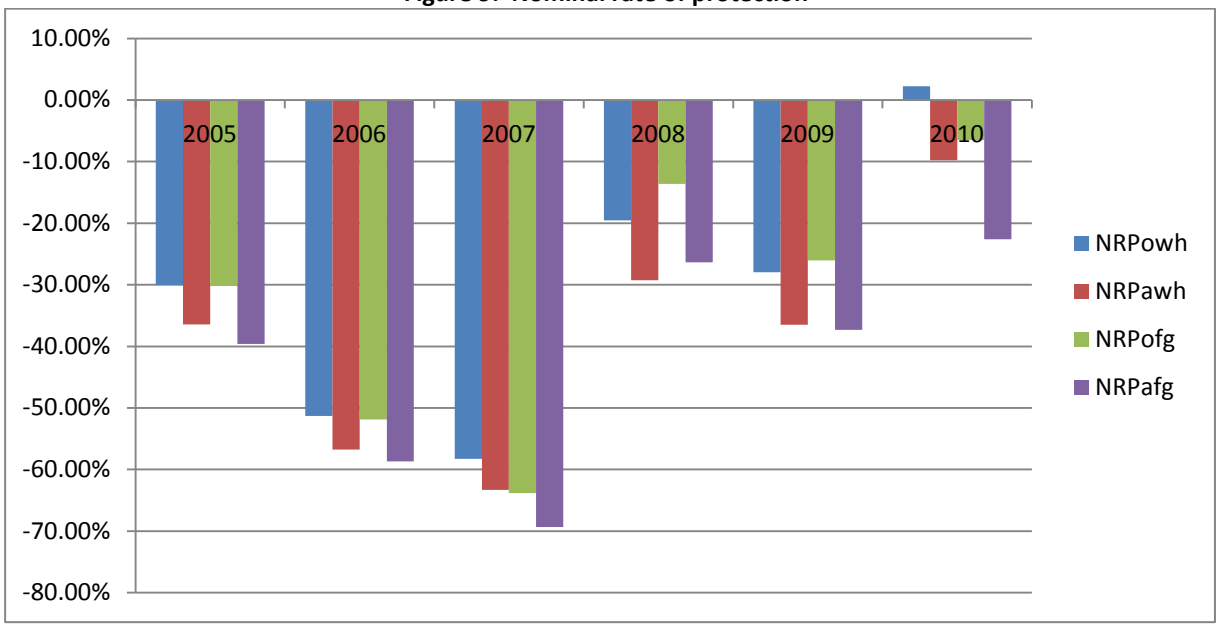


Table 9: MAFAP nominal rates of protection (NRP) for maize in Ethiopia 2005-2010 (%)

	2005	2006	2007	2008	2009	2010
Trade status for the year	m	m	m	m	m	m
Observed NRP at wholesale[1]	-30.03%	-51.30%	-58.25%	-19.56%	-27.95%	2.22%
Adjusted NRP at wholesale[1]	-36.44%	-56.74%	-63.33%	-29.25%	-36.47%	-9.80%
Observed NRP at farm gate[2]	-30.21%	-51.85%	-63.82%	-13.60%	-26.03%	-6.51%
Adjusted NRP at farm gate[2]	-39.63%	-58.69%	-69.32%	-26.35%	-37.33%	-22.61%

Source: Own calculations using data as described above.

5. CONCLUSIONS AND RECOMMENDATIONS

Main message

The results of the MAFAP price indicators show that the level of disincentive to maize farmers is considerable with an average implicit taxation of 32 percent (observed farm gate) and 42 percent (adjusted) during the period of 2005 to 2010. While producers have failed to gain fully from recent high world prices, consumers are protected as they pay significantly less than the border price equivalent.

Overvalued exchange rates and the Government policy of banning export and distributing imported cereals at subsidized prices (at times of high food prices) have kept domestic prices relatively low. Food aid, which accounts for a significant share of cereal consumption, may have also contributed to the lower domestic price levels[15].

Moreover, overvaluation of domestic currency (see the section on exchange rates below) contributed to lower export parity prices, hence less pressure on domestic prices (i.e. due to low demand for export). The export ban on maize and other cereals (see below) has also discouraged export and added to the downward pressure on prices. Maize trade is also affected by high price volatility. As shown in Figure 6, the peaks and the troughs are more pronounced in the cases of maize than wheat, for instance.

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

The Government has succeeded in its policy of ensuring relatively lower prices for consumers who are mostly poor and often live below the poverty line. However, this achievement has come at the cost of denying adequate incentive to producers.

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

[15] 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).

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

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

Demand for maize is generally weak in Ethiopia since it is not a preferred staple in the urban areas where purchasing power is stronger. A well-developed food processing and feed mill sector would have a positive impact on production incentives. Maize can be used to transform the livestock sector considering the fact that Ethiopia has yet to tap into the full potential of its livestock population, the largest in Africa.

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

Our results are consistent with the Anderson and Valenzuela (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. These have been identified as control over input markets, ad hoc Government interventions in cereal markets and disincentives through depressed prices due to inflow of food aid (Rashid, Assefa and Ayele, 2007).

Preliminary recommendations

- it is very important for policy makers to reconsider policies, including currency overvaluation and export bans, that resulted in implicit taxation of agriculture; mores specifically, actions to be taken to reduce disincentives could include 1) address currency overvaluation, 2) adopt less restrictive trade policies, 3) encourage the participation of private traders in grain import and export, 4) avoid non-targeted distribution of grain at subsidized prices, 5) support the development of market structure and the grain value chain, and 6) promote the use of bulk transport system.
- policies regarding distribution of food aid and subsidized cereals should be handled in ways that they do not negatively impact on producers;
- the Government should consider various incentive to enhance investment in maize trading, milling and processing as well as feed mill industries;
- Government policy should be informed by the fact that low domestic prices are good for consumers only in the short. Long-term and sustained gain to consumers can only be achieved through improved incentive to producers that translate into increased production, hence lower prices in the long term;
- price risk management tools for maize producers need to be designed and mainstreamed into Government investment plans and programs in agriculture;

- investment in bulk transport and storage facilities, along with grades and standards, would have a significant impact on competitiveness of maize production in Ethiopia.

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 access costs was hard to come by and the research team had to rely on an assistant who collected primary data through interviews with a small number of traders and representatives of trader associations. The data reveals a lot of interesting features of the maize market but further investigation and consultations with relevant Government and private organizations are required to validate the access data.

The study has not looked into distortions in input markets or public expenditure in support of agriculture, which will be addressed in subsequent MAFAP activities.

Further investigation and research

Farm gate prices were estimated based on wholesale prices observed in a town (Jimma) located in major maize producing area. Refinement of the results should include obtaining actual farm gate prices for Jimma as well as other locations in different maize producing areas. More effort is also required to acquire CIF prices from importing companies such as the prastatal EGTE. Research on the impact of price volatility on the incentive of producers is also required as part of the effort to improve the overall incentive environment for producers.

BIBLIOGRAPHY

Alemayehu Seyoum, et al. (2011), Crop Production in Ethiopia: Regional Patterns and Trends Ethiopia Strategy Support Program II (ESSP II), ESSP II Working Paper No. 0016.

Demeke, M, W. Amha, T. Ferede and K. Getnet (2012), Firm growth dynamics: the case of grain traders in Ethiopia, FAO/ESA. forthcoming

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

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

Rashid 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

Rashid S., K. Getnet and S. Lemma (2010) Maize value chain potential in Ethiopia: Constraints and opportunities for enhancing the system, IFPRI, Working Paper, July

Rashid S. and A. Negassa (2011), Policies and Performance of Ethiopian Cereal Markets, IFPRI/ EDRI, Ethiopia Strategy Support Program II (ESSP II) ESSP II Working Paper No. 21, May

Rogstadius J. (2009). Visualizing the Ethiopian Commodity Market, Department of Science and Technology Institutionen för teknik och naturvetenskap Linköping University Linköpings Universitet SE-601 74 Norrköping, Sweden 601 74 Norrköping

The RATES Center, Maize Market Assessment and Baseline Study for Ethiopia, Nairobi, Kenya, July 2003

USAID (2011), USAID Office of Food For Peace Ethiopia, Bellmon Estimation, Annex 1 Economic Data and Trends, September

ANNEX I: Methodology Used

A guide to the methodology used by MAFAP can be downloaded from the MAFAP website or by clicking here.

Annex II: Maize production in Eastern and Southern Africa

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Ethiopia	2682940	3298330	2825560	2743880	2906310	3911870	4029630	3336800	3776440	3897160	4400000
Kenya	2160000	2790000	2408600	2710850	2607140	2905560	3247200	2928790	2367240	2439000	3222000
Malawi	2501310	1713060	1556980	1983440	1608350	1225230	2611490	3226420	2634700	3582500	3800000
Mozambique	1180430	1143260	1114770	1178790	1060400	942000	1417800	1152050	1284930	1932000	1878000
South Africa	11431200	7772000	10076000	9705000	9710070	11715900	6935060	7125000	12700000	12050000	12815000
Uganda	1096000	1174000	1217000	1300000	1080000	1170000	1258000	1262000	1266000	1272000	1373000
Tanzania	1965400	2652810	4408420	2613970	3157420	3218540	3423020	3302060	3555800	3326000	4475420
Eastern & Southern Africa	27064535	23783300	25738281	25447916	25992775	27919366	26831134	25567629	30322017	32250824	37373753

Annex III: Volume and value of imports and exports from 2000 to 2010

Element	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Import (tonne)	18300	23500	3189	11582	11347	30436	60271	31912	36050	54466	
Import (1000 USD)	6500	8500	1341	5049	7713	10500	25000	14000	14891	22000	
Export (tonne)	385	1327	12848	746	11086	2606	672	17	0	0	
Export (1000 USD)	83	217	1858	101	1787	453	128	9	0	0	
Trade Balance (X-M)	-17915	-22173	9659	-10836	-261	-27830	-59599	-31895	-36050	-54466	

Source: FAOSTAT

Annex IV: Data and calculations used in the analysis

Name of product	Maize
International currency	

Local currency	

	DATA	Unit	Symbol	Year trade status	2005 m	2006 m	2007 m	2008 m	2009 m	2010 m	Notes
	Benchmark Price										
1	*Observed*	US$/TON	$P_{b(int\$)}$		**151.31**	**252.49**	**358.07**	**417.12**	**299.46**	**274.76**	CIF Price
1b	*Adjusted*	US$/TON	P_{ba}								
	Exchange Rate										
2	*Observed*	ETB/US$	ER_o		8.67	8.74	9.21	9.80	12.10	12.89	
2b	*Adjusted*	ETB/US$	ER_a		10.40	10.49	11.05	11.76	14.52	15.47	
	Access costs border - point of competition										
3	*Observed*	US$/TON	ACo_{wh}		782.07	810.40	872.23	1,018.58	1,052.20	1,080.83	
3b	*Adjusted*	US$/TON	ACa_{wh}		730.68	748.37	789.52	900.05	954.81	988.65	
4	**Domestic price at point of competition**	US$/TON	P_{dwh}		1,464.73	1,469.36	1,740.13	4,107.38	3,367.98	4,726.02	
	Access costs point of competition - farm gate										
5	*Observed*	US$/TON	ACo_{fg}		485.00	485.00	540.00	547.00	615.00	745.00	
5b	*Adjusted*	US$/TON	ACa_{fg}		445.00	445.00	465.00	457.00	510.00	555.00	
6	**Farm gate price**	US$/TON	P_{dfg}		1,122.50	1,219.17	1,312.88	3,939.31	3,002.79	3,625.56	
7	Externalities associated with production	US$/TON	E								
8	Budget and other product related transfers	US$/TON	BOT		1.00	1.00	1.00	1.00	1.00	1.00	
	Quantity conversion factor (border - point of competition)	Fraction	QT_{wh}		1.00	1.00	1.00	1.00	1.00	1.00	
	Quality conversion factor (border - point of competition)	Fraction	QL_{wh}		1.00	1.00	1.00	1.00	1.00	1.00	
	Quantity conversion factor (point of competition - farm gate)	Fraction	QT_{fg}		1.00	1.00	1.00	1.00	1.00	1.00	

	Quality conversion factor (point of competition - farm gate)	Fraction	QL_{fg}	1.00	1.00	1.00	1.00	1.00	1.00	

	CALCULATED PRICES	Unit	Symbol	2005	2006	2007	2008	2009	2010	Formula
	Benchmark price in local currency									
9	*Observed*	US$/TON	$P_{b(loc\$)}$	1,311.38	2,206.72	3,296.05	4,087.76	3,622.25	3,542.39	[1]*[2]
10	*Adjusted*	US$/TON	$P_{b(loc\$)a}$	1,573.66	2,648.07	3,955.26	4,905.31	4,346.70	4,250.87	[1]*[2b]
	Reference Price at point of competition									
11	*Observed*	US$/TON	RPo_{wh}	2,093.45	3,017.12	4,168.27	5,106.34	4,674.45	4,623.21	([9]*[QTwh]*[QLwh])+[3]
12	*Adjusted*	US$/TON	RPa_{wh}	2,304.33	3,396.43	4,744.77	5,805.36	5,301.51	5,239.52	([10]*[QTwh]*[QLwh])+[3b]
	Reference Price at Farm Gate									
13	*Observed*	US$/TON	RPo_{fg}	1,608.45	2,532.12	3,628.27	4,559.34	4,059.45	3,878.21	([11]*[QTfg]*[QLfg])-[5]
14	*Adjusted*	US$/TON	RPa_{fg}	1,859.33	2,951.43	4,279.77	5,348.36	4,791.51	4,684.52	([12]*[QTfg]*[QLfg])-[5b]

	INDICATORS	Unit	Symbol	2005	2006	2007	2008	2009	2010	Formula
	Price gap at point of competition									
15	*Observed*	US$/TON	PGo_{wh}	(628.72)	(1,547.76)	(2,428.15)	(998.96)	(1,306.46)	102.81	[4]-[11]
16	*Adjusted*	US$/TON	PGa_{wh}	(839.61)	(1,927.07)	(3,004.65)	(1,697.98)	(1,933.52)	(513.50)	[4]-[12]
	Price gap at farm gate									
17	*Observed*	US$/TON	PGo_{fg}	(485.95)	(1,312.96)	(2,315.40)	(620.03)	(1,056.66)	(252.65)	[6]-[13]
18	*Adjusted*	US$/TON	PGa_{fg}	(736.83)	(1,732.27)	(2,966.90)	(1,409.05)	(1,788.71)	(1,058.96)	[6]-[14]
	Nominal rate of protection at point of competition									
19	*Observed*	%	$NRPo_{wh}$	-30.03%	-51.30%	-58.25%	-19.56%	-27.95%	2.22%	[15]/[11]
20	*Adjusted*	%	$NRPa_{wh}$	-36.44%	-56.74%	-63.33%	-29.25%	-36.47%	-9.80%	[16]/[12]
	Nominal rate of protection at farm gate									

21		*Observed*	%	NRPo$_{fg}$	-30.21%	-51.85%	-63.82%	-13.60%	-26.03%	-6.51%	[17]/[13]
22		*Adjusted*	%	NRPa$_{fg}$	-39.63%	-58.69%	-69.32%	-26.35%	-37.33%	-22.61%	[18]/[14]
	Nominal rate of assistance										
23		*Observed*	%	NRAo	-30%	-0.518124 88	-0.637878 48	-0.135772 21	-0.260049 2	-0.064889 31	([17]+[8])/[13]
24		*Adjusted*	%	NRAa	-39.58%	-58.66%	-69.30%	-26.33%	-37.31%	-22.58%	([18]+[8])/[14]

	Decomposition of PWAfg	*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*Formula*
25	International markets gap	US$/T ON	IRG	-	-	-	-	-	-	-
26	Exchange policy gap	US$/T ON	ERP G	(262.28)	(441.34)	(659.21)	(817.55)	(724.45)	(708.48)	([2]-[2b])*[1]*QTwh*QLwh
27	Access costs gap to point of competition	US$/T ON	ACG$_{w}$ h	51.39	62.03	82.71	118.53	97.39	92.18	[3]-[3b]
28	Access costs gap to farm gate	US$/T ON	ACG$_{fg}$	(40.00)	(40.00)	(75.00)	(90.00)	(105.00)	(190.00)	[5b]-[5]+(([12]-[11])*(1-(QTfg*QLfg)))
29	Externality gap	US$/T ON	EG	-	-	-	-	-	-	-

	Total values	*Unit*	*Symbol*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*Formula*
30	**Production volume**	tons								
	Market price support									
31	*Observed*	YYY	MPSo	-						[17]*[29]
32	*Adjusted*	YYY	MPSa	-						[18]*[27]

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