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**The Impact of Banning Export of Cereals in Response to Soaring Food Prices:  
Evidences from Ethiopia using the New GTAP African Database**

**Getachew Abebe Woldie<sup>1</sup> and Khalid Siddig<sup>2</sup>**

**Abstract:**

*In the poorest countries like Ethiopia the spillover effects of a soaring food price is unbearable. To mitigate the recent rise in food prices and the burden on urban poor consumers, different measures have been considered by policy makers. Recently, Ethiopia banned the export of all grain products in a bid to stem huge price hikes. The export of indigenous grains, including the staple grains, like teff, maize, sorghum, and wheat are suspended indefinitely. Using the standard GTAP model and the recent GTAP Africa database, this paper simulates the overall implication of banning export of grains. Regarding the impact on prices, the simulation result tells us that prices are likely to fall. At macro level, the result reveals trade balance will not be decline following such actions. However, it has been shown that in terms of overall welfare the policy has a devastating impact as the country will likely to lose welfare equivalent of \$ 148 million.*

**Key words:** *Food price inflation, export ban, WTO, Ethiopia, GTAP*

**JEL Classification:** *D58, E31, F13, Q17*

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## **Introduction**

Food prices play a significant role in the well-being of the poor as poor consumers spend a large budget share on food. Thus, the level of food prices is an important determinant of their purchasing power. Even relatively small price changes for food staples may seriously influence the ability of poor consumers to meet their basic needs, including nutritional requirements.

Food prices are accelerating at their fastest rate since 2006 resulting from, among other things, the price of oil, speculation on the financial markets, erratic weather patterns, subsidized production of bio-fuels, and population growth. The rising cost of food is becoming a major source of global social instability and economic hardships. In developing countries, the problem is worse in terms of rising poverty and hunger. In the poorest countries like Ethiopia, the spillover effect of a soaring food price is unbearable. It could be both in terms of the adverse effects on the poor and on the risk it poses to macroeconomic stability through adverse effects on growth and inflation and large swings in the terms of trade with important balance of payments consequence. It is argued that the urban poor as well as food deficit farmers are the worst affected by food price inflation as they rely on food purchases (IMF, 2008a). It should not also be ignored that food- surplus farmers may not also benefit from food price increase, as the pass-through of higher input costs is also often faster than that of the world market price for food. To mitigate the rise in food prices and the burden on urban poor consumers, different measures have been considered by policy makers. International organizations including the International Monetary Fund (IMF), have actively involved in the provision of advice and support to address this urgent concern. Different countries have also responded in different ways for this recent

sharp increase in food prices. The responses take different forms among others a decrease in food tax either in the form of reducing import duties and consumption taxes or in the form of curtailing export of food grains. According to IMF (2008a), for instance food taxes were reduced in 84 countries between 2006 and 2008 of which 76 countries have cut food import taxes and 22 countries reduced VAT rates. The above report also confirmed that about 22 countries have increased food subsidies. Exporting countries have on the other hand used both tax and regulatory measures that include increase in export taxes, the introduction of export quotas, and even the imposition of outright bans on certain exports. Some 30 rice-exporting countries have imposed a clear export restriction or bans. South Asia and East Asia led in terms of export restrictions in this case, as about 40 percent of the countries survey by FAO in 2008 have implemented export restrictions. Europe and Central Asia were also not far behind as about 35 percent of countries surveyed have used these measures while Africa, Latin America and Caribbean, the Middle East and North Africa exhibited around 20 percent (see Mitra and Josling, 2009 for a vibrant documentation of some examples of recent export restrictions imposed by some countries).

With the growing debate on WTO accession and the Doha agenda in so many developing countries including Ethiopia, policy makers also face challenges in making use of such instruments. This is because acceding to the WTO means no easy room for such instruments even in cases where the effectiveness of government intervention rather than letting the market, sort out some of the challenges such as that posed by the food price inflation.

In Ethiopia, an increase in food prices over the years 2004 to 2008 have been observed and the food inflation rates(end of period) has exhibit an all-time high levels in 2008 (Ulimwengu, Workneh & Paulos, 2009). At the national level, the inflation rate steadily increased from a mere 3.4 percent in 2004 to 13.6 percent in 2006 and rose further to 34.9 percent by June 2008. Recent statistics show that food price inflation is still rising. At country level, food inflation rate reaches 60.9 percent in January 2009, which is 38.1 percentage points higher than that of 22.8 percent inflation rate at January 2008. This higher increase in the food inflation rate was due to the increase in price of the food components like cereals, pulses, meat, oils and fats (specially butter), milk and egg, vegetable and fruits, potatoes and other tubers and stems, and food taken away from home(Central Statistical Agency, 2009).

A recent shift from subsidizing oil to grain to ease the spiraling cost of food is one attempt the Ethiopian government has made so far. To this end, the government has removed an \$800m annual subsidy on petroleum products and uses the money to combat rising grain prices as well as eliminated value- added taxes on grains. In addition, the government has also curtailed export of cereals in a way to stabilize the soaring price that hit most of the low-income population. Despite the fact that protecting the poor and other vulnerable groups from the impact of rising prices are justified from policy point of view, a thorough investigation should be made in terms of efficiency, welfare and particularly from the pressure it creates on fiscal policy point of view.

Cognizant of the fact in this context, using the standard GTAP model and the recent GTAP Africa database this paper simulates the overall implication of recent policy

response particularly, the implication of export ban on cereals and grains to mitigate soaring food prices. The findings from this paper are appealing as it addresses an important aspect that continues to divide policy analysts. First, it gives insights on how government intervention is indeed effective compared with the market mechanism during challenges such as that posed by the food price inflation. If governments should intervene, how should such intervention be perceived or negotiated in multilateral rules based trading environment? This paper might offer some insights to these questions. With Ethiopia as a WTO acceding country<sup>3</sup>, would Ethiopia be able to make use of such instruments if it accedes to the WTO? The findings of this research, therefore, might have some relevance to public policy concerning the ongoing negotiation by helping the Ethiopian negotiators to know some of the areas that are important when it comes to the useful question of policy space.

The rest of this paper is organized as follows. The second section discusses state of food price inflation in Ethiopia and some remedies taken so far. The third section presents a brief description of the methodology used. The fourth section discusses simulation results while the final section draws conclusions and policy implication of results of the study.

### **Food Price Inflation and government responses in Ethiopia**

As it has been explained earlier, sky rocketing food prices have been at the center of policy debates and pose challenges to policy makers. In the past two three years

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<sup>3</sup> Ethiopia requested for WTO accession on 13 January 2003 and General Council established a working Party on 10 February 2003. The on-going negotiation on WTO accession is clear evidence about the country's status of opening up its economy.

World food prices reached the highest ever in history. For instance, according to Ulimwengu, Workneh & Paulos (2009), the price of wheat has more than tripled in the world market while maize prices have more than doubled. Price of rice has also jumped to its record level.

Different factors have been cited as responsible for the soaring food prices. Increase in the production of biofuels, rapid economic growth in most developing countries and population pressure are among them.

Studies show that the Ethiopian case is even worse as food price index has been always higher since 2004 than the world index and has something to do with the rise in the world oil prices (see Figure 1). It should be noted that even when the world oil price dropped in September 2006 and June 2007, the Ethiopian food price index remains rising.

Food price inflation in general has shown an increasing trend since 2004(Figure 2). Accordingly, food price inflation in Ethiopia has increased from its 3.4 level in 2004 to its highest ever at the end of 2008.

It should be considered that cereals are dominant in Ethiopia taking the lion's share of household budget and food price inflation mainly comes from rise in price of cereals. Hence, it is expected that from welfare point of view compensation or loss due to price increase is much higher for cereals than for other food items (Ulimwengu, Workneh & Paulos, 2009). As the most vulnerable social group in Ethiopia highly depend on cereal consumption, in response to soaring food prices there seems to be a consensus for implementation of expansion of social safety net programs that target this group (von Braun, et al., 2008). In general, increasing food prices present a

difficult policy challenges for governments. Below we discuss some of the responses from the Ethiopian government in mitigating food price increase.

Bearing in mind that food takes about 60 percent of the consumer price index (CSA, 2009), and food price inflation is higher than the non-food price inflation, policy makers have focused on stabilizing food prices. One attempt in response to the challenges posed by soaring food price inflation was subsidizing wheat price by shifting resources, which already used in fuel price subsidy motivated by the sudden decline in the oil price in international market. A subsidized wheat supply of 25kg every month for low-income urban dwellers was introduced in March 2007. The subsidized price of wheat is about 350 birr<sup>4</sup> per quintal (100 kg) while the market price of domestic wheat was around 750 birr per quintal. This coupled with the reduction in domestic taxes on grains expected to result in a further decline in price.

According to the market report of World Food Program (2008), in October 2008 prices of local grains declined in most markets across the country, mainly due to supply of new harvests. And food assistance interventions and the government's urban price stabilization program also considered as factors for the decreasing prices. A study by Woldie and Siddig (2009) has indeed confirmed that price of wheat for instance, falls following a government intervention through wheat price subsidy. However, the price level is still very high as compared to the same period last year. For instance, compared to October 2007, the price is higher by 101 percent for maize; 94 percent for wheat and 137 percent for sorghum.

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<sup>4</sup> Birr is Ethiopian currency and 1 USD = 11 birr in March 2009.

Apart from the above policy responses the government has also raised the cash wage rate of the largest cash-for-work program by 33% (World Bank, 2008) in a way to increase the purchasing power of the poor.

Ethiopia has also banned the export of grains for an indefinite period of time in a way to stabilize the domestic price of grains. There are no studies however on the likely impact of such trade restriction and embargoes and whether or not such actions indeed reduced domestic prices and improved welfare. To this end, the current study sets forth the analysis of the impact of such restrictions.

The government, apart from the fiscal and trade policies, has also considered a monetary policy measure by increasing reserve requirements from 5 to 10 percent. A banking system in which commercial banks having already excess reserves, it is less likely that such monetary measures indeed responded to the price surge. In this paper we focus on export embargoes. Looking at the impact of reduction on domestic taxes and an increase in the reserve requirement is beyond this paper and are not discussed.

## **Methodology**

The current study is entirely based on the model of the Global Trade Analysis Project (GTAP) and the New African database. GTAP was established in 1992 at Purdue University, USA. The main objectives of which were to combine research efforts of many international experts in quantitative policy modeling and to lower entry costs for researchers who are willing to conduct economy-wide analysis of international economic issues given the fact that the start-up costs for model development, data collection and calibration are very high for complex multi-sector, multi-region models (Hertel, 1997).

The global CGE modeling framework of the GTAP, is the best possible way for the ex ante analysis of the economic and trade consequences of comprehensive multilateral or bilateral trade agreements (Hertel, 1997). The GTAP model is a comparative static, global CGE model based on neoclassical theories. The GTAP model is a linearized model, using a common global database for the CGE analysis. It assumes perfect competition in all markets, constant returns to scale in all production and trade activities, and profit and utility maximizing behavior of firms and households respectively, and it is solved using GEMPACK software (Harrison & Pearson, 1996).

The GTAP Africa database is a special version based on GTAP 6 database. It includes data for 39 regions (30 African regions and 9 other aggregated regions) and the 57 sectors of the GTAP 6 Database. Cameroon, Cote d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, and Sudan are the new IO tables that have been contributed by African economists. Further, the missing bi-lateral trade flows for the African regions have been econometrically estimated, using the gravity approach, which is documented in Estimation of Missing Intra-African Trade by Villoria (2008).

The GTAP African database is helpful in assisting African policy makers in their way to quantitatively assess different trade agreements currently under negotiation. A more specific and disaggregated policy analysis in Africa was constrained by data limitation and this special database expected to loosen such constraints. Hence, the current study is also appealing from methodological grounds as the paper makes use

of the new African database, which requires a lot of interrogation in order to build confidence in it, even as it complements the normal GTAP database.

Finally, based on the above methodology and data structure below an attempt is made to simulate a policy scenario for Ethiopia. It tries to simulate one of the recent policies adopted by the Ethiopian government. It assumes that no exports of cereals exist from Ethiopia. To do so, the GTAP standard model, which endogenize export flows, should be modified. Therefore, in this paper the closure is changed in three steps:

**Step1: *Changes in the CMFSTART file*** to make possible separating Ethiopia from other regions. The resulting code in the new *smstart* file is shown in the box below.

```
This is the default CMFSTART file which RunGTAP uses when
! a version has no CMFSTART file of its own
!-----
xset eth # ethiopia-cntry # (ethiopia);
xsubset eth is subset of REG;
xset oth_reg #other regions# = REG - eth;
!-----
iz1 = no ;
NDS = yes; ! no displays
Extrapolation accuracy file = YES ;
CPU = yes;
```

**Step2: *swapping the quantities exported***, which is endogenous variable in the model with the corresponding export taxes. This will allow exogenizing the exported quantities from Ethiopia to other regions. Accordingly, the modified closure is shown in the following box.

```

! closure for baning grains and wheat expoers in Ethiopia
Exogenous
  Pop
  psaveslack pfactwld
  profitslack incomeslack endwslack
  cgdslack tradslack
  ams atm atf ats atd
  aosec aoreg avasec avareg
  afcom afsec afreg afecom afesec afereg
  Aoall afall afeall
  au dppriv dpgov dpsave
  to tp tm tms tx txs
  qo(ENDW_COMM,REG) ;
Rest Endogenous ;
swap txs("GrainsCrops", "Ethiopia", oth_REG) = qxs("GrainsCrops", "Ethiopia", oth_REG);
swap txs("Wheat", "Ethiopia", oth_REG) = qxs("Wheat", "Ethiopia", oth_REG);

```

**Step3: the shock:** Cereals exports are assumed to be reduced by 99%. This rationale of 99% instead of 100% is realistic because it leaves a room for smuggling and other means of moving these commodities from Ethiopia to other countries (Siddig, 2009).

### Simulation Results and Discussions

This section reports simulation results that show the overall effect of banning export of cereals and particularly due emphasis is given on its implication to the recent food price surges.

#### Overall impact

The overall impact of the export ban in Ethiopia is summarized in Table 1 below. To this end, following such measures, trade balance is likely to increase. This can be explained by the fact that the simulation result has shown following the export ban exports of other regions to Ethiopia, have declined and at the same time export of other goods from Ethiopia have increased following such restrictions on cereals and grains. One explanation could be the meager nature of the contribution of the cereal

and grain sector on the Ethiopia's external trade and hence it is likely that there will not be a huge decline in exports that could have in turn led to a trade deficit.

Following the export ban, the simulation result shows that GDP in terms of quantity index will negatively be affected by 2.5 percent. GDP in terms of value index will also be decline by about 9.5 percent.

Both volume of merchandise imports and exports will decline following such embargoes. Volume of merchandise imports declines by about 8 percent while the volume of merchandise exports declines by more than 10 percent.

The policy has also a devastating impact on household income and household consumption expenditure. To this end, both household income and household consumption expenditure are likely to decline by 10 percent.

The overall welfare impact of such policy as observed by the equivalent variation shows that the policy result in a decline in a welfare by 148 millions of US dollar. It should be noted that export bans are undertaken as an effort to redistribute welfare to the consumer. However, such an intervention results in an aggregate welfare loss. The result is not surprising as export ban result in price distortion. Following an export ban the availability of the product to domestic consumers will increase and domestic prices then decrease to absorb the increased availability, leading to price distortion (in our simulation result it has been observed that prices in deed fall following the export ban see discussion below and table 2). The degree of the welfare loss and price distortion particularly depends on the price elasticity of the product (Mitra and Josling, 2009). As grains and cereals are inelastic staple goods and require a greater

price decrease to absorb the domestic supply, it is expected that export ban will result in a greater welfare loss.

### **Impact on Price, household demand and domestic sales**

Table 2 summarizes the effect of cereal and grain export ban on price, domestic sales, and household demand of different goods and services. As the major objective of this paper is to see whether an export ban likely to have a stabilizing impact on prices, due emphasis is given to see such effects. The simulation result reveals that private consumption price in general, private domestic consumption price, and aggregate imports market price for wheat and other grain and cereals fall following the export embargo. Accordingly, export ban on wheat and other cereal crops likely to lead a fall in household consumption price by 7 percent for wheat and by about 13 percent for other cereal and grains. The fall in price is huge for imports, may be because apart from the increase in domestic supply due to the export ban, a huge amount of imported wheat has been supplied by the government as part of the price stabilization effort. According to Fortune (2008) the government has recently imported about 300,000 tons of wheat and distributed it for 350 birr per 100 kg in response to the soaring food prices. It is reported that when the market price of domestic wheat was about 750 birr per 100 kg, the market price of imported wheat gone down for 560 birr per 100 kg mainly because the quality of the imported wheat was lower compared to the domestic ones. This can be explained by a fall in household demand for imported wheat and other cereals and grains while there is a significant rise in the demand for domestic wheat and other grains. Regarding domestic sales, the simulation result reveals that wheat sales are likely to increase by more than 15 percent while there is a

slight decrease for domestic sales of other cereals and grains. This may be because wheat is not only consumed by households but also used as an intermediate input for bakeries and food processing industries. Hence, following a slight decrease in wheat price will likely lead to a huge domestic demand and sale of this crop.

The impact of the export ban on other sectors is also presented in Table 2. The simulation result reveals that prices of other goods and services in other sectors are also likely to fall. This is not surprising as some sectors enjoy from the decline of the price of cereals and grains through its impact on their cost of production.

### **Impact on Domestic Output**

It is documented in the international economics literature that trade distortions likely to affect both composition and allocation of domestic output in production. To this end, the impact of the export ban on domestic output is portrayed in Figure 3. The result reveals that wheat domestic production will likely to raise by about 16 percent while other cereals and grains likely to fall in the composition of domestic output. The oil seed sector is the most significantly affected sector in positively responding for such an export embargoes on competing sectors. As oil seeds are the strategic export of Ethiopia, it is likely that a ban in export of other cereals will be an incentive to increase export of oil seeds and hence domestic production is expected to increase. In general, the policy has a little impact on the composition of other sectors on domestic output.

## **Concluding Remarks**

In this paper, an attempt has been made using the new GTAP African database for Ethiopia to show the likely impact of a recent export embargo on cereals and grains in a way to stabilize soaring food prices. The study sheds some light on the role of government intervention in food price stabilization rather than letting the market sort out some of the challenges posed by the food price inflation. As Ethiopia, requesting for a WTO accession, the paper may have also some policy implications on how should such intervention be perceived or negotiated in multilateral rules based trading environment where there are no rooms for trade restrictions even in situations like this. To this end, we look, particularly, whether such policies would indeed stabilize domestic prices or not. Regarding the impact on prices, the simulation result tells us that prices are likely to fall. At macro level, the result reveals trade balance will not be decline following such actions. However, it has been shown that in terms of overall welfare the policy has a devastating impact as the country will likely to lose welfare equivalent of \$ 148 million.

However, with the growing concern on WTO and other regional negotiations, banning exports in a way to curb a soaring food prices may not be available as a first best option and policy makers should consider alternative measures in stabilizing food prices. The result may also be different if we consider a household level CGE analysis Targeted cash transfers to vulnerable groups usually considered as first best options as these support the purchasing power of the poor without distorting domestic incentives to produce more food, and without reducing the incomes of poor food net sellers from a reduced price following an increase in domestic supply. Future research therefore,

should focus on the impact of price stabilization policies on specific household groups, which can only be done using a household level analysis. Research also needed to evaluate the efficacy of alternative intervention in curbing soaring food prices in particular and improving welfare in general. In doing so, the following questions should be answered. What would be the likely impact of reducing tariffs and other taxes on key staples vis-à-vis direct subsidy? How should such intervention be perceived or negotiated in a multilateral rules based trading environment?

## References

- Central Statistical Agency of Ethiopia. (2009). *Country and Regional Level Consumer Price Indices: for the Month of Januray 2009*. Information No. 16, Addis Ababa.
- FAO (2008). *Soaring Food Prices: Facts, Perspectives, Impacts and Actions Required*. HLC/08/INF/1.
- Fortune. (2008). *Soft Heart Hard Head*. Vol.9 No. 441. October 12 edition, Addis Ababa.
- Harrison, W Jill & Pearson, K R. (1996). Computing Solutions for Large General Equilibrium Models Using GEMPACK, *Computational Economics*, vol. 9(2): 83-127.
- Hertel, T.W. (1997). *Global Trade Analysis: Modeling and Applications*, Cambridge University Press.
- International Monetary Fund ( 2008a). *Food and Fuel Prices-Recent developments, Macroeconomic Impact, and Policy Responses*. Washington DC:  
<http://www.imf.org/external/np/pp/eng/2008/091908.pdf>
- International Monetary Fund.(2008b). *Fuel and Food Price Subsidies: Issues and Reform Options*, Washington DC.  
<http://www.imf.org/external/np/pp/eng/2008/090808a.pdf>
- Mitra, S. and Josling T. (2009). Agricultural Export Restrictions: Welfare implications and Trade Disciplines. *IPC Position Paper*. International Food & Agricultural Trade Policy Council.
- Siddig, Khalid (2009) *Macroeconomy and Agriculture in Sudan: Analysis of Trade Policies, External Shocks, and Economic Bans in a Computable General*

Equilibrium Approach. PhD thesis, Justus Liebig University of Giessen, Germany forthcoming.

Ulimwengu, J., Workneh, S., & Paulos, Z. (2009). Impact of Soaring Food Price in Ethiopia: Does Location Matter? *IFPRI Discussion paper 00846*. Washington D.C: International Food Policy Research Institute.

Villoria. N. (2008). Estimation of Missing Intra-African Trade: *GTAP Research Memorandum No. 12*, Purdue University.

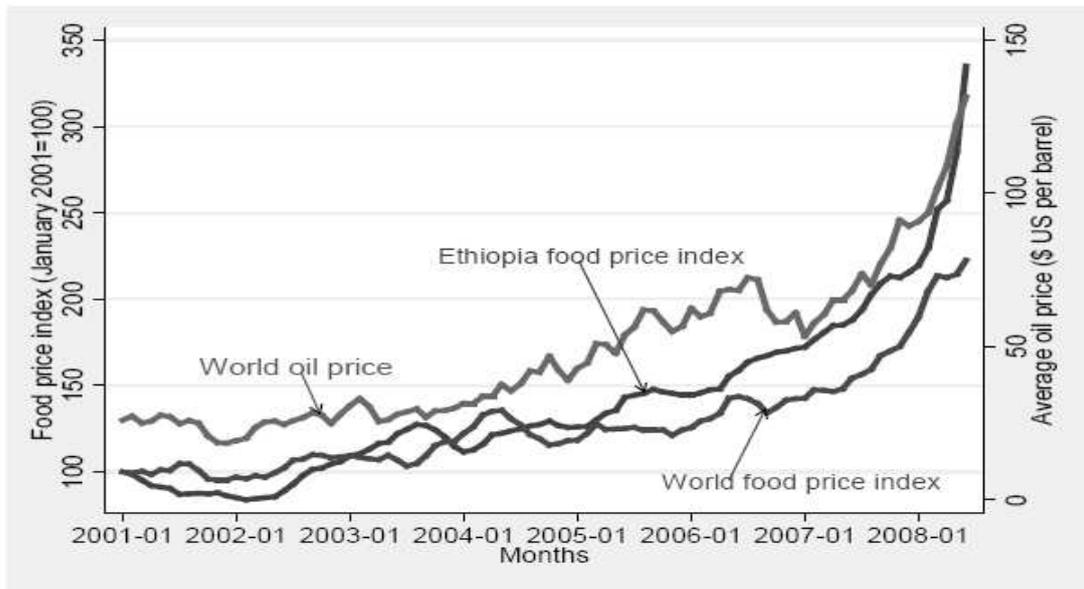
von Braun, J., Ahmed, A., Asenso-Okyere, K., Fan, S., Gulati, A., Hoddingott, J., et al. (2008). High Food Prices: The What, Who, and How of Proposed Policy Actions. *Policy Brief*. International Food Policy Research Institute, Washington.

Woldie, Getachew A., and Siddig, Khalid (2009). Do Subsidies Matter in Response to Soaring Food Prices? Evidences from Ethiopia. Selected paper for the 12th annual conference on Global Economic Analysis, Santiago, Chile (June 2009).

World Bank. (2008). *Rising food prices: Policy options and World Bank response*. A note

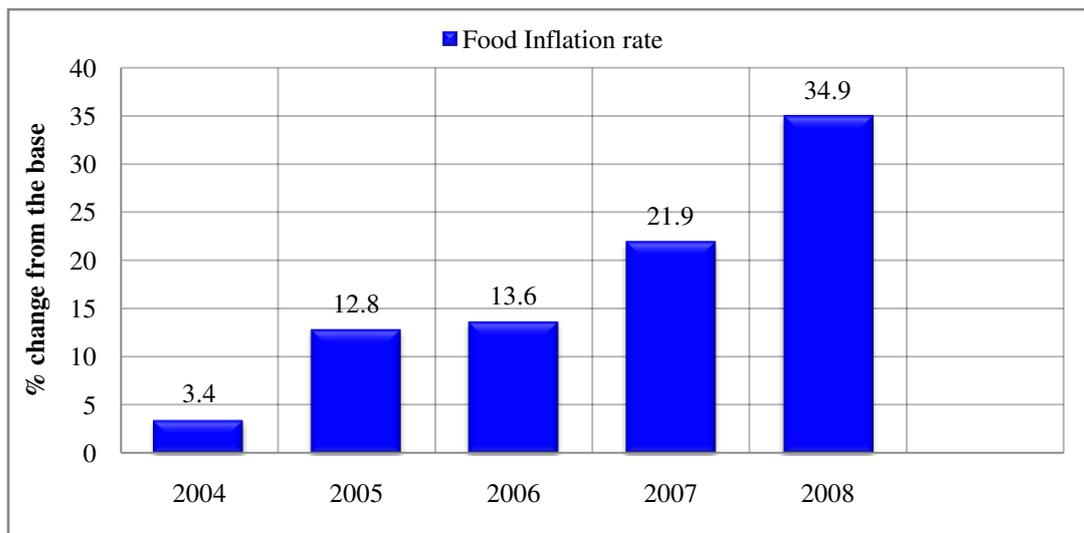
[http://siteresources.worldbank.org/NEWS/Resources/risingfoodprices\\_backgroundnote\\_apr08.pdf](http://siteresources.worldbank.org/NEWS/Resources/risingfoodprices_backgroundnote_apr08.pdf).

World Food Program.(2008). *Ethiopia Market Watch*, October Edition



**Figure 1: Monthly trend of food price indices and World oil price (January 2001-June 2008)**

Source: Ulimwengu, Workneh & Paulos (2009)



**Figure 2: Food price inflation in Ethiopia, end-of period rates (%)**

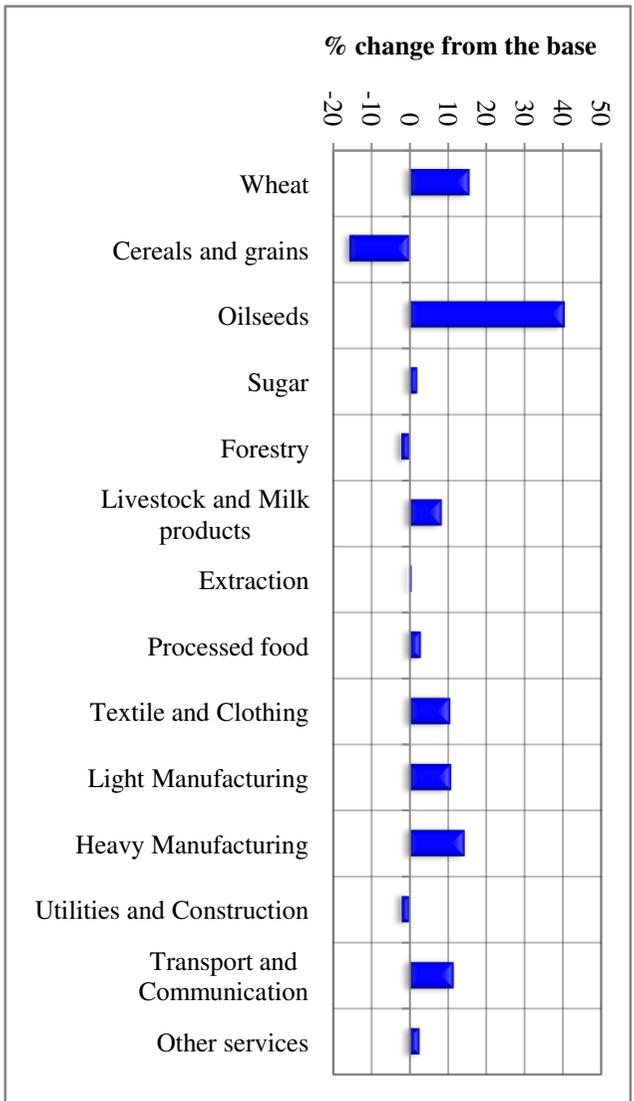
Source: Central Statistics Agency (2009)

**Table 1: Overall effects of an export ban of cereals and grains in Ethiopia**

<b>Variables</b>	<b>Simulation result</b>
Trade balance	70.35
GDP quantity index	-2.52
Volume of merchandise imports	-7.84
Volume of merchandise exports	-10.34
GDP value index	-9.47
Value of merchandise imports	-7.84
Value of merchandise exports	-6.95
Household income	-10
Household consumption expenditure	-9.86
Equivalent variation (EV)	-148.47

**Table 2: Effects on prices and household demand and domestic sales**

Sectors	Private consumption price	Private domestic consumption price	Domestic sales	Aggregate imports market price	Household demand	Household demand (domestic)	Household demand (imports)
Wheat	-6.57	-9.41	15.49	-25.52	-0.3	14.39	-26.32
Cereals and grains	-12.47	-12.74	-0.53	-28.38	-0.3	0.47	-28.37
Oilseeds	-7.81	-8.96	23.21	-9.34	-0.3	2.81	-18.31
Sugar	-6.42	-6.55	0.68	-16.4	-0.33	0.11	-16.76
Forestry	-5.44	-5.45	-2.74	-16.42	-3.86	-3.84	-16.43
Livestock and Milk products	-10.41	-10.43	-1.83	-25.09	-5.83	-5.74	-33.53
Extraction	-3.88	-3.92	-2.89	-10.21	-5.98	-5.77	-24.32
Processed food	-5.24	-6.43	2.45	-10.72	-0.5	2.09	-11.12
Textile and Clothing	-4.52	-6.45	8.07	-14.84	-0.52	7.28	-16.36
Light Manufacturing	-3.97	-5.5	7.06	-9.52	-2.96	2.38	-16.32
Heavy Manufacturing	-1.49	-4.57	10.11	-4.34	-4.24	6.5	-9.69
Utilities and Construction	-4.15	-4.16	-2.19	-11.59	-9.99	-9.97	-18.23
Transport and Communication	-3.98	-5.53	7.25	-6.79	-5.78	-2.51	-13.51
Other services	-5.3	-5.88	1.39	-5.9	-0.83	0.46	-10.68



**Figure 3: Effects of Export bans on domestic output in Ethiopia**