MPRA

Munich Personal RePEc Archive

Do subsidies matter in food price stabilization? Evidences from Ethiopia in a computable general equilibrium framework

Getachew Abebe Woldie and Khalid Siddig

Justus Liebig University of Giessen

31. May 2009

Do subsidies matter in food price stabilization? Evidences from Ethiopia in a computable general equilibrium framework

Getachew Abebe Woldie[1] and Khalid Siddig[2]

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, policy makers have considered various measures. 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 used the money to combat rising grain prices. Using the standard GTAP model and the recent GTAP Africa database, this paper simulates the overall implication of 5 and 10 percent increase of subsidy on wheat. Regarding the impact on prices, the simulation result tells us that prices have indeed fall. At macro level, the result reveals subsidy on wheat leads to a decline in the overall trade balance. In terms of welfare, the intervention is likely to have a positive impact.

Key words*: Food policy, price stabilization, WTO, Ethiopia, GTAP*

JEL Classification: C68, E64, F17, Q18,R13

1. INTRODUCTION

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

[1] Department of Economics, Arba Minch University, P.O.Box 21,Arba Minch, Ethiopia, E-mail Getachew.A.Woldie@gmail.com

[2] Department of Agriculture and Food Policy, University of Hohenheim, Stuttgart , Germany, E-mail khalidhasiddig@yahoo.com

1

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 were 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.

With the growing debate on WTO accession issues in so many developing countries including Ethiopia, policy makers also face challenges in making use of such instruments as acceding to the WTO means no 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, etal., 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. 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 eliminating 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.

Theoretically, subsidies (particularly price subsidies) are primarily used to either alter consumption and production patterns by changing the relative prices both consumers and producers face or to affect resource allocation and distribution for achieving equity. However it should be considered when one think of subsidies that there are some costs both in terms of high fiscal costs and the spillover effects onto prices and quantities in other markets (IMF, 2008b). In different countries following the recent sharp increase in food prices, subsidies are coming under renewed scrutiny, which requires investigation of the overall impacts to the economy. According to IMF (2008a) food inflation in developing countries which is already 10 percent higher than the advanced economies would have been higher in the absence of food subsidies.

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 responses 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 country3, 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.

---

[3] 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.

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.

2. 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 World food prices reached the highest ever in history. According to Ulimwengu et al. (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.
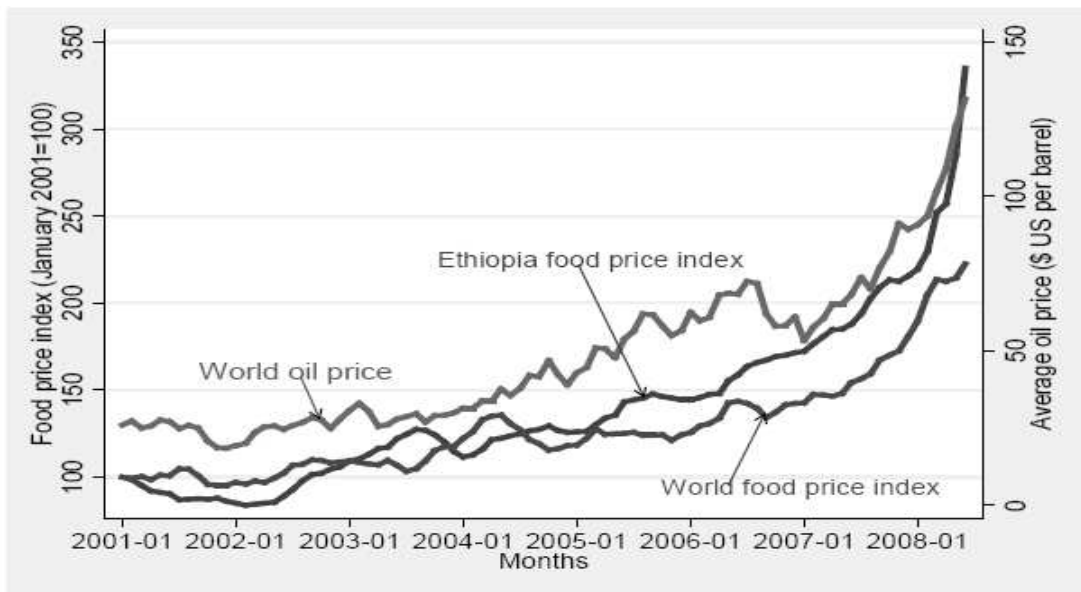

Figure 1: Monthly trend of food price indices and World oil price (January 2001-June 2008)

Source: Ulimwengu, Workneh & Paulos (2009)

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 of the prices of oil in the world market (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.
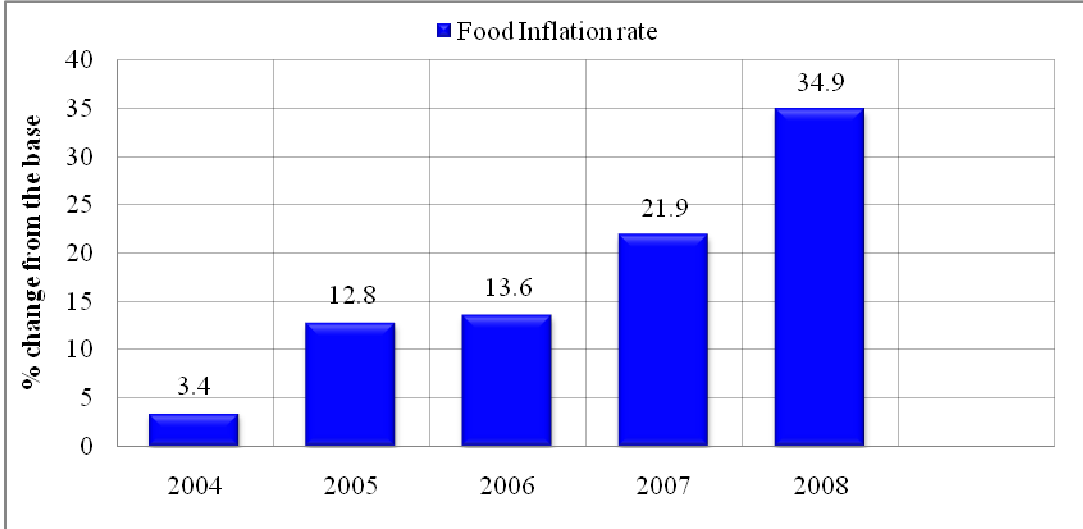
Figure 2: Food price inflation in Ethiopia, end-of period rates (%)

Source: Central Statistics Agency (2009)

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 et al., 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 presnt 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 birr4 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. 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.

Apart from the above policy responses the government has also has 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.

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 the overall impact of wheat subsidy. Looking at the impact of the export ban, and a reduction on domestic taxes and an increase in the reserve requirement is beyond this paper and hence not discussed.

3. METHODOLOGY

The current study is entirely based on 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).

---

[4] Birr is Ethiopian currency and 1 USD = 13 birr in March 2010.

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 assess quantitatively 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 an anonymous reviewer puts:

> "*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. To see an application of the database is welcome and would be a useful contribution to raising the awareness of using this kind of data to deal with policy questions*"

Finally, based on the above methodology and data structure below an attempt is made to simulate a policy scenario for Ethiopia.

4. SIMULATION RESULTS AND DISCUSSIONS

This section reports simulation results that show the overall effect of a 5 and 10 percent subsidy on wheat and particularly due emphasis is given on its implication to the recent food price surges.

4.1 Overall impact

The overall impact of a 5% and 10% subsidy on wheat in Ethiopia is summarized in Table 1 below. To this end, following a 5 percent and 10 percent subsidy on wheat, which is the major cereal in Ethiopia's household consumption and an input for most food processing factories, trade balance is negatively affected. Trade balance deteriorates by 1.97 percent for a 5 percent subsidy and decline by 3.65 percent following a 10 percent subsidy rate.

Table 1: Overall effects of a 5%% and 10 % wheat subsidy in Ethiopia

	Scenarios	
Variables	**5%**	**10%**
Trade balance	-1.97	-3.65
GDP quantity index	0	-0.01
Volume of merchandise imports	-0.24	-0.47
Volume of merchandise exports	-0.8	-1.52
GDP value index	0.1	0.17
Value of merchandise imports	-0.24	-0.47
Value of merchandise exports	-0.62	-1.18
Household income	0.1	0.18
Household consumption expenditure	0.08	0.15
Equivalent variation (EV)	2.45	4.18

When we look at the trade balance impact at sectoral level, it can be observed from Figure 3 below that wheat trade balance has been improved in both scenario cases.

As expected trade balances for other cereals other than wheat has significantly deteriorated following the subsidy on wheat. The livestock and milk products, heavy and light manufacturing, transport and communication, and other services sectors have also shown a slight decline in the their respective trade balances. It should be apparent that commodities' balance of trade reflects the direction of producers' preferences either towards the local market or to the international market given the comparative advantage that each sector has and its ability to compete. In this regard, the improvement in the trade balance of wheat clearly

shows the preference of consumers towards the domestic wheat than the imported ones.
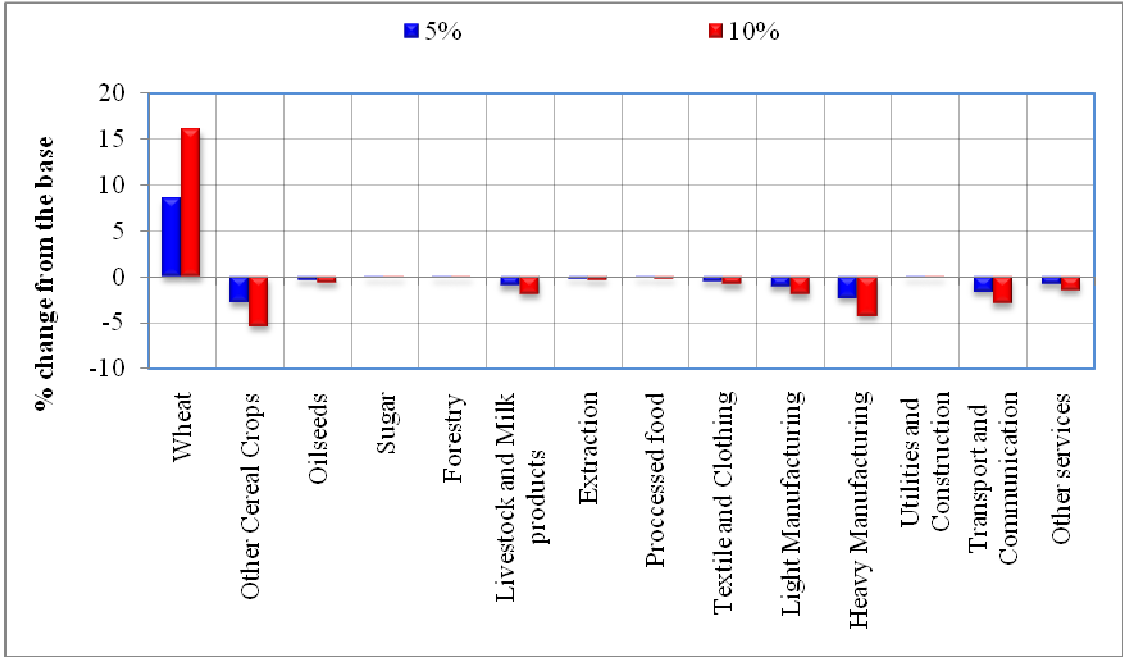
Figure 3: Effects of wheat subsidy on trade balance

GDP in terms of quantity index is not affected in the first scenario and has shown 0.01 percent decline following the second scenario. However, GDP in terms of value index has risen by about 0.1 percent in both cases.

Both volume of merchandise imports and exports have declined in both scenarios. Volume of merchandise imports have decline by 0.24 and 0.47 percent following a 5 percent and 10 percent subsidy on wheat respectively. As expected, household consumption expenditure has increased in both cases.

The overall welfare impact of such policy as observed by the equivalent variation shows that the policy result in an increase in a welfare by 2.45 millions of US dollar for a 5 percent subsidy and even increases to 4.18 millions of US dollar for a 10 percent subsidy.

4.2 Impact on Price, household demand and domestic sales

Table 2 in the appendix summarizes the effect of a 5% and 10 % wheat subsidy on price, domestic sales, and household demand. The simulation result reveals that in both scenarios private consumption price in general, private domestic consumption price, and aggregate imports market price for wheat all have fallen following the subsidy on wheat. The fall in price is huge for imports, may be because the government has supplied huge amount of imported wheat. 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. Following a 5% and 10 % subsidy on wheat household demand for imported wheat has significantly fallen by 11.62 and 21.94 percent respectively.

Household demand for domestic wheat has indeed increase by about 6.3 percent following a 5 percent subsidy on wheat and by about 12.3 percent for a 10 percent increase in wheat subsidy. Domestic sales have also increased by 6. 5 and 12.5 percent for a 5 and 10 percent increase in wheat subsidy respectively.

As expected price of other grain crops have shown a slight increase following the wheat subsidy. However, household demand for these commodities did not change significantly in both scenario cases.

The impact of the subsidy on other sectors is also presented in Table 2. Despite there are positive signs on price in the other sectors in general, the values are not more than 0.2 percent and hence not discussed.

4.3 Impact on Domestic Output

As it was said earlier, subsidy is expected to affect both composition and allocation of domestic output in production. To this end, the impact of wheat subsidy on domestic output is portrayed in Figure 4.

As expected domestic wheat output significantly and positively responded to wheat subsidy in both scenario cases. Even though there are some contractions in the output of other sectors, most of them little affected following the subsidy. There is only about 2 percent decline in domestic output of oilseeds may be because there is some resource competition between the wheat and oil seeds sectors.
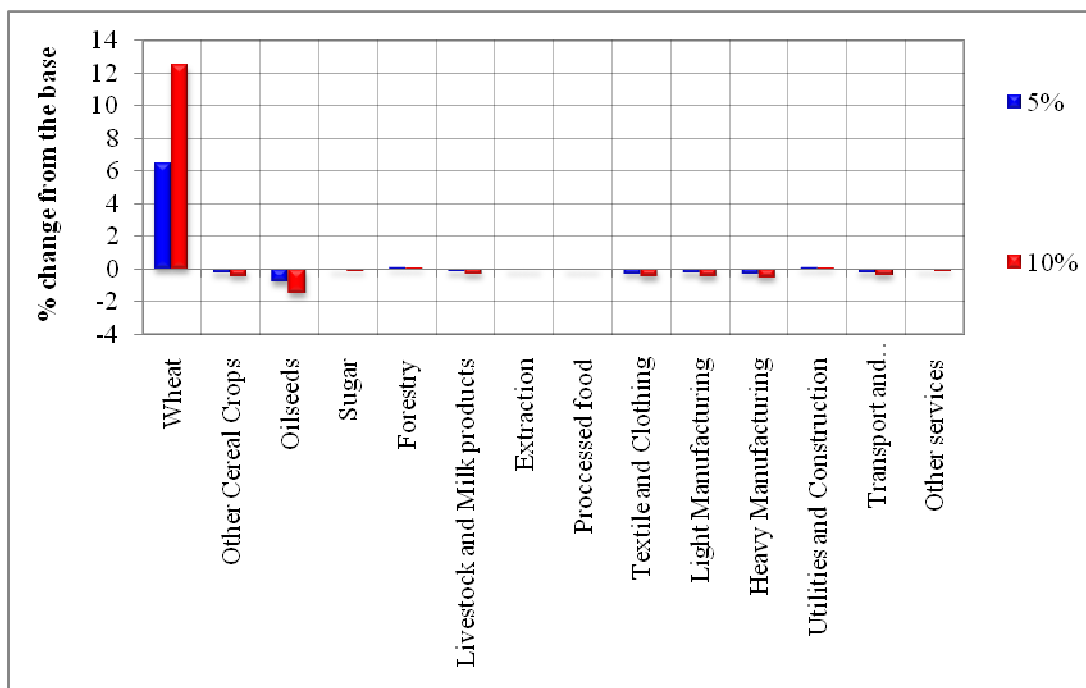
Figure 4: Effects of wheat subsidy on domestic output

5. CONCLUDING REMARKS

In this paper, an effort has been made to show the likely impact of subsidies in curbing soaring food prices using the new GTAP African database for Ethiopia. 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. To this end, we simulate the overall implication of 5 percent and 10 percent increase in subsidy on wheat. Regarding the impact on prices, the simulation result tells us that prices have indeed fall. At macro level, the result reveals subsidy on wheat leads to a decline in the overall trade balance. In terms of welfare, the intervention has been found to have positive impact.

However, with the growing concern on WTO and other regional negotiations, subsidy 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 as the subsidy we considered here does not differentiate the vulnerable and needy people. 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. Future research therefore, should focus on the

impact of price stabilization policies on specific household groups, which can only done using a household level analysis. Research also needed to evaluate the efficacy of alternative intervention in curbing soaring food price 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-á-vis direct subsidy? What would be the implication of an export ban on key staples in a soaring price situation? How should such intervention be perceived or negotiated in the context 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.

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

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

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

World Bank. (2008). Rising food prices:Policy options and World Bank response. A note http://siteresources.worldbank.org/NEWS/Resources/risingfoodprices_backgroundnote_apr08.pdf.

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

Table 2: Effects of Wheat Subsidy on price, domestic sales and household demand

Sectors	Private consumption price		Private domestic consumption price		Domestic sales		Aggregate imports market price		Household demand		Household demand for domestic		Household demand for imports	
	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%	5%	10%
Wheat	-2.74	-5.42	-4.09	-7.85	6.49	12.5	-11.49	-21.71	0.01	0.01	6.39	12.3	-11.62	-21.94
Other cereals	0.28	0.54	0.29	0.55	-0.03	-0.07	0.69	1.34	0.01	0.01	-0.01	-0.02	0.7	1.35
Oilseeds	0.2	0.38	0.23	0.44	-0.45	-0.86	0.28	0.53	0.01	0.01	-0.07	-0.14	0.49	0.94
Sugar	0.17	0.33	0.18	0.33	-0.02	-0.03	0.47	0.89	0.01	0.01	0	-0.01	0.47	0.9
Forestry	0.16	0.29	0.16	0.29	0.06	0.11	0.46	0.84	0.07	0.12	0.07	0.12	0.46	0.84
Livestock and Milk products	0.27	0.51	0.27	0.51	0.02	0.02	0.71	1.35	0.11	0.18	0.1	0.18	0.93	1.77
Extraction	0.10	0.17	0.10	0.17	0.05	0.08	0.28	0.49	0.11	0.19	0.1	0.18	0.62	1.10
Processed food	0.04	0.08	0.06	0.10	-0.02	-0.03	0.10	0.16	0.01	0.02	-0.01	-0.02	0.1	0.18
Textile and Clothing	0.11	0.21	0.16	0.31	-0.2	-0.38	0.38	0.72	0.01	0.02	-0.19	-0.35	0.42	0.79
Light Manufacturing	0.1	0.19	0.14	0.26	-0.16	-0.32	0.25	0.47	0.05	0.08	-0.09	-0.18	0.38	0.7
Heavy Manufacturing	0.04	0.07	0.12	0.22	-0.18	-0.34	0.18	0.33	0.08	0.13	-0.21	-0.4	0.2	0.37
Utilities and Construction	0.11	0.21	0.11	0.21	0.06	0.11	0.33	0.61	0.08	0.12	0.08	0.12	0.32	0.57
Transport and Communication	0.10	0.19	0.14	0.26	-0.13	-0.25	0.22	0.4	0.11	0.18	0.03	0.03	0.29	0.54
Other services	0.10	0.19	0.12	0.22	-0.02	-0.04	0.11	0.19	0.02	0.03	-0.01	-0.02	0.21	0.40