IMPACT OF THE GLOBAL FOOD PRICE SHOCK
ON THE POOR IN EGYPT

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Abstract

The government of Egypt (GOE) has adopted a set of policy responses to mitigate the negative impact of the food price surge, particularly on the poor. Policy interventions encompassed *price oriented policies* to reduce the impact of the global food price shock on domestic prices through increasing consumer food subsidies and better targeting them towards those who need them most, lowering tariffs and imposing export bans; *income oriented policies* to compensate the most vulnerable groups for income loss through cash transfers and food ration cards; and a number of *supply oriented policies* to induce an increase in the production of agricultural products, mainly wheat. The purpose of this study is to assess the impact of global food price changes on Egypt's macroeconomic performance, poverty levels and income distribution and evaluate the effects of different policy options that the GOE is likely to implement in order to protect the most vulnerable segments of the population without jeopardizing the fiscal balances. Following an analysis of Egypt's food policy, the study investigates the policy's effectiveness in alleviating poverty and assesses its impact on the fiscal position. It then assesses the impact of soaring world food prices on Egypt's macroeconomic performance under different scenarios of policy interventions, followed by estimating the effect of the global food price shock on poverty and income distribution in Egypt under the same scenarios of policy interventions.

ملخص

في سعيها لمواجهة أزمة زيادة أسعار الغذاء والحد من تأثيرها السلبي على الفقراء، قامت الحكومة المصرية بتبني طائفة من السياسات تضمنت ثلاث مجموعات، الأولى *مرتبطة بالأسعار* للحد من تأثير صدمة الأسعار العالمية للغذاء على الأسعار المحلية من خلال زيادة دعم الغذاء وتحسين أساليب توجيه هذا الدعم لمستحقيه، وتخفيض معدلات التعريفة الجمركية وفرض حظر على صادرات الغذاء؛ أما الثانية *فتتعلق بالدخل* وتهدف إلى تعويض الفئات الأكثر تهميشا عن الدخل الضائع من خلال التحويلات النقدية والبطاقات التموينية؛ في حين تضمنت المجموعة الثالثة *سياسات مرتبطة بالعرض* تساعد على زيادة إنتاج المحاصيل الزراعية، وخاصة القمح. وفي هذا الإطار، تهدف الدراسة إلى تقدير آثار التغيرات في الأسعار العالمية للغذاء على الأداء الاقتصادي الكلي في مصر، ومستويات الفقر وتوزيع الدخل، وكذلك إلى تقييم آثار مختلف خيارات السياسات التي قد تتخذها الحكومة لحماية الفئات الأكثر ضعفا من السكان دون تعريض الموازنة العامة للخطر. ومن الناحية التنظيمية، تبدأ هذه الدراسة بتحليل السياسة الغذائية في مصر، ثم تقوم بتحليل فاعليتها في التخفيف من حدة الفقر وتقدير تأثيرها على الأوضاع المالية العامة. بعد ذلك تقوم الدراسة بتقدير تأثير ارتفاع الأسعار العالمية للغذاء على الأداء الاقتصادي الكلي في ظل سيناريوهات مختلفة للتدخل من خلال السياسات، يليه تقدير تأثير صدمة الأسعار العالمية للغذاء على الفقر وتوزيع الدخل في مصر في ظل ذات السيناريوهات.

1. INTRODUCTION

Global food prices increased drastically over the period July 2006–June 2008 in nominal and real terms.[1] In June 2008, the prices of basic foods on international markets reached their highest levels for 30 years and their volatility approached record highs, threatening the food security of the poor worldwide.[2] Since then, prices have declined, driven by the financial crisis, emerging world recession, falling oil prices and an appreciating US dollar. However, they are still high by recent historical standards and are still above their average of the last five years, implying that the recent price shock is of a more permanent nature. Even if prices become more moderate, they will not return to their previous levels (OECD-FAO 2009; World Bank 2009a; Von Braun 2008).[3]

Higher global food prices threaten economic, social and political stability in Egypt primarily through inflation, increasing the poverty rate from 19.6 percent in 2005 to 21.6 percent by June 2009 and weakening the fiscal balance by largely increasing the food subsidy bill (authors' calculations based on Egypt's Household Income, Expenditure and Consumption Survey (HIECS) 2008/2009). Hence, soaring global food prices have renewed attention to food security issues.[4]

The government of Egypt (GOE) has adopted a set of policy responses to mitigate the negative impact of the food price surge, particularly on the poor. Policy interventions encompassed *price oriented policies* to reduce the impact of the global food price shock on domestic prices through increasing consumer food subsidies and better targeting them towards those who need them most, lowering tariffs and imposing export bans; *income oriented policies* to compensate the most vulnerable groups for income loss through cash transfers and food ration cards; and a number of

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[1] Over the period July 2006-June 2008, global prices of rice, maize and wheat increased by 165 percent, 91 percent and 73 percent in nominal terms and by 148 percent, 79 percent and 62 percent in real terms (authors' calculations based on the IMF Commodity Price Database (2009a)). The IMF commodity price database is all in nominal US$ terms; a simple way of getting real price changes was by taking US Consumer Price Index from the October 2009 IMF World Economic Outlook database, which gave 2006-2008 US inflation rate at 6.8 percent (average consumer price index, 2000= 100).

[2] Volatility measures how much the price of a commodity fluctuates over a given time frame using the standard deviation of prices. Wide price fluctuations over a short period constitute "high volatility". In the first four months of 2008, volatility in wheat prices was twice the level of the previous year while rice price volatility was five times higher (FAO 2009a).

[3] In the past few months, the prices of major cereals have fallen by about 30 to 40 percent as a result of economic slowdown and favorable weather conditions, but they remain high compared with three years ago (IFPRI 2008). Real food commodity prices are forecast to be on average about 25 percent higher during 2009-2018 than over 1999-2007 and likely more volatile (World Bank 2009a).

[4] Food security prevails when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (WFP 1996; USAID 1992; Timmer 2000).

supply oriented policies to induce an increase in the production of agricultural products, mainly wheat.

The purpose of this paper is to assess the impact of global food price changes on Egypt's macroeconomic performance, poverty levels and income distribution and evaluate the effects of different policy options that the GOE is likely to implement in order to protect the most vulnerable segments of the population without jeopardizing the fiscal balances.

The structure of the paper is as follows: Section 2 provides an analysis of Egypt's food policy, investigates its effectiveness in alleviating poverty and assesses its impact on the fiscal position. Section 3 assesses the impact of soaring world food prices on Egypt's macroeconomic performance under different scenarios of policy interventions. Section 4 estimates the effect of the global food price shock on poverty and income distribution in Egypt under the same scenarios of policy interventions. Section 5 concludes.

2. EGYPT'S FOOD POLICY

The Egyptian economy is highly vulnerable to a global food price shock. The pass-through of world food prices to inflation and the cost of living in Egypt is strong. The country is a net food importer and relies heavily on costly consumer food subsidies. Policy interventions are needed to improve Egypt's food security.

2.1. Higher Global Food Prices Boost Inflation in Egypt

The link between international food prices in local currency (the Egyptian pound) and food prices in the Egyptian market depends on a number of factors, including exchange rate, transportation costs and border policies, as well as the structure of the food distribution system.

There is a strong relationship between the inflation of domestic food prices in Egypt and international food prices. According to International Monetary Fund estimates (IMF 2009b), changes in world commodity prices explain about 43 percent of the variation in headline inflation in Egypt, with world food prices playing a much larger role (39.8 percent) than fuel prices (3.3 percent). Based on World Bank estimates, the pass-through of international food prices to domestic food prices in Egypt ranges between 61 and 81 percent, with a median estimate of 64 percent. This is a significantly higher estimate than for the advanced economies or for other emerging economies reported by the International Monetary Fund's World Economic Outlook.

Soaring global food prices were reflected in escalating domestic food prices (which constitute almost half the consumer price index (CPI) basket), resulting in a higher cost of living (Figure 1)[5] as food absorbs 41.5 percent of total household expenditures and accounts for 54 percent of total expenditures of the poorest Egyptian households.[6]

Figure 1. Percentage Changes in Egypt's Consumer Price Index and Food Price Index over the Period June 2006-September 2009
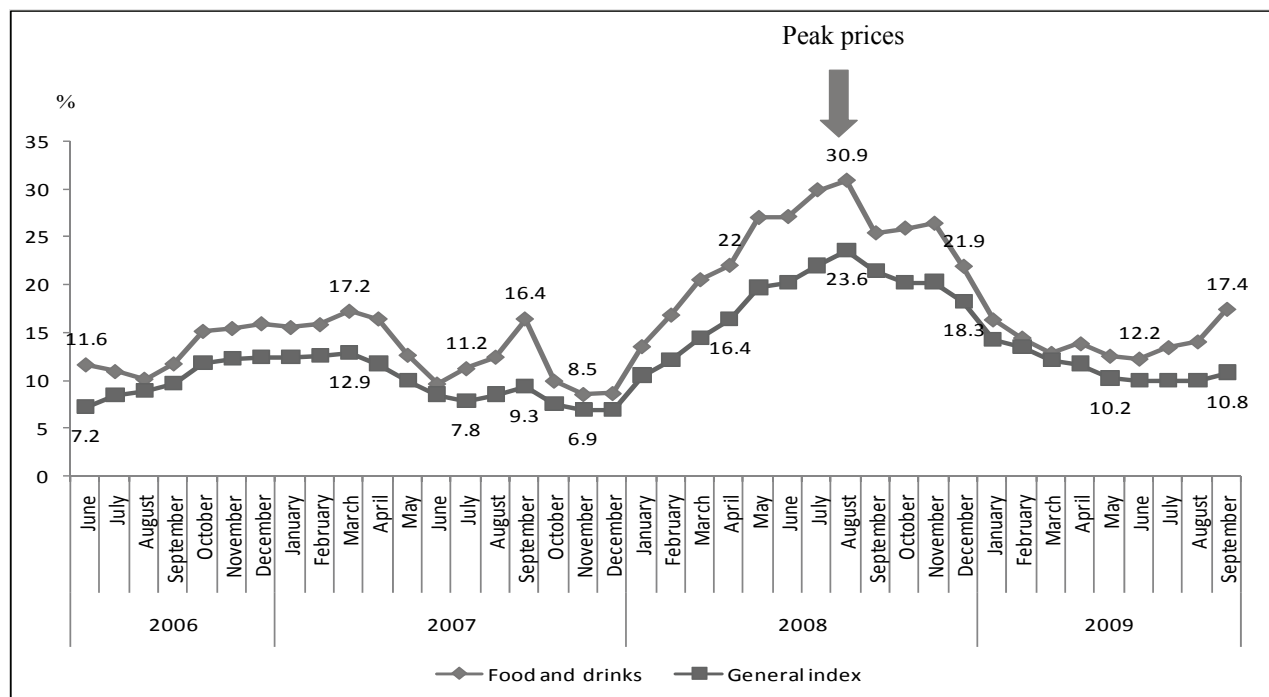
Source: Central Bank of Egypt, *Monthly Statistical Bulletin*, several issues (2007–2009).

As average expenditures on food account for about half of total household expenditures, any increase in food prices will have a negative impact on the purchasing power of incomes, particularly low-income households and will often lead to drastic cuts in expenditures on health, education and other basic needs. This is likely to become a potential source of political and social tensions.

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[5] It is worth mentioning that from February 2007 to February 2008 the impact of food price inflation on overall inflation in Egypt was large, contributing 5.6 percentage points of the total inflation of 9.5 percent. Food price inflation contributes 6.5 points of the total inflation of 8.7 percent in China, 7.6 points of the total of 10.6 percent in Pakistan, 9.2 points of the total of 10.3 percent in Bangladesh, 12.4 points out of total inflation of 15.4 percent in Kenya and 1.9 points out of total inflation of 4.6 percent in India (OECD-FAO 2009).

[6] The share of food expenditure in the budget is only 28 percent in China, 33 percent in India and absorbs more than half of total household expenditures in countries such as Kenya at 51 percent, Haiti at 52 percent, Malawi at 58 percent and Bangladesh at 62 percent (OECD-FAO 2009).

2.2. Egypt Is a Net Food Importer

Egypt is highly vulnerable to international food price risk as the country relies on food imports for at least 50 percent of domestic consumption and food accounts for more than 15 percent of all imports. Egypt suffers from agricultural and food trade deficits standing at LE 13.8 billion and LE 8.7 billion respectively in 2007, reflecting modest export to import ratios for agricultural and food items (33 percent and 30 percent, respectively) [Table 1].[7]

Table 1. Agricultural and Food Trade Balance for Egypt (LE Million)

Egypt's:	2005	2006	2007
Agricultural trade balance	(8626)	(8130)	(13796)
Agricultural exports as % of imports	38.1	37.7	33
Food trade balance	(7615)	(6488)	(8680)
Food exports as % of imports	28.3	31.1	30.3

Source: Authors' calculations from CAPMAS.

Low self-sufficiency rates in major food commodities are reflected in the country's high dependence on food imports. Self-sufficiency rates are estimated at 54.4 percent for wheat, 53.2 percent for maize and 76.9 percent for sugar. Egypt is the second largest importer of wheat in the world, the fourth largest importer of vegetable oils and the fifth largest importer of maize (NDP 2008c; Aksoy and Isik-Dikmelik 2008; Ibrahim and Kamal 2009).

The low self-sufficiency rate of wheat is of particular concern since wheat is particularly crucial for Egyptian food security given the scale of distribution and coverage of bread subsidies in the country. Egypt consumes over 14 million tons of wheat every year and grows nearly 7 million tons. This means Egypt imports at least 7 million tons per year (Baker and Maitra 2008). The country has one of the world's highest per capita wheat consumption, standing at 196 kilograms in 2008 on average (FAPRI 2009). In 2006, the average daily caloric intake per capita in Egypt was estimated at 4439, much higher than the world average of 2600 (UNDP 2008a, b; FAO 2008a).

Over the period July 2006-June 2008, soaring global food prices led to an increase in the value of Egyptian food imports, particularly grains (Figure 2).[8]

[7] In 2007, there was a significant surge in the value of Egypt's food imports, which went up by 78 percent compared to the 2006 level. Nearly 72 percent of the surge was due to the increase in import prices, while 6 percent was attributable to the rise in the volume of imports.

[8] In 2008, Egypt's imports of wheat, maize and sugar have increased by 7790, 4000, and 1040 thousand metric tons respectively.

Figure 2. Increase in Egypt's Food Imports (Percentage Change, over the Period July 2006-June 2008)
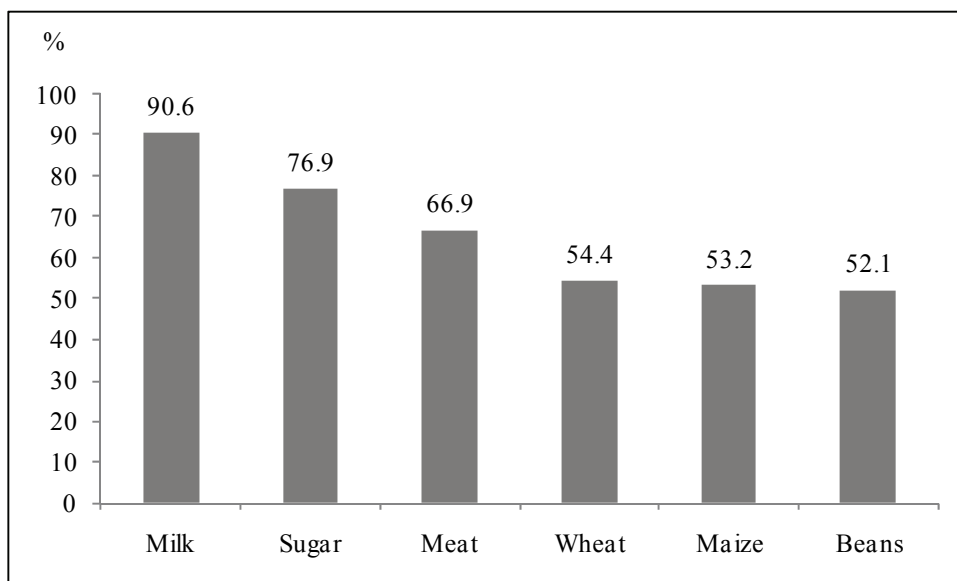
Egypt is projected to remain a net cereal importer through 2030 and beyond, increasing its cereal imports 137 percent from 2000 to 2030, far more than any other country in the Arab region. The primary driver of increasing net cereal imports is population growth, with income growth playing a smaller role (IFPRI 2008; FAO 2008a, b and 2009b, c).

Being a significant net importer of food, Egypt is likely to suffer significant poverty, malnutrition, balance of payments and fiscal impacts from high food prices (Ng and Aksoy 2008).[9]

2.3. Egypt Relies Heavily on Consumer Food Subsidies

Prices of many goods and services are subsidized in Egypt to make basic needs affordable to consumers. By providing citizens with their minimum level of food requirements at subsidized prices, the government aims to protect them from malnutrition and helps them cope with individual/household food insecurity.

Food subsidies are provided through two main channels: the subsidy for "baladi" bread (82 percent extraction rate) which is universal (i.e., available to every citizen with no quota restrictions) and the ration cards which offer eligible households a pre-determined monthly quota of basic

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[9] Recent estimates of the Food and Agriculture Organization of the United Nations (FAO) show that the number of undernourished people increased from 848 million to 923 million from 2003-05 to 2007, largely owing to the food crisis (FAO 2008a).

foodstuffs (including rice, sugar and edible oil) for a maximum of four persons registered on each card.[10]

Dramatic rises in global prices since mid 2006 have increased the food subsidy ratio to GDP from 1.5 percent in 2006/07 to 1.8 percent in 2007/08, noting that part of the increase in the subsidy bill is due to the increase of ration quantities and the expansion of ration cards coverage. Food subsidies could become a major fiscal problem if food prices stay high or in the event of future price shocks (Table 2).

Table 2. Food Subsidy in Egypt, 2005/06-2009/10

	2005/06	2006/07	2007/08	2008/09 Expected budget	2009/10 Projected budget
In billions of LE	9.4	9.4	16.4	22.8	16.1
In percent of GDP	1.5	1.3	1.8	2.1	1.3
Nominal GDP (LE billion)	617.7	744.8	896.5	1,098.2	1,284.9

Source: IMF (2009b); MOF (2008).

Note: The data are presented for the fiscal operations of the budget sector (which comprises central government, local governments and some public authorities), on a cash basis consistent with the Government Finance Statistics (GFS) 2001 classification.

Nearly 79 percent of the 2007/08 food subsidy bill is allocated to baladi bread, while 21 percent is dedicated to other subsidized items, including sugar, rice and edible oil through the ration card system (Table 3).

Table 3. Fiscal Cost of Food Subsidies in 2006/07 and 2007/08 (LE Million, Nominal)

	2006/07	2007/08
Total bread subsidy *	7990	15164
Other subsidized food **	2503	3922
Total subsidy	10493	19086
Cash food subsidy transfers from the government budget	9406	16444
Discrepancies	-1087	-2641

Source: People's Assembly Plan and Budget Committee (2008, 2009b), February.
Notes: *Includes subsidy on wheat (domestic and imported), maize and flour.
** Includes subsidy on edible oil, sugar, rice and tea.

In response to soaring food prices, the government decided in 2008 to update the registration for the food subsidy program to allow those born after 1989 to be registered in the system of ration cards. An extra 22 million people were added, expanding the coverage of the ration card subsidy system to nearly 69.2 million beneficiaries by November 2008. In addition, the quantities of subsidized food items for all ration cards were increased (Law number 114 for the year 2008). As of

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[10] Ration card beneficiaries include pensioners; government employees; public sector workers; casual workers; business sector workers whose salaries do not exceed LE 1000 per month; widows; divorced and people eligible for cash transfers (social solidarity).

November 2008, ration cards supply additional quantities of rice, sugar and vegetable oil, at prices well below their free market value, as shown in Table 4. Distortionary effects increase when the gap between subsidized prices and market prices widens. This is more relevant when international prices increase.

As a result of these measures, the food subsidy bill was increased from LE 16.4 billion in 2007/08 to LE 21.5 billion in 2008/09, implying a very high fiscal cost of 2.1 percent of GDP in 2008/09 (IMF 2009b; Ministry of State for Economic Development and the World Bank 2007; World Bank 2009a, b; UNDP 2009).

Table 4. Ration Scale of the Ministry of Social Solidarity (MOSS), November 2008

Commodity	Ration type	Allowance: kg per person per month	Price of rationed food as a % of free market price
Rice	Uniform	1.3	24
Sugar	Base ration	1.0	15
	Additional ration	0.66	52
Vegetable oil	Base ration	0.5	9
	Additional ration	0.66	40

Source: WFP (2008a).

With the recent decline in international prices of flour and edible oil, projections for the year 2009/10 show that food subsidies are nearly LE 13.8 billion, a 35.8 percent drop from 2008/09 food subsidy figures. Bread subsidy is projected to account for nearly 64 percent of total food subsidies. Sugar and edible oil subsidies are projected to reach nearly 19.8 percent of total food subsidies. Other subsidized food commodities would account for about 16.2 percent of total food subsidies (Table 5).

Table 5. Fiscal Cost of Food Subsidies in 2008/09 and 2009/10

	2008/09 (Expected budget)		2009/10 (Projected budget)	
	Quantity (thousand tons)	Subsidy (LE million)	Quantity (thousand tons)	Subsidy (LE million)
(1) Total subsidy of basic commodities	9293	18752.9	9632	13158
- Total bread subsidy	8300	16188.3	8500	10049
- Rationed oil	279	1495.3	377	1675
- Rationed sugar	714	1069.3	755	1434
(2) Total subsidy of additional commodities*	2559	2880.5	2028	2518
Total subsidy (1+2)	11852	21633.4	11660	15676
Net subsidy of rationed commodities		21476.8		13841

Source: MOF (2009); People's Assembly Plan and Budget Committee (2009a, b).
Notes: *Includes subsidy on rice and tea and on additional quantities of oil and sugar.
**Net subsidy refers to total subsidy after deducting changes in the value of inventory of food items to be sold at subsidized prices.

Egyptian households' consumption of subsidized food could be analyzed by estimating the subsidized food budget shares by product and income group/quintile using Egypt's HIECS 2008/2009 (Table 6). Subsidized food constitutes quite a small proportion of total household expenditure, ranging between 5 and 1.35 percent of total consumption of the lowest and highest expenditure quintile, respectively, and representing 2.58 percent on average for the population as a whole.

Expenditure on subsidized bread represents on average 1.11 percent of total household budget, and ration card subsidized food items represent 1.47 percent. The budget share of subsidized food is lowest in the top quintile and increases as we move towards lower expenditure groups.

Table 6. Subsidized Food Budget Shares by Expenditure Quintiles (Percent of Total Spending)

	Per capita expenditure quintile					Average
	1	2	3	4	5	
Baladi bread	2.03	1.56	1.35	1.18	0.62	1.11
Ration cards food items	2.96	2.27	1.85	1.47	0.73	1.47
Total food subsidies	4.99	3.83	3.20	2.65	1.35	2.58

Source: Authors' calculations based on HIECS, 2008/09.

Four out of five households in Egypt purchase subsidized baladi bread and 67 percent have ration cards. The three middle quintiles have the largest share of households that purchase baladi bread while the share of ration card holders decreases as expenditure increases. This is not surprising as baladi bread is available for everybody while certain criteria are used to exclude the rich from ration card system, as shown in Table 7.

Table 7. Percentage of Households Receiving Food Subsidies by Quintiles

	Per capita expenditure quintile					Average
	1	2	3	4	5	
Baladi bread	78.01	80.96	83.80	84.86	77.74	81.01
Ration cards food items	75.99	73.33	71.54	67.67	57.38	67.60

Source: Authors' calculations based on HIECS, 2008/09.

Turning now to actual per capita consumption levels (Table 8), the higher a household's expenditure is, the higher its total level of expenditure is on all types of subsidized food items. On average, every person spends LE 41 on subsidized baladi bread and LE 54.7 on other food subsidized items. Per capita expenditure of the richest quintile, on subsidized baladi bread, is about one third higher than expenditure of the poorest quintile, while the expenditure gap between the

richest and the poorest is insignificant for ration card food items (less than 8 percent of the per capita spending of the poorest quintile).

Table 8. Per Capita Annual Spending on Subsidized Food Items by Expenditure Quintiles (LE, 2008/9)

	Per capita expenditure quintile					Average
	1	2	3	4	5	
Baladi bread	34.75	37.87	41.03	45.82	46.78	41.25
Ration card food items	50.71	55.04	56.07	57.23	54.58	54.72

Source: Authors' calculations based on HIECS, 2008/09.

In 2008/09, total direct household food subsidies represented on average LE 276.4 per capita per annum, constituting almost 7.4 percent of total per capita annual consumption. The amount of subsidy received by a household increases with expenditure level. The poorest quintile received on average LE 258 per capita for food subsidies, whereas the richest quintile received LE 291. Nevertheless, as a proportion of per capita spending, subsidies are more important for the poorer quintiles. Hence, while food subsidies represented 15 percent of household expenditure for the bottom quintile, the corresponding percentage for the top quintile was 3.9 percent (Table 9).

Table 9. Per Capita Absolute Benefits Per Annum (LE)

	1	2	3	4	5	Average
Subsidies for baladi bread	123.0	134.9	146.9	164.4	167.8	147.4
Rice	17.4	20.1	20.9	21.5	22.1	20.4
Wheat	45.0	29.8	19.2	13.6	7.7	23.1
Oil	42.2	49.5	53.8	58.4	59.9	52.7
Sugar	25.9	27.9	29.2	29.9	28.6	28.3
Tea	4.5	4.5	4.2	4.9	4.3	4.5
All subsidies	257.9	266.6	274.3	292.9	290.5	276.4
Per capita consumption	1714.0	2423.6	3032.5	3887.0	7503.7	3712.1
Total subsidies as percentage of total consumption	15.0	11.0	9.0	7.5	3.9	7.4

Source: Authors' calculations based on HIECS, 2008/09.

Food subsidies are poorly targeted and unnecessarily expensive, resulting in substantial leakage of resources to high-income households. Nearly two thirds of food subsidies leak to the rich. The share of per capita spending on all subsidized commodities of the top three quintiles exceeds their share in total population (more than 60 percent) except for wheat[11] where it appears that per capita spending on wheat declines, as total spending of household rises (Table 10).

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[11] Subsidized wheat is only available for poor areas, especially in Upper Egypt.

Table 10. Distribution of Total Benefits Across Quintiles, 2008/09

	Per capita expenditure quintile					Average	Benefits to non needy
	1	2	3	4	5		
Subsidies for baladi bread	16.69	18.30	19.93	22.31	22.77	100.00	65.02
Rice	17.08	19.66	20.49	21.10	21.67	100.00	63.26
Wheat	39.02	25.83	16.64	11.81	6.70	100.00	35.16
Oil	15.99	18.75	20.40	22.15	22.70	100.00	65.26
Sugar	18.26	19.72	20.65	21.15	20.22	100.00	62.02
All subsidies	18.66	19.29	19.85	21.19	21.02	100.00	62.05

Source: Authors' calculations based on HIECS, 2008/09.

Also, World Bank estimates reveal that between one-quarter and one-third of the poor do not benefit from food subsidies, and fully 83 percent of the value of these subsidies go to the non-poor. A quarter of highly vulnerable households are excluded from participating in the ration card system. This may be attributed to the fact that highly vulnerable households who work in the informal sector and are illiterate do not have the valid credentials needed to apply for ration cards, such as ID and permanent housing (World Bank 2009a, 2007).

Although the government stipulates punishment for any violation in baladi bread specifications, weight, or use of flour outside the legitimate purpose, more than half a million tons of subsidized flour is smuggled and sold on the black market or lost, and baladi bread is often used as animal feed.

Despite the longstanding provision of in-kind food subsidies in Egypt and the expansion of the overall coverage of the food subsidy program over the past number of years, poverty continues to rise and a large proportion of people remains highly vulnerable to food insecurity and malnutrition.[12] Almost 44 percent of the population subsists on less than $2 per day in purchasing-power-parity (PPP) adjusted terms compared to less than 10 percent of the population in Jordan.[13] Similarly, the prevalence of malnutrition in children is close to double that of Jordan and more than double that of Tunisia (Table 11).[14] The level of benefits available to poor households is insufficient to raise them out of poverty. Only about 15 percent of the total food consumption of the lowest quintile is covered by the subsidy (WFP 2009).

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[12] Poverty is defined in Egypt based on the cost of the minimum basket of essential food and non-food necessities, which differs according to the location and composition of a household; in 2008 the lower poverty line used to identify the poor averaged to LE 1648 per capita per year and the upper line used to identify the near-poor was LE 2223 per capita per year. (This is close to the poverty rate using the PPP $2 a day definition that was recently revised) (Author's calculations based on HIECS 2008/09).

[13] The share of population living on less than $2 per day in Morocco and Tunisia is well under half the Egyptian rate.

[14] Based on the percentage of children under the age of five who are underweight for their age group.

Table 11. Subsidies and Transfers Spending and Indicators for Egypt and Selected Countries

Country	Per capita subsidies and transfers spending (in US$ PPP adjusted)	GINI coefficient	Malnutrition prevalence (weight, percent of children under 5)	Poverty headcount ratio at $2 a day (PPP) (in percent of population)
Egypt	230.4	34.4	8.6	43.9
Jordan	145.4	38.8	4.4	7.0
Morocco	40.0	39.5	10.2	14.3
Tunisia	184.1	39.8	4.0	6.6

Source: IMF (2007).

During 2005-2009, extreme poverty (inability to meet basic food needs) increased by almost 20 percent from 5.4 percent to 6.4 percent of the population. Much of this increase could be attributed to soaring food prices, given that the poor spend the largest part of their income on food. In addition to the 5-6 million extremely poor and food insecure, many Egyptians live close to the poverty line and soaring food prices threatened their food security and livelihoods.

There is a great need for food subsidy reform, not only in the targeting mechanisms used but also in the level of benefits available to the poor. Better targeting will reduce leakage of food subsidies to those who are not vulnerable and redistribute resources to vulnerable populations, without necessarily increasing budgetary burdens for the state.

2.4. Policy Interventions towards Food Subsidy Reform

To reorient the food subsidy system in Egypt toward delivering targeted assistance while creating space for fiscal adjustment, policy interventions may include:

Enhancing the efficiency of baladi bread production and distribution

The efficiency of baladi bread production and distribution could be increased through various mechanisms, including improving wheat storage and the bread production technique through public-private partnerships; providing credit for bakeries so that they can get new equipment, train their workers and satisfy health and environmental standards and supervising all marketing stages and imposing financial fines to avoid leakages in subsidized flour and bread.

Improving the ration card system

The ration card system needs further improvements by facilitating the registration for eligible households, improving the quality of subsidized goods, introducing more nutritious foods (a quota of powdered milk can be offered to households with children) and eliminating or reducing subsidies on tea and sugar. In addition, a system of flexible commodity mix could be adopted to help take tastes and preferences into account (most vulnerable households in rural areas may prefer to add

subsidized wheat flour to their ration card instead of buying baladi bread) (WFP 2008a, b, 2009; IDSC 2008).

Adopting better targeting mechanisms

Better targeting reduces leakage and tightens eligibility for ration cards. As 78 percent of the poor in Egypt are concentrated in rural areas (World Bank 2009b), proxy means testing combined with poverty mapping would help identify the most vulnerable groups, reduce errors of inclusion (of non-vulnerable groups) and errors of exclusion (of vulnerable households).

Piloting the smart card system

Currently, Egypt is piloting an electronic "smart" card for its ration system that will eventually include cash transfers and other benefits such as health insurance. Smart cards are designed to control the leakage of subsidized goods to the black market by allowing officials to electronically track the distribution of subsidized goods. Another benefit of the smart cards is that they help identify which goods are more demanded than others. So, the government can prioritize on the subsidy provided on goods. However, smart-card implementation may be more difficult to deploy in rural areas, where limited education and access to infrastructure may reduce usage rates.

Replacing in-kind food subsidies with well-targeted cash transfers

In-kind food subsidies could be gradually replaced with a system of well-targeted cash transfers.[15] Cash transfers are non-contributory transfers made by the State to vulnerable households to support their purchasing power without distorting incentives for food producers (WFP 2009). Direct cash transfers to poor households could be conditional upon meeting a requirement or engaging in a mandated behavior (sending poor children to school). Such conditional cash transfers could help reduce extreme poverty in the short-run and break the intergenerational cycle of poverty through investments in human capital (Helmy 2008, 2005), provided that good quality public health and education services are available and accessible.

Hedging against global food price risk

Egypt can set up an options contract to protect itself against world market price volatility. Options contracts give the purchaser the right, but not the obligation, to purchase a fixed quantity of a commodity at a fixed price during a predetermined time period. Options are paid for up front in

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[15] One proposal is to remove the subsidy from bread and flour, sell the items at their real market price and compensate poor people in the form of monthly cash income.

cash, making them easier to access when credit cannot easily be obtained. Egypt, a major wheat importer, could have used options to mitigate the impacts of the recent food-price shock.

A recent World Bank/FAO/IFAD study estimated that during the 2007/08 season, the government of Egypt might have saved between $144 million and $648 million (approx. LE 0.8 billion to LE 3.6 billion) on international procurement costs of wheat if alternative forms of hedging, futures contracts or options had been used rather than the current system of monthly tenders (World Bank, FAO, and IFAD 2009). This potential saving is equivalent to a minimum of 4 percent and a maximum of 18 percent of the procurement cost.

2.5. Egypt Adopts Several Measures to Improve Food Security

To ensure sufficient and safe food supply throughout the year and from one season to the next and make it accessible to the public at affordable prices relative to their income, the government provides subsidies to farmers to stimulate domestic food production, and adopts food trade policy measures in response to soaring global food prices, mainly lowering tariffs on food imports and temporarily restricting or banning rice exports (UNDP 2009).

Providing farmers' subsidies

To bolster national production of strategic crops, the government offers farmers guaranteed prices for wheat, maize, sugarcane, sugar beet and cotton. For example, given domestic grain and bread shortages, the government more than doubled the guaranteed buy-in price paid to Egyptian farmers for wheat to about $466/ton [nearly LE 2,533/metric ton] in 2007/08 in comparison to the previous year. The delivery price for sugarcane to the Sugar and Integrated Industries Company (SIIC) for 2008/09 was increased to LE 200 per metric ton compared to LE 185 per metric ton in 2007/08. Farmers receive 60 percent of funds when they deliver their cane to the mill and the remaining 40 percent is paid out to them at the end of the season. The current government policy also promotes expansion of sugar beet production. The delivery price for sugar beet in 2008/09 has been set by the beet sugar companies at LE 300 per ton for sugar beet that has 16 percent sugar content, compared to LE 250 per MT in the previous year (USDA Foreign Agricultural Service 2009a,b,c).

Despite government efforts to increase guaranteed prices for strategic crops, they remain at a low level relative to production costs. In addition, guaranteed prices are not set in line with the profitability of competing crops and a delay in announcing them *before* the due date for cultivating crops result in an ineffective pricing policy. Hence, a consistent, transparent and effective pricing policy for key staples, including a well-defined floor price for wheat and maize (possibly with regional differentiation) is central to national food security and for maintaining a certain level of

price stability. In times when international prices fall below domestic floor prices (e.g., for wheat), imported wheat could be taxed (e.g., through tariffs).

To lower agricultural costs, inputs necessary for agricultural production, such as fertilizers, seeds and pesticides are subsidized. However, government ownership of most fertilizer factories and the distribution of fertilizers through Egypt's Principal Bank for Agricultural Development and Credit (PBDAC) hamper the development of a well functioning competitive market and result in fertilizers' prices being sometimes 40 percent above world market prices (IMC 2007). Recent bans on urea and nitrogen used for "fertigation" are hampering access to key fertilizers and pesticides. The price of nitrogen fertilizers increased from LE 700 per ton in 2006/07 to LE 1000 per ton in 2007/08 and increased since then to more than LE 1200 per ton.[16]

Notwithstanding government efforts to stimulate domestic food production, subsidies to farmers remain modest and well below levels allowed under the World Trade Organization commitments. Egypt's producer support estimate is very low (2 percent), when compared to OECD countries (30 percent), Mexico (21 percent), China (8 percent) and Brazil (3 percent) (Table 12).

Table 12. Producer Support Estimate in Egypt and in Selected Countries (2007)

Country(ies)	Producer support estimate*
OECD countries (average)	30
Mexico	21
China	8
Brazil	3
Egypt	2

Source: IMC (2007).
Note: Producer support estimate is gross annual monetary values to support agriculture producers, expressed as a percentage of gross farm receipts.

Only 1 percent of the total government subsidy bill is transferred to farmers (Table 13). PBDAC offers favorable terms and low interest rates in soft loans to farmers and the treasury incurs the burden of the interest rate differential.[17]

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[16] The government plans to liberalize fertilizers' prices by December 2009 (NDP 2008a, b, c).

[17] In addition to direct farmers' subsidies, Egypt helps farmers indirectly by not charging users for water.

Table 13. Farmers' Subsidies (LE Million)

Farmers' subsidies	2007/08	2008/09 (expected)	2009/10 (projected)
In LE million	876.1	707.6	792.6
As % of total government subsidies	1	1	1

Source: MOF (2009).

2.6. Adopting Food Trade Policy Measures in Response to the Global Food Price Shock

While higher food prices are clearly a burden to poor net purchasers of food, they also present an opportunity to stimulate domestic food production and exports, reverse a generally declining trend in investment in the agricultural sector, increase agricultural productivity and enhance the contribution of agriculture to medium run growth. In addition, higher global and domestic food prices weaken the rationale for costly floor prices and so alleviate their fiscal burden. During 2008, agriculture producers' prices in Egypt soared (Figure 3).

Figure 3. Change in Agriculture Producers' Prices in Egypt (September 2007–September 2009)
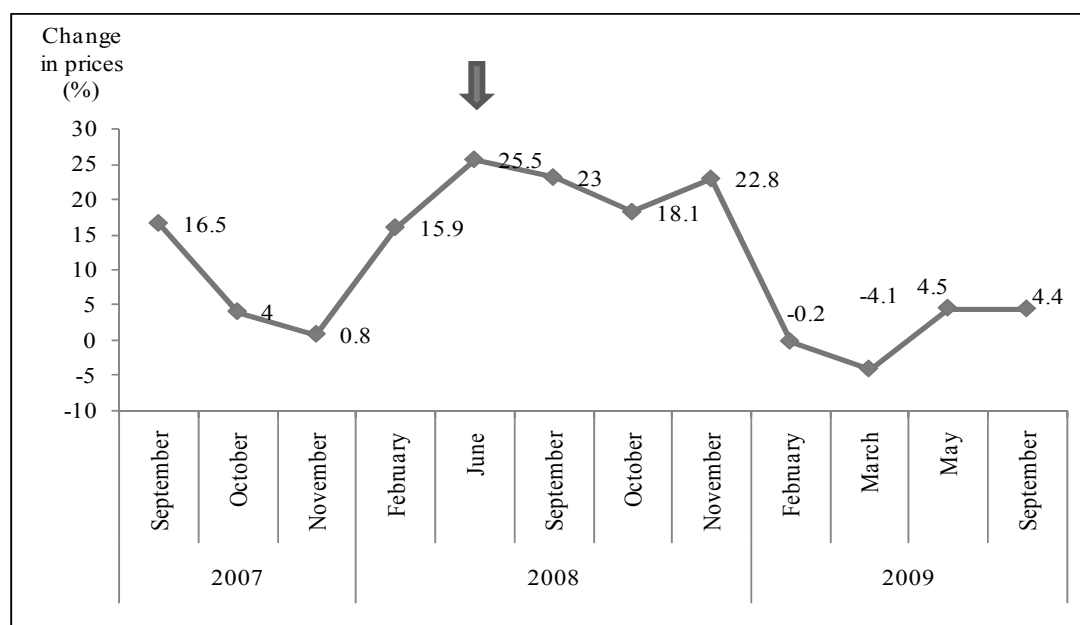
Source: Central Bank of Egypt, *Monthly Statistical Bulletin*, various issues (2009).

Strategic crops (i.e., wheat, maize and rice) cultivated land and production have increased in 2008 relative to the previous year (Figure 4).
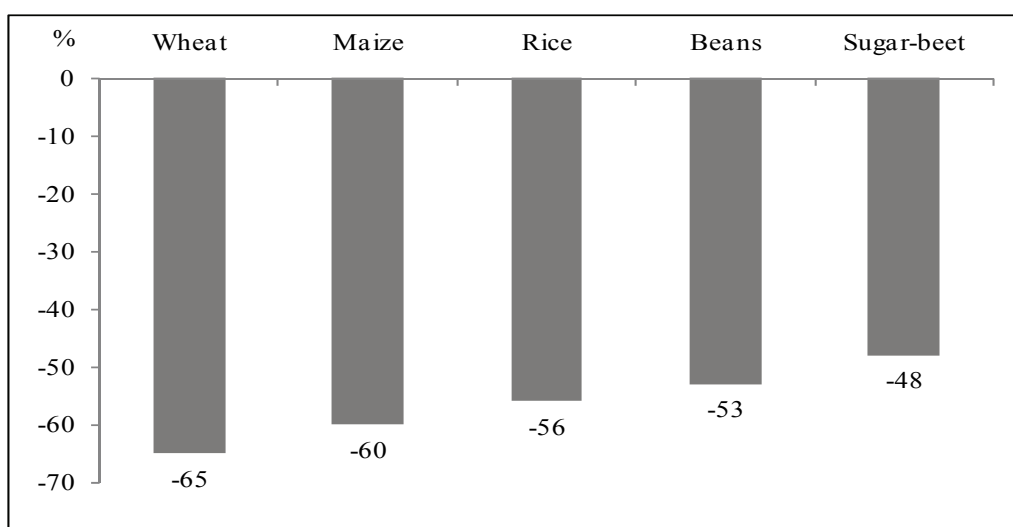
Figure 4. Increase in Strategic Crops Cultivated Land and Production (Percentage Change, 2007-2008)

However, this increase may not be sustainable since agriculture labor wages and land rents (which, combined, represent nearly 80 percent of the total production cost of some crops) have increased by 25 percent and the prices of fertilizers and pesticides have risen by 200 percent, in 2008. During January-July 2008, global and domestic prices of agricultural inputs soared. For example, prices of fertilizers increased from $400/ton to $850/ton in the world market and from LE 700/ton to LE 1500/ton in the Egyptian market (NDP 2008a, b, c). In addition, fluctuations in global food prices in 2009 led to a decline in farmers' crop revenues (Figure 5).

Figure 5. Decrease in Farmers' Revenues from Strategic Crops (Percent, 2008-2009)

To secure food supply, reduce its price in the domestic market and provide some relief to consumers, tariffs on food imports were either eliminated (e.g., rice, oil, some milk and cheese products and sugar), or reduced (e.g., other milk, cheese and butter products) and rice exports were banned starting April 2008.[18]

Tariff reductions on food items

In February 2007, the government applied reductions in import duties on 1,114 items, including foodstuffs. The changes reduced the weighted average of applied tariffs from 20.1 percent to 16.7 percent. The maximum tariff rate for most imports was reduced from a high of 40 percent to 30 percent.

In April 2008, Presidential Decree No. 103 introduced further reductions to customs tariff for several imported products. Rice and soybean oil became exempt from custom tariffs.

Since mid 2009, global raw sugar prices have risen sharply. The cost of a pound of sugar, 22 cents in September 2009, is up 65 percent from January of the same year when it hovered just above 13 cents. Refined white sugar prices were up 59 percent over the same period. Concerned over higher world sugar prices, in September 2009, Egypt temporarily suspended the tariffs it had imposed on sugar imports to boost supply locally. Tariffs on raw sugar stood at 2 percent and those on processed sugar were 10 percent (USDA Foreign Agricultural Service 2009b).

Rice export ban

The increase in international demand for rice in the last few years has pushed market prices up, luring Egyptian exporters to increase the amount of exported rice, from 700,000 tons in 2006 to 1 million tons in 2007 (Oxford Business Group 2009).

To secure rice supply and reduce its price in the domestic market, the government decided to halt rice exports, starting in April 2008.[19] The decision to suspend exports had an immediate impact on prices, with rough rice prices dropping almost $100 per ton to $330 on the local market (USDA Foreign Agricultural Service 2008, 2009c).

To sum up, more efforts are needed to improve Egypt's food security and reduce the fiscal burden of food subsidies, while alleviating poverty. Improving food security requires supporting farmers to better cope with the fluctuations of international food prices.

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[18] Egypt had accumulated 7 million tons of rice during the period of its export ban and is expected to curb the intervention soon (World Bank 2009b, p.43).

[19] During the first quarter of 2008, the price of a one kilogram bag of rice doubled from LE 2 to LE 4 ($0.37 to $0.74).

3. The Impact of Soaring Global Food Prices on Egypt's Macroeconomic Performance under Different Scenarios of Policy Intervention

In this section, a CGE model is designed to examine the short-run equilibrium effects of the global food crisis along with a set of alternative policy options on the Egyptian economy.[20] The model simulates the direct and indirect impacts of the food price surge and the various policy options on the performance of the main macroeconomic indicators including economic growth, inflation rate, current account balance, trade balance, budget deficit and unemployment rate. The model sectoral coverage and level of households' disaggregation allow for analyzing the effects of policies on sectoral output growth rates as well as on the welfare level of households.

The core model is basically neoclassical; however, it includes some structuralist features that depart from the Walrasian paradigm providing a better representation of the Egyptian economy. The model is characterized by its detailed treatment of households differentiating between rural and urban where each is classified into five different income quintiles. Given the purpose of the study, special focus is given to food subsidies where sectors for subsidized food products are disaggregated to differentiate between unrationed subsidized products (bread and flour) and rationed ones (sugar, edible oil and rice). A separate subsidy account highlighting the amount of subsidies received by various activities (producer subsidy) and commodities (import subsidies) is also defined. In addition, the model accounts for detailed treatment of various types of taxes including direct and indirect taxes (detailed description of this model is available in Annex 1).

3.1. Impact of Soaring Global Food Prices without any Policy Response for Mitigating the Effects on the Poor (Maintaining Food Subsidies)

The model tests the impacts of two assumptions concerning the growth rates for world food prices. The first assumption (Scenario I) represents the worst case where food prices are assumed to change according to the highest growth rates prevailing in June 2008. The second assumption (Scenario II) represents the moderate case where the dampening effect of the financial crisis on the growth rates of world prices is taken into account. Growth rates for the latter assumption (Scenario II) were calculated based on average growth rates for world food prices during 2006/07-2007/08 (Tables A2.2, Annex 2).

For both assumptions, it is assumed that the government will not take any policy response to the global food crisis. The two assumptions for world food price growth rates had almost similar impacts in trend on most variables at the macro and micro levels. However, the impact was more pronounced in magnitude in scenario I of high price growth rates (Figure 6).

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[20] The model structure draws highly on Mandour (2000).

Figure 6. Impact of Food World Price Growth Rates on Main Real Macroeconomic Indicators Compared to 2006/07
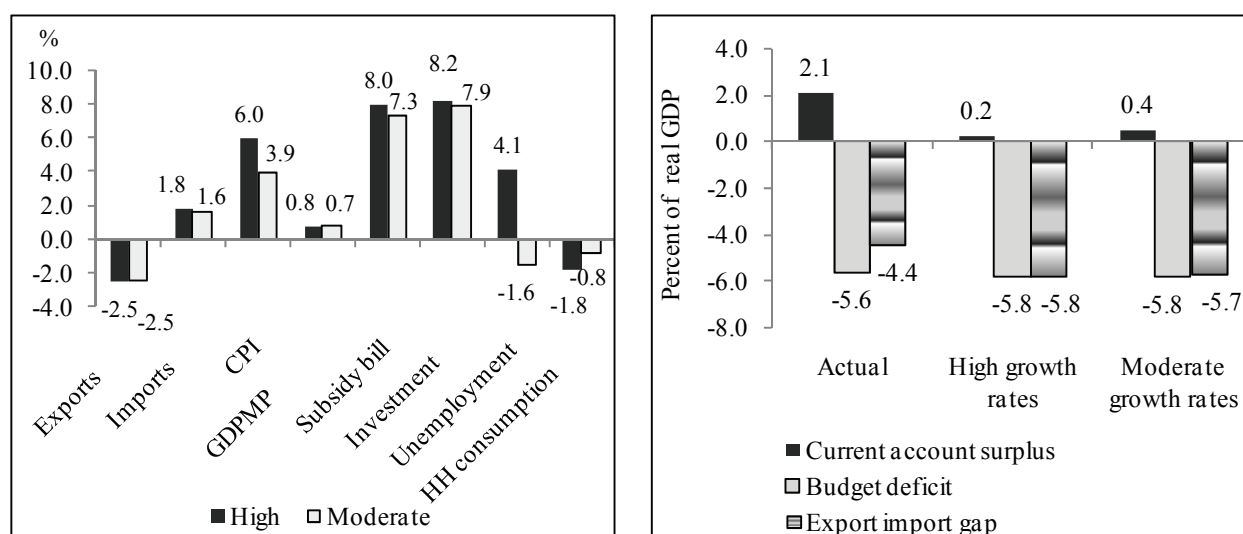
Source: Results of CGE simulations.

In what follows, the discussion will be confined to the outcomes of the first assumption of high growth rates (Scenario I). However, results of the second assumption (Scenario II) are provided in Annex 2 (see Table A2.3).

The model results indicate that world food price growth rates have resulted in higher inflation rate at the aggregate level (increasing CPI by 6 percentage points). Real household consumption declined by 1.8 percent. Furthermore, the current account balance (CAB) has been the most negatively affected macro indicator, with the surplus achieved in 2006/07 declining by 89 percent in 2008/09 in response to the food price hikes in mid 2008.

This is mainly attributed to the deterioration of the trade balance (or export/import gap) in nominal and real terms (it increased from -4.4 percent to -5.8 percent from GDP) due to the decline in exports real growth rates (-2.5 percent) while imports continued to increase (1.8 percent) as a result of the low elasticity of demand for food imports (Table A2.3, Annex 2).

Government revenue increased in nominal terms reflecting the increase in tariff proceeds as well as indirect and direct tax bills. Yet expenditure increased at a higher rate reflecting the increase in government consumption and compensation for the losses incurred on subsidized food products. As a result, the budget deficit increased by 10.2 percent and 3.9 percent in nominal and real terms successively, however its ratio to GDP almost did not change (from 5.6 percent to 5.8 percent). Compared to the base year 2006/07, GDP at factor cost experienced a slight increase (0.6 percent) whereas GDP at market price increased by (0.8 percent) in real terms.

At the sectoral level, composite output prices increased in all sectors except for subsidized food products which are assumed to be fixed. This has induced from one side an increase in total output of non-subsidized items and from the other side resulted in a decline in household demand for those products. Such sectors responded to lower domestic demand and higher export supply prices by shifting some of their output to exports. Households' demand for subsidized food products increased since these products became relatively cheaper due to their fixed prices. Yet, their domestic production declined due to the increase in intermediate cost (Figure 7). The increase of household demand for subsidized products was met by an increase in their imports.

Figure 7. Scenario I: Real Output Growth Rates by Sector (%)
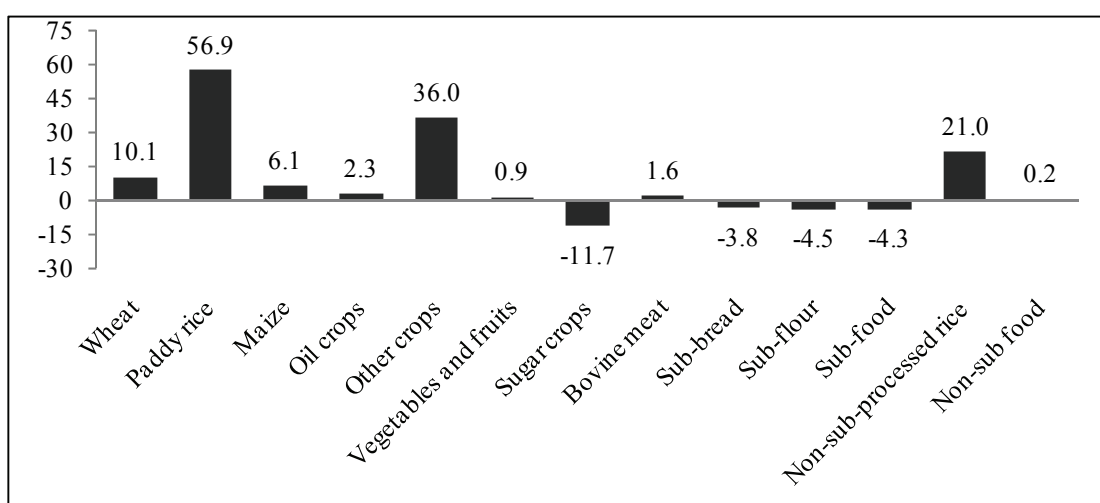
Source: Results of CGE simulations.

The increase in export supply price leading to a decline in private real consumption of many non-subsidized commodities has induced exports of a number of such commodities to increase. Non-subsidized rice exports showed the highest increase due to the significant rise in its world price (Figure 8).

Figure 8. Scenario I: Real Exports Growth Rates (%)
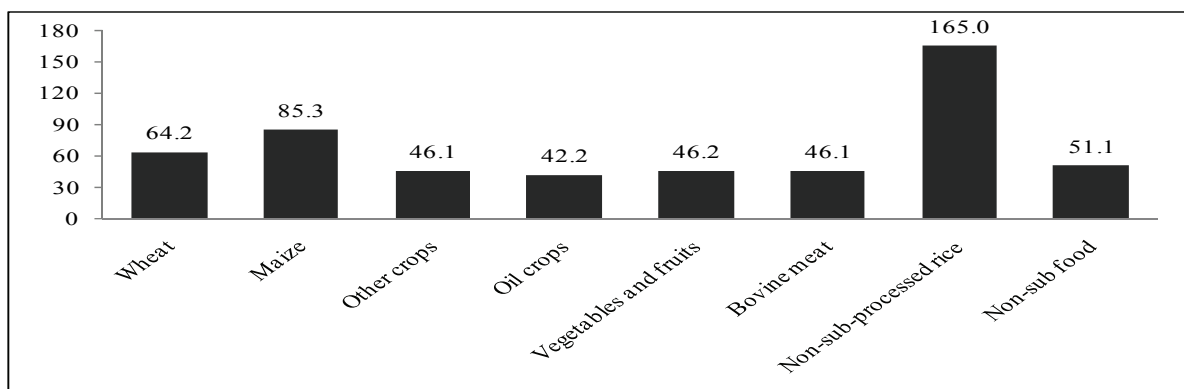
Source: Results of CGE simulations.

3.2. Impact of Price Shock along with Subsidies Elimination

Extreme case of complete food subsidy elimination for bread, flour and other subsidized products on ration cards

Scenario (Ia) assumes an extreme case of complete subsidy elimination on all food products. Processed food subsidy elimination encompasses removal of producer subsidy, import subsidy as well as coverage for losses in markup that result from cost changes that appear as an item in government expenditures. Subsidies directed to those sectors presented 94.6 percent out of the total food and agricultural subsidies and 18.5 percent of total subsidy bill in 1996/97.[21]

Compared to the previous scenario, where there was no policy response to soaring global food prices, complete subsidy elimination (scenario Ia) showed obvious contractionary real effects on the economy in terms of household real consumption (-4.24 percent), import growth rates (1.7 percent), GDP at factor cost (-2.3 percent) and unemployment rise (11.1 percent) (Figure 9). The downward shift in demand resulted in a lower increase in CPI (1.9 percentage points) compared to the previous scenario. These results are perceived to be at odds with the expected long run effects of subsidy removal. However this outcome could be attributed to the nature of CGE models which can only capture the short-run response of policy changes.[22]

Subsidy elimination with its contractionary impact on private consumption has positively affected the growth of a number of agricultural exports (Figure 9). A key initial macro impact of this scenario is the decline in government budget deficit (-19.7 percent) and its ratio to GDP at factor cost slightly decreases from 5.6 percent to 4.5 percent as shown in Table A2.5 and in Figure 9.

Complete elimination of food subsidies except for bread

Partial elimination of food subsidies through removing all food subsidies while maintaining baladi bread subsidies, which account for more than two thirds of the total food subsidy bill, as shown in Table A2.5, indicates that the cuts in real GDP at factor cost (-0.5 percent), household consumption (-2.9 percent) and budget deficit (-4.7 percent), and the increase in unemployment (7.2 percent) are much less than in the previous scenario and closer to scenario I in which all subsidies are maintained. Budget deficit ratio to GDP decreases from 5.6 percent to 5.4 percent.

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[21] Subsidies directed to agricultural production activities accounted only for 2 percent of total subsidy bill according to the 2006/07 SAM.

[22] Löfgren (1995) findings highlighted the contractionary effects of removing consumer subsidies on real GDP, household income and consumption demand and on employment. On the other hand, Moursi, El Mossallamy and Adel (2008) showed that raising consumer subsidies had expansionary effects on output and demand resulting in escalation of inflationary pressures. Both results are in line with these simulation results.

Figure 9. Impacts of Scenarios Ia and Ib (Complete and Partial Elimination of Subsidies) on Main Macroeconomic Indicators Compared to 2006/07
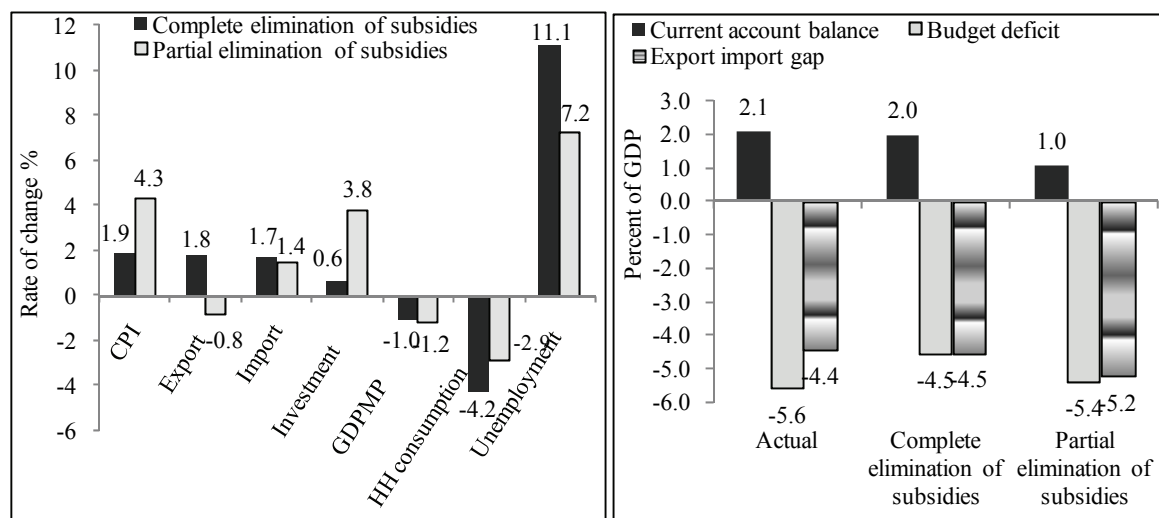
Source: Results of CGE simulations.

Regarding sectoral GDP at factor cost and exports, results indicate similar trends with lower intensity. The main exception is subsidized bread output which did not experience a significant decline due to the continuation of the government subsidization of bread to cover up for markup losses due to the food crisis (Table A2.7, Annex 2).

3.3. Impact of Policy Responses to Mitigate the Impact of the Food Price Surge (Fiscal Measures)

Increasing direct cash transfers from the government to the poor and eliminating all food subsidies

After eliminating all food subsidies and compensating the poor through government cash transfers to households, in both urban and rural areas, and in the lowest two expenditure quintiles (scenario Ic), it appears that real consumption demand of these households for a number of food products increased. Among these subsidized food products is subsidized bread, while for other products demand has declined at a lower rate compared with scenario Ia (complete elimination of food subsidies with no compensation for the poor). Yet due to low consumption share of the poor in most products total real consumption still declined (-3.3 percent) (Table A2.6 and Figure 10).

Figure 10. Impacts of Complete Elimination of Food Subsidies with Compensation for the Poorest Quintiles through Cash Transfers
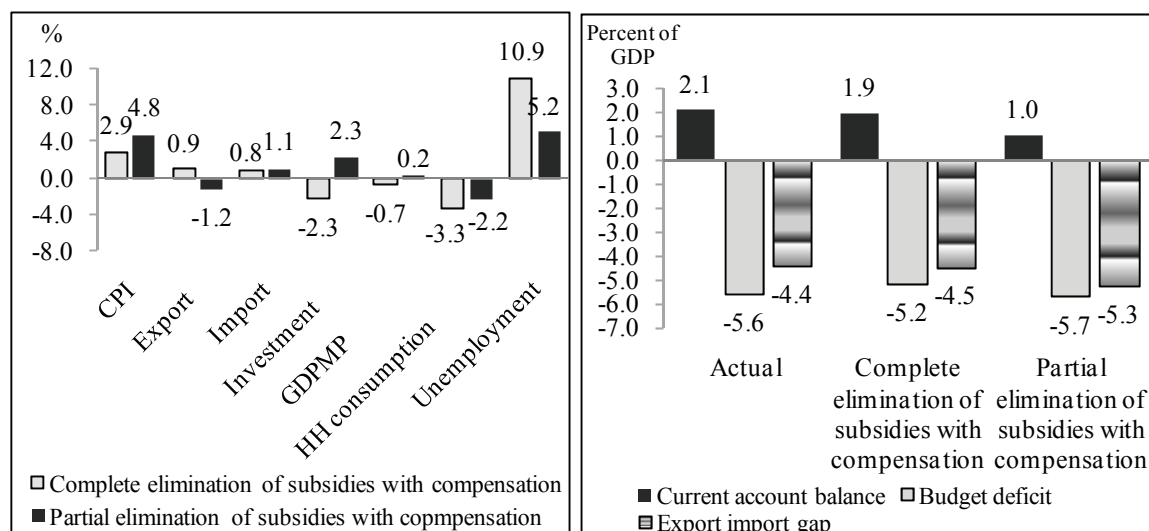
Source: Results of CGE simulations.

Directing higher transfers to the poorest quintiles had slightly increased exports of some agricultural and food products. Poorest quintiles increased consumption of commodities which are mostly confined to either non-tradable products (like bread) or non-exportable ones (flour and other previously subsidized items) and to some extent vegetables and fruits and other crops.

Government transfers as a share of income of the poorest quintiles increased from an average of 1.2 percent to 5.4 percent and from 0.72 percent to 4.8 percent in urban and rural households respectively to offset the negative impact of subsidy elimination on their real income. Yet this increase in transfers did not prevent the budget deficit from declining (-8.2 percent) though at a much lower rate than scenario (Ia) with no compensation (Table A2.8).

In general, when the government mitigates the impact of the food crisis and complete food subsidy elimination on the poor, the contractionary impact of subsidy elimination is milder on household total consumption, GDP, budget deficit and employment.

Increasing direct cash transfers to the poor with fixed prices of bread

When all food subsidies are removed except for baladi bread, and the government compensates the poor through direct cash transfers to the households in the two poorest rural and urban expenditure quintiles (scenario Id), consumption of baladi bread of the lowest two quintiles increased by almost 5 percent, whereas in scenario Ic of complete elimination of subsidies, it increased only by 0.5 percent. Government transfers to households increased at a lower rate to represent 4 percent and 3 percent of poorest quintiles spending in urban and rural areas respectively to offset the negative

impact of subsidy removal on their real expenditure. In this scenario welfare loss accounts for -2.18 percent, and budget deficit increases by around 2.5 percent (Table A2.8).

3.4. Impact of Policy Responses to Mitigate the Impact of the Food Price Surge (Trade Measures)

Impact of tariff removal on non-subsidized food products

According to the SAM 2006/07, non-subsidized foods are the only food products subject to import tariffs. In line with the arguments raised in the literature, the results indicate that trade measures adopted by the government of Egypt (GOE) through elimination of tariffs on these food items (scenario Ie) are not expected to contribute significantly to solving the problem of increased food prices (Ghoneim 2008). This is attributed to the low initial values of tariffs (as non-subsidized food tariff rate was 3.3 percent in the base year according to SAM 2006/07).

Imports of non-subsidized processed food represented 10 percent of total imports and 52 percent of agricultural and food imports in the base year. Table A2.9 shows that the results are close to those of scenario I with no policy response. The main differences lie in the current account and in the budget deficit and their components.

Tariff elimination resulted in a higher decline in the current account surplus (-95 percent) due to the deterioration in the trade balance. Imports of non-subsidized food increased by 24.5 percent compared to the base year (compared to an increase of 22.4 percent in scenario I) in real terms. Further, tariff elimination led to a higher growth rate in the budget deficit (6.43 percent) (Table 2.9). This is due to the loss in tariff revenue, which declined by 10.7 percent in real terms compared to a decline by 0.2 percent in scenario I. This reflects the fact that such products have low elasticity of substitution and thus the decline in tariff rate was not surpassed by an increase in imports. For the same reason, the differences in sectoral consumption were very minor. Consumption of non-subsidized processed food declined by 4.8 percent (compared to a decline of 5.2 percent in scenario I). Moreover, removal of tariffs on imported processed food had slightly improved households' welfare, measured by household real consumption growth rates (-1.61 percent) (Figure 11). Otherwise, the impact on CPI, investment, GDP and unemployment is almost the same as in the case of scenario I.

Impact of imposing an export ban on processed rice

Imposing an export ban on processed rice (scenario If) had more tangible effects on the economy. Processed rice exports represented 28 percent of food exports and 1.2 percent of total exports according to SAM 2006/07. The initial impact for this policy is the decline of the relative domestic

price of processed rice and paddy rice.[23] Consequently the relative prices of other agricultural and food products increased. Such a result had its dampening effect on households' consumption (-2.68 percent) and consequently the aggregate price level (3.7 percent) as shown in Table A2.9.

Figure 11 shows the higher decline in sectoral private consumption compared to scenario I. Processed rice is the only exception where consumption declined at a much lower rate as the product became relatively cheaper after the imposition of the ban.

Figure 11. Growth Rate of Real Consumption (%)
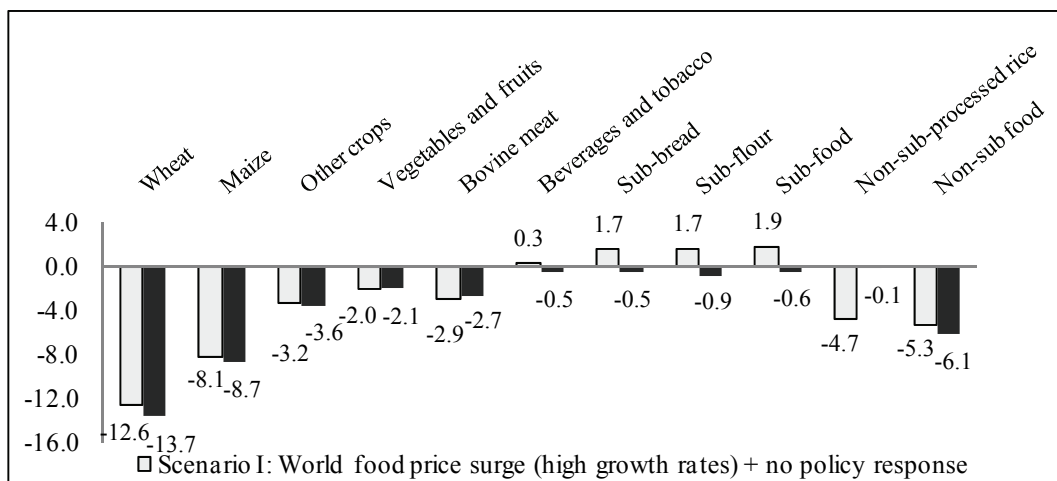
Source: CGE simulations.

The export ban on processed rice had many other repercussions in the economy. Sectoral output has also experienced a contractionary impact with an uneven rate across sectors, yet with the highest degree in processed rice as well as in paddy rice. Due to the contractionary impact on private consumption, real sectoral exports have increased in most sectors resulting in an unexpected lower reduction in the current account (-82.4 percent) compared to scenario I as reflected in Table A2.9.

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[23] Paddy rice is a non-tradable commodity that is not demanded for final consumption. It is demanded as an intermediate input by a number of sectors and is an essential input in processed rice representing 29 percent of its output.

Figure 12. Impact of Food Tariff Elimination and of Export Ban of Rice on the Main Macroeconomic Indicators (Scenarios Ie and If)
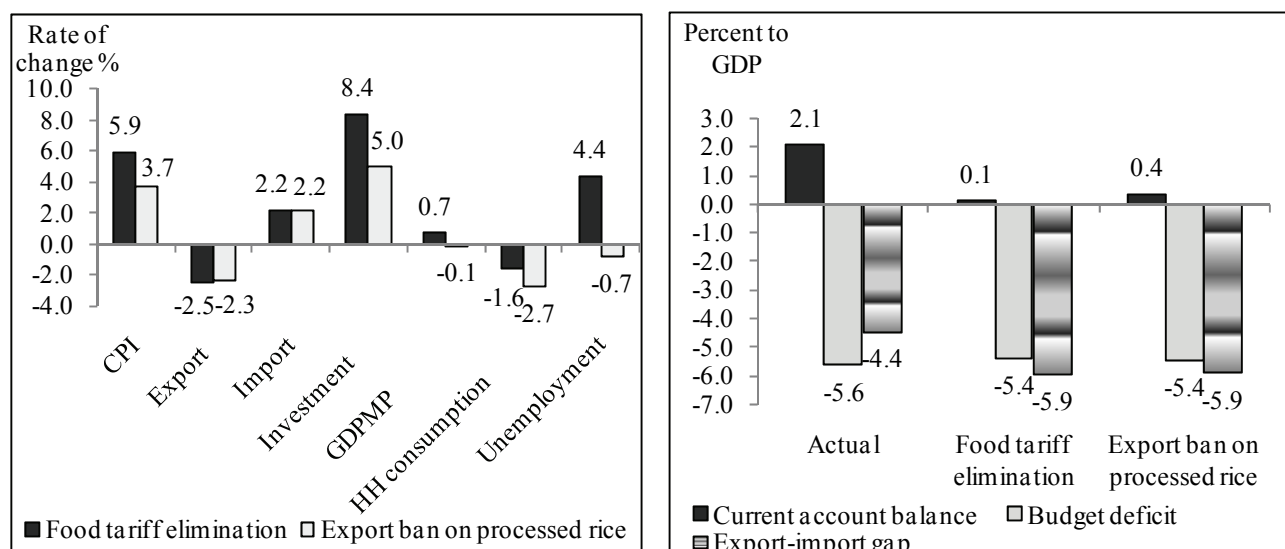
Source: CGE simulations.

Thus the ban on rice exports had positive effects on lowering the budget deficit and the decline in the surplus of the current account, yet it had a negative impact on welfare as measured by households' real consumption growth rates (Figure 12). It is worth noting that although both the share of export-import gap to GDP and that of the budget deficit to GDP are the same in both scenarios Ie and If, the two gaps differ significantly in terms of nominal and real percentage change as highlighted in Table A2.9.

4. IMPACT OF SOARING GLOBAL FOOD PRICES ON POVERTY AND INCOME DISTRIBUTION USING MICRO SIMULATIONS

4.1. Methodology: Linking CGE Results with Micro Data

In order to link the CGE model with the micro-simulation framework, a top-down approach is adopted.[24] This approach uses the two frameworks sequentially. First, the impact of different scenarios is simulated with the CGE model. The second step consists of passing the simulated changes in some variables such as prices, wage rates, and consumption levels down to the micro data.

In the first phase, the standard CGE model is solved and the impact of different scenarios on real income and consumption of different sectors are derived. Consumers have linear expenditure system (LES) preferences and hence changes in real consumption reflect the impact of price

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[24] Top-down approach completely disregards the possible feedback effects coming from the microeconomic side of the economy, which could affect also the macroeconomic variables.

changes as well as changes in consumption patterns (as households may be able to reduce the impact of price changes by substituting away from expensive sectors or using cheaper alternatives). Changes of different sources of income are also obtained. In the second phase, the micro-simulation is worked out to attain the changes in variables—provided by the CGE counterfactuals—such as income and consumption of each household in 2008/09 dataset.

For each household of the 2008/09 household survey, and for each scenario, household consumption on different goods and services as well as its real income are adjusted according to the CGE simulation results, then real income effect, poverty and inequality measures are calculated using the adjusted datasets.

4.2. Poverty and Inequality: Stylized Facts

Based on the 2008/09 HIECS, there were 21.56 percent poor people in Egypt. The poor are defined as those persons who cannot satisfy their basic food and non-food needs. More specifically, the cost of essential food and non-food basic needs is estimated. It is defined as the "poverty line", and then consumptions of households are compared to this poverty line. If household consumption [25] lies below the poverty line, all members of the household are considered poor, otherwise they are considered non-poor. The "poverty rate" represents the proportion of the population that falls below the "poverty line" or which is classified as "poor". In 2008/09, on average, a person who spent less than LE 1,648 per year (LE 134 per month) in Egypt was considered *extremely poor* and those who spent less than LE 2,223 per year (LE 185 per month) were *poor*. Poverty lines vary according to the number of persons in a household, the age of household members, and regional differences in relative prices.

As reflected in Table 14, the poverty rate declined from 19.41 percent in 1995 to 16.7 percent in 2000, it was back to its 1995 level in 2005 (19.6 percent) then increased again to reach 21.56 percent in 2008-09. The number of persons living below the Egyptian expenditure poverty line in 2008-09 was 16.3 million persons. As expected, the global economic crisis had increased the total number of poor. Rural Upper Egypt had the largest poverty rate; accounting for 43.7 percent of its population in 2008-09 (twice the national rate). Spending inequality improved slightly during the period 1995-2008; the Gini coefficient increased from 34.5 to 36.2 during the period 1995-2000, and then fell to 32 in 2004-05. It fell further to 30 in 2008-09. The share of expenditure by the

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[25] As in previous poverty reports for Egypt and in most developing countries, household consumption is considered as the welfare measure.

poorest quintile fell from 9.8 percent to 9.23 percent in the same period, and the top quintile's share stood at 40.4 percent in 2008-09.

Table 14. Poverty and Inequality Measures (1995/96–2008/09)

Indicator*	1995/96	1999/00	2004/05	2008/09
P_0	19.41	16.74	19.56	21.56
P_1	3.39	2.97	3.90	4.1
P_2	0.91	0.80	1.09	1.2
Gini coefficient	0.345	0.362	0.320	0.301

Source: Authors' own calculations based on various HIECS.
* P_0 is a measure of poverty incidence; P_1 measures the depth of poverty or poverty gap; P_2 measures the severity of poverty (Foster, Greer, and Thorbecke 1984).

4.3. Impacts of Food Price Surge on Welfare of Households in Different Income Groups

The CGE model and analysis of the previous sections provide very valuable insights into the aggregate welfare changes and economic impacts of the change in world prices of staple food and proposed subsidy removal scenarios. One of the key findings of that analysis was that (urban and rural) household consumption would fall significantly in all scenarios under consideration. However, the CGE model is unable to distinguish the relative impact on households in different percentiles of the income distribution and more importantly on the poor. This therefore provides the motivation and purpose of the present section. Assessment of impact of different scenarios is addressed through the real income effects, poverty and inequality measures, such as poverty head count, poverty gap and Gini coefficients.

Impacts of soaring global food prices without any policy response for mitigating the effects on the poor
The loss in real consumption due to high increase in world prices of staple food is estimated to be in the range of -2.23 percent to -1.25 percent for each consumption quintile (Table A2.10).

Figure 13. Change in Total Real Consumption after the Price Shock
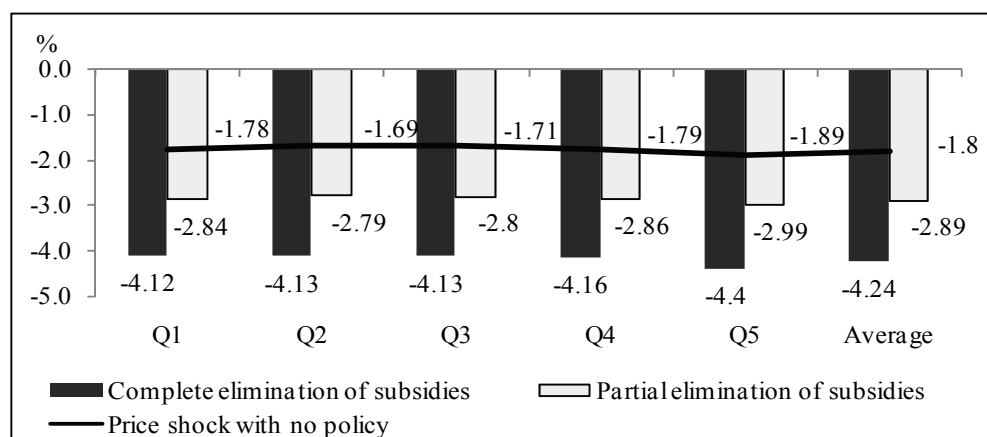
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

As urban residents consume more imported food compared to rural areas, consumption loss is 57 percent higher for urban than for rural residents, the rich also consume more food in absolute terms, and consumption loss for the rich is larger than for the poor.

When increase of world prices was coupled with complete elimination of food subsidies, consumption loss expanded to reach on average 4.24 percent. However losses in real consumption are not homogeneous across quintiles and between urban and rural areas. As in the first scenario, urban population suffers slightly more of loss in consumption, the richer quintiles also are more hit in terms of consumption decline, perhaps because of the progressive nature of food subsidies as mentioned earlier (Figure 13).

Figure 14. Change in Real Consumption in Urban and Rural Household after Prices Shock
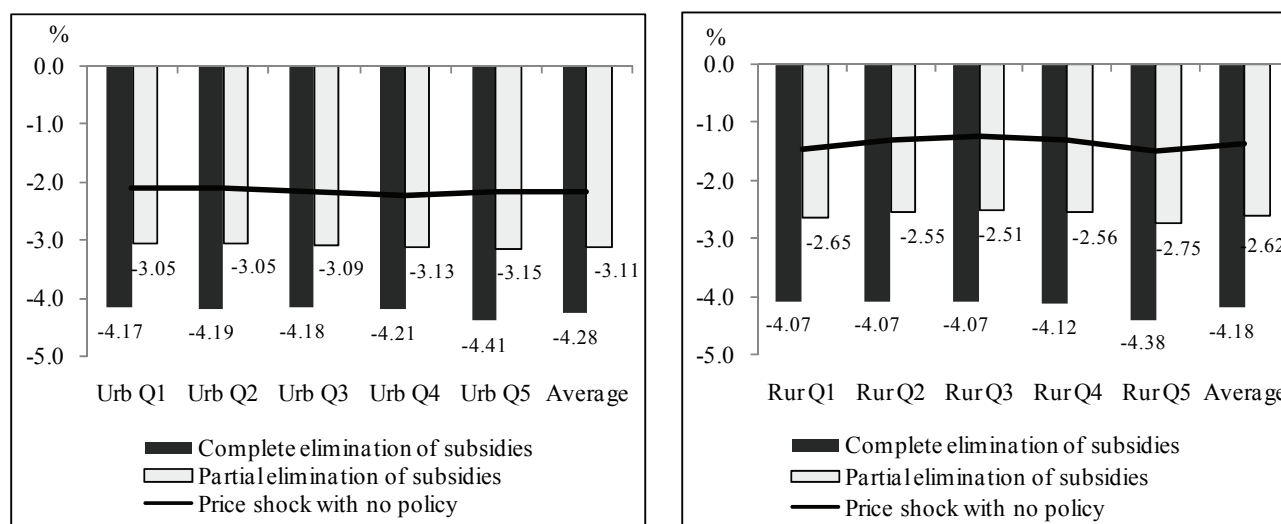
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Similar results are observed when food subsidies are partially eliminated while keeping bread subsidies unchanged, but with smaller deterioration in welfare. Real consumption declines by 2.88 percent on average, compared to 4.34 percent when all subsidies are eliminated.

Impacts of subsidies elimination with compensation of the poor (fiscal measures: increasing direct cash transfers to the poorest two quintiles)

Naturally, when the poorest two quintiles in both urban and rural areas are compensated (scenarios Ic and Id), through direct cash transfers from government, such that their welfare measures are kept unchanged, average real consumption losses are smaller than consumption losses experienced by households when there is no compensation (scenarios Ia and Ib).

Figure 15. Changes in Total Real Consumption according to Various Policy Scenarios

	Q1	Q2	Q3	Q4	Q5	Average
%	-1.57	-1.49	-1.51	-1.58	-1.68	-1.59

Tariff removal
Export ban on rice
Complete elimination of subsidies with compensation
Partial elimination of subsidies with compensation
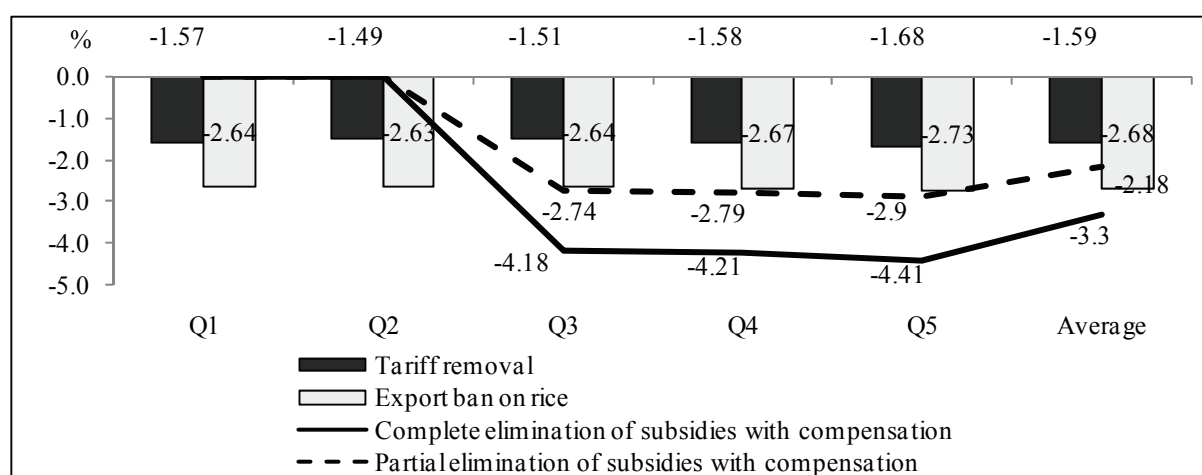
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Households in richer quintiles suffer higher declines in their real consumption compared to the scenario with no compensation, perhaps because of higher inflation (CPI is 1.029 compared to 1.019 in the scenario with no compensation).

Impacts of trade measures

When increases in world prices are coupled with *export bans* as a strategy to mitigate increases in prices (scenario If), and although CPI declined from 1.06 to 1.037, households suffer a larger decline in their total welfare (-2.68 percent) compared to scenario I of world price increases only (-1.82 percent) (see Table A2.9). All quintiles (as reflected in Table A2.10) are negatively affected but these losses are generally lower than the scenario when world prices increase without export bans.

Contrary to the previous scenario, if the government is to *remove import taxes* on non-subsidized food (scenario Ie), consumption losses will be lower compared to all other scenarios, where total household consumption loss is 1.61 percentage points. This loss is lower than the benchmark consumption loss of 1.8 and considerably less than total consumption loss observed in all other scenarios, particularly scenario Ia when increases in world prices are coupled with complete elimination of food subsidies (4.25), as shown in Table A2.5. Scenario Ie exhibited the least impact on living standards and slightly higher GDP growth rate but it also demonstrated a larger increase in budget deficit, compared to scenario If (see Table A2.9), reflecting imposition of export ban on rice.

Figure 16. Change in Real Per Capita Consumption (Scenarios Ic, Id, Ie and If)
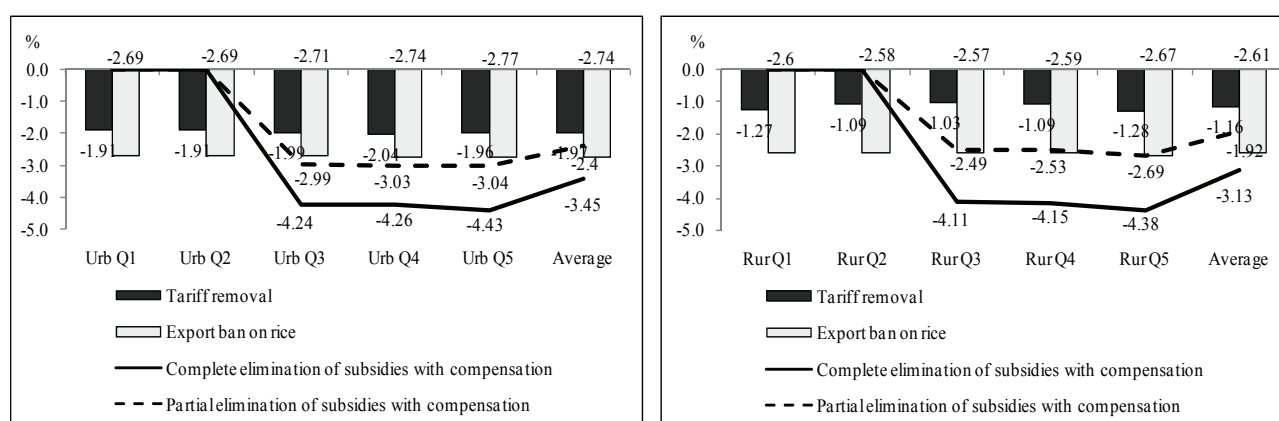
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

It should be emphasized that a *real* per capita consumption loss of the magnitude implied in scenarios Ie and If, as reflected in Figure 16 and in Table A2.10 is not small, especially for low income households which may have little opportunities to economize and switch to cheaper alternatives.

Impacts on poverty and inequality measures

Increases in world food prices are expected to have impacts on poverty. Poverty rate increased from 21.56 percent to 22.85 percent. Given that poverty in Egypt is shallow and many households are clustered just above the poverty line, any decline of consumption of households at the lower distribution ladder may result in a significant increase in poverty and vice versa, therefore scenarios of subsidy elimination have the worst impact on poverty, though the rich suffer larger decline in their welfare, (poverty rate is projected to be 24.95 percent if increases in world prices are coupled with complete elimination of food subsidies and 23.73 percent if food subsidies are partially eliminated, keeping baladi bread subsidies).

Compensating the two poorest quintiles for consumption losses have resulted in slightly lower poverty rates than its original level. For example, the poverty rate is 24.95 percent for the scenario of "increasing world food prices and eliminating food subsidies" (scenario Ia), but when the poorest two quintiles are compensated, poverty rate dropped to 22.38 (scenario Ic). *Therefore, the government of Egypt can reduce the heavy burden of food subsidies—especially when world food prices increase—by targeting some of subsidy savings to the needy.*

Figure 17. Changes in Poverty Rate and Poverty Gap
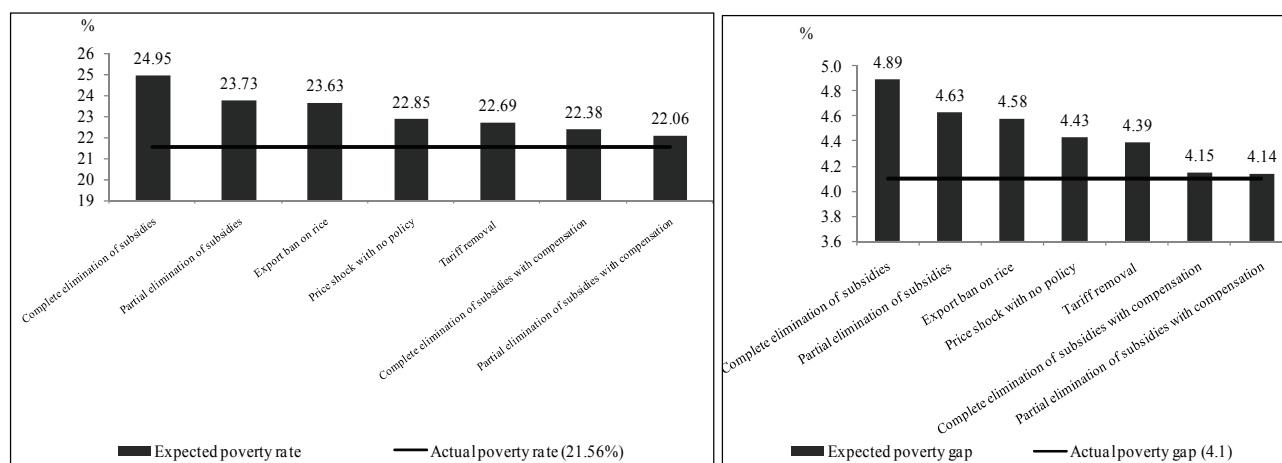
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Finally, the *poverty gap[26] index* also deteriorates compared to the actual poverty gap, with the scenario of "increasing world food prices and eliminating all food subsidies," reflecting the worst performance in this regard (scenario Ia). The food price shock results in an increase in poverty gap from 4.1 percent to 4.43 percent, and in case of complete elimination of food subsidies without compensating the severely poor, poverty gap reaches 4.89 percent. *Severity of poverty* indices followed similar trends; they increased from its original level of 1.2 percent to 1.33 percent due to world price increases and to 1.48 percent if increases in world prices are coupled with complete elimination of food subsidies.

The *inequality measures* (Gini coefficient[27] and Theil measure[28]), have declined for all scenarios, indicating improvements in consumption distribution. As all scenarios exhibit a larger decline in real consumption of the rich compared to the poor, the gap between consumption levels becomes smaller and income distribution improves. In fact, this is always observed for any poverty trends in Egypt, when real consumption declines inequality improves. One explanation of this is that the consumption level of the poor is already low and there is no much space to become lower.

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[26] The poverty gap is given by the distance of the poor below the poverty line, as a proportion of this line; the non-poor are counted as having zero poverty gap.

[27] This is the most commonly used measure of inequality. It is defined as a ratio with values between 0 and 1. A low Gini coefficient indicates more equal income, expenditure or wealth distribution, while a high Gini coefficient indicates more unequal distribution. 0 corresponds to perfect equality (everyone having exactly the same income, expenditure or wealth) and 1 corresponds to perfect inequality (where one person has all the income, expenditure or wealth, while everyone else has none).

[28] The Theil index is part of a larger family of measures of inequality referred to as the General Entropy class. It shows the difference between maximum 'entropy' (perfect equality) and the actually measured 'entropy' (caused by inequality). It does not have a straightforward representation and indeed has many different possible formulations.

Gini index is the smallest for the scenario of "increasing world food prices, eliminating food subsidies, and compensating the lowest two quintiles for consumption losses," it declined by 2.6 percent compared to the actual index. Gini index for the scenario of "increasing world food prices" shows the minimum distribution improvement, indicating that increase in world food prices affects all population segments almost equally. This is also true for all scenarios except scenarios with compensation strategies (Figure 18).

Figure 18. Gini Coefficients under Various Scenarios
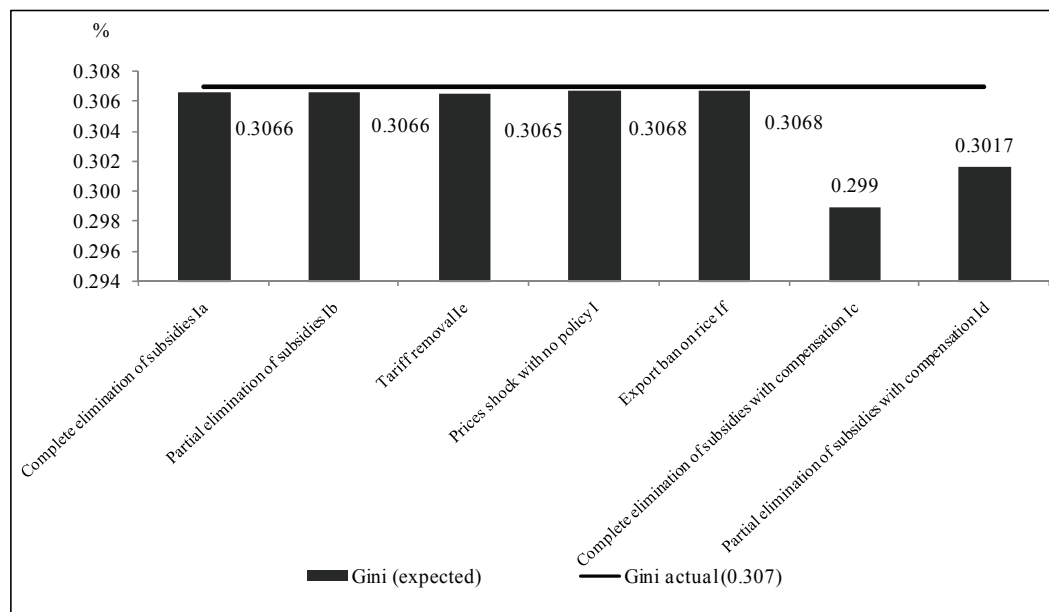
Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Another important insight is gained by looking at the movement of individuals in and out of poverty after world price increases and/or elimination of food subsidies under the various scenarios.

In Figure 19, we show the change in proportion of people that are 'poor' (i.e., below the poverty line) and in those that are 'non-poor' (i.e., above the poverty line) for each scenario compared to the actual poverty classification. Hence, under the first scenario of world food price increases (scenario I), 76.2 percent of the population is non-poor originally and under this scenario, 20.6 percent are poor under both cases, 2.2 percent who would otherwise be non-poor become poor after world price increases, and 0.9 percent who were poor become non-poor. These movements of individuals up and down poverty line result in an increase in poverty rate to 22.9 percent in this scenario compared to 21.6 percent before prices surge.

Figure 19. Dynamics of Poverty under Different Scenarios
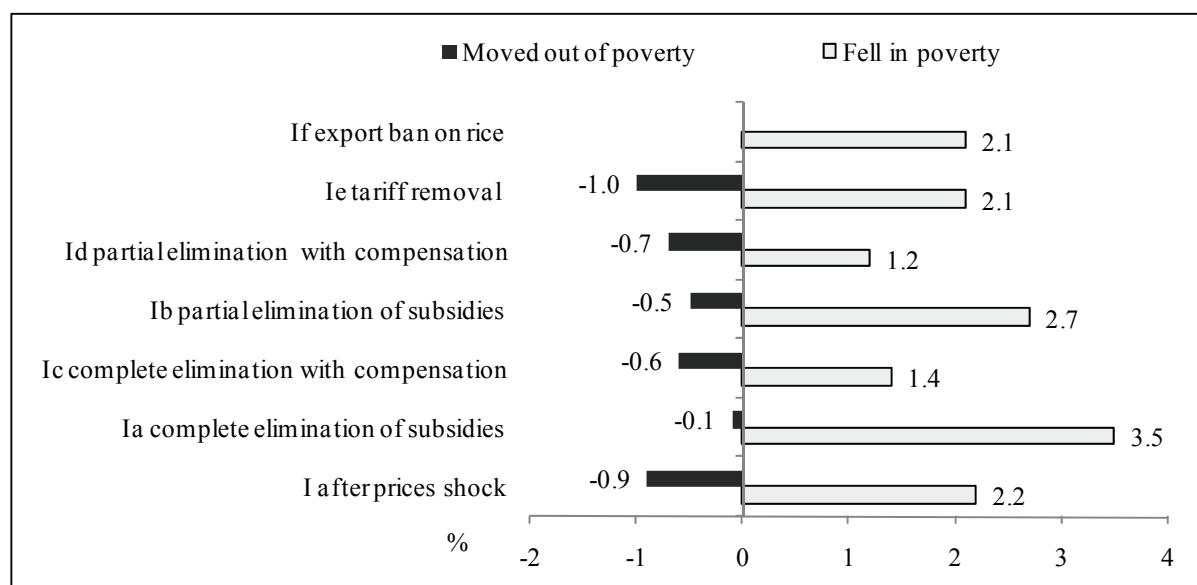
Source: Authors' calculations.

In fact, for all scenarios, the number that goes from poor to non-poor is small (ranges from 0 to 1 percent), while the proportion that would be non-poor under the actual path, but become poor with different scenarios ranges from 1.2 percent (in scenario Id of partial elimination of subsidies except for bread with compensation to the lowest 2 quintiles) to 3.5 percent (in scenario Ia of complete elimination of food subsidies without compensation to the poor). To put this into perspective, this implies that when world food prices increase, with different scenarios to mitigate price increase impact, the additional number of people who would fall below the poverty line is approximately between 1.2 percent and 3.5 percent.

5. CONCLUSION AND POLICY IMPLICATIONS

The main features of the Egyptian economy before the crisis of soaring world food prices, and later with the advent of the global financial crisis, reveal that 21.6 percent of the population live below the poverty line. Food subsidies represent 22 percent of total subsidies in the government budget and 7.4 percent of total household consumption, with this percentage increasing to 15 in the lowest expenditure quintile of the population. The non-needy benefit from more than two thirds of the total food subsidy bill. Government budget deficit reached 6.9 percent of GDP in 2007/2008. However GDP growth rate reached 7 percent for 3 successive years.

Results of the study show that food price increases produce negative impacts on vulnerable population, government budget and macroeconomic indicators. Inflation rises by 6 percentage points; welfare (real consumption) of household decreases by 1.8 percent; government budget

deficit increases by 3.9 percent in real terms; unemployment increases by 4 percent and current account surplus decreases by 89 percent.

Complete elimination of food subsidies without compensation has contractionary effects on the economy. It substantially decreases budget deficit (-19.7 percent); however it worsens the situation of the poor as 3.5 percent more of population fall below the poverty line, which increases poverty rate to 25 percent compared to 21 percent in the reference case. Average household welfare decreases by 4.24 percent, GDP growth rate by (-2.3 percent) and unemployment increases to 11.1 percent. Maintaining subsidies for bread lowers contractionary effects and welfare loss (-2.9 percent).

When government undertakes compensatory policies, in the form of direct cash transfers to the lowest 2 quintiles, to mitigate negative impacts of food price increases and subsidy elimination, welfare loss is down to 3.3 percent. Maintaining bread subsidies in this case lowers welfare loss to 2.2 percent, and poverty rate is the least among all scenarios (22.06 percent).

Trade measures in the form of removal of tariffs on food products lead to a total welfare loss, measured by household (HH) consumption, by (1.61percent), while imposing export ban on rice raises total welfare loss to (2.68 percent).

One interesting result of the study is that income distribution improved in all scenarios. This is explained by the fact that all scenarios exhibit a larger decline in real consumption of the rich compared to the poor.

To sum up, welfare indicators are sensitive to food prices. These prices along with subsidies may exclude or add to the people below the poverty line; therefore government policy should focus on this issue, and vulnerable segments of the population must be compensated in cases of food price increases, either because of world prices surge or because of subsidy reform.

Compensation of low income population could be financed from savings resulting from the elimination of subsidies that leaked to non-needy; moreover direct cash transfers should be indexed to CPI, at least for food items, to secure vulnerable population from future food price shocks.

Cash transfers should be targeted to the poor, and unless the system is implemented very efficiently it would lead to increased administrative costs that could ultimately offset the savings of subsidy reform. This would impose new burdens on the government budget, and more importantly it could severely affect the poor. Poll surveys in the media show that people's impressions about bureaucracy and inefficiency of performance in public institutions lead to lack of credibility in a cash transfer system as a substitute to an in-kind subsidy system.

Reform of the subsidy system towards targeted cash transfers may have some side effects on households, as they may partly use it in the consumption of other products than food. Negative nutritional effects could arise.

In the context of reforming the subsidy system it may be recommended to keep the bread subsidy. Results of the study show that it has an essential role in reducing negative impacts of the food price increases. Other instruments of fiscal policy should be addressed, such as wages and social insurance.

Protection of households, especially the poor, from welfare losses induced by increases in food prices, requires considering the subsidy system reform in a broader context of development strategy. Policies on the supply side should focus on agricultural sector. In-depth studies are required to decide on optimal crop pattern which considers all constraints and conflicting targets of food security, environment issues, water scarcity, export expansion and others. The agricultural products market is in need of reform as well to enable it to perform its function of allocating resources in line with development targets.

The ultimate target of development should be to eradicate poverty and hence to reduce the need for subsidies and protect households against food price shocks.

Finally, the role of institutions in designing and implementing adequate policies is of great importance to address all aspects of food security and poverty alleviation. Lack of harmonization between these institutions is an impediment to reach expected results of proposed policies.

Improvements in data bases and a clear vision about a comprehensive development strategy are a prerequisite to enhancing such harmonization.

ANNEX 1. MODEL BASIC STRUCTURE, CHARACTERISTICS AND EQUATIONS

The computable general equilibrium (CGE) model designed for this study is based on a class of CGE models that has been extensively applied to developing countries to study the impact of different policies on growth, economic structure and performance, and income distribution. In particular, the model draws on the work of Dervis, de Melo and Robinson (1982); Devarjan, Lewis and Robinson (1994), Löfgren (2001), Löfgren and El Saïd (1999) and Kheir-El-Din, Moursi and El Megharbel (1996).

Model basic structure

The core model is basically neo-classical. However, it includes some structuralist features that depart from the Walrasian paradigm providing a better representation of the Egyptian economy. Such features include the assumption of markup-pricing for subsidized food products and accordingly fixed domestic prices for such products. The model also assumes imperfect substitutability between goods traded internationally and domestic output. Structuralist features extend to the factors' markets where existence of wage rigidities and immobility of capital and land are assumed. Regarding labor, the nominal wage rate is assumed to be determined exogenously according to institutional mechanisms. This corresponds to the Keynesian assumption of short-run predetermined nominal wages implying the presence of involuntary unemployment. Thus, the model deviates from the neoclassical full employment assumption and allows for the presence of unemployment which is a major feature characterizing labor markets in Egypt. National Keynesian unemployment is endogenously determined as the difference between the aggregate labor demand from activities and from the exogenously given aggregate labor supply. Due to the assumption of perfect labor mobility and the fact that most of the unemployed workers in Egypt are new entrants to the market and therefore cannot be assigned to each sector, the model does not solve for sectoral unemployment rates and determines only the national rate of unemployment (Kheir-El-Din, Moursi, and El Megharbel 1996).

Capital and land stocks are assumed to be sectorally fixed, implying factor immobility. This assumption is compatible with the short-run nature of the model where capital may be regarded to be less mobile than labor (Dervis, de Melo, and Robinson 1982). Further, immobility implies that rental rates will differ across sectors reflecting the fact that capital is heterogeneous, i.e., a unit of capital has a different composition across sectors. For both factors, the model assumes full utilization with flexible rental rates. Due to market forces, rental rates are determined endogenously in each sector. However, the neoclassical assumption regarding all factors to be paid according to

their marginal productivity is retained. Incorporating both neoclassical and structuralist characteristics allows the model to be classified as a "Neoclassical-Structuralist" model.

The model is of a short-run nature implying that the results of the comparative static analysis experiments may be interpreted as relatively short-run equilibrium effects to an exogenous policy change. Regarding its time dimension, the model is static. It solves for equilibrium values in one period. For each period, it generates a set of relative prices of commodities and factors that equate supply and demand in the corresponding markets. The model also allows for the determination of the consumer price index indicating inflation.

Social Accounting Matrix as database for the model

A Social Accounting Matrix (SAM) for Egypt for 2006/2007 was constructed as database for the model. An updated input-output table was estimated for this year on the basis of the input-output table for 2002/2003, which was constructed at the Ministry of State for Economic Development (MOED). This table consists of 32 sectors producing goods and services.

The updated table was adjusted to conform to the objectives of the study, therefore more details on production and consumption of food were included and non-food manufactured products were grouped in one sector. Disaggregation of sectors explicitly reveals subsidized food products.

Model characteristics

The model disaggregation by institutions, factors and activities is shown in Table A1.1.

Table A1.1. Disaggregation of Factors, Institutions and Activities

Actors	Elements
3 Factors of production	Labor, capital and land
22 sectors (activities and commodities) Agricultural products:	Wheat, paddy rice, maize, other crops, oil crops, vegetables and fruits, sugar crops, bovine, chicken and other meat.
Processed food:	Subsidized bread, subsidized flour, other subsidized food products (including subsidized processed rice, edible oil, and sugar), non-subsidized rice, non-subsidized processed food.
	Crude oil and extractions, beverages and tobacco, textiles, chemicals and petroleum products, and other industries.
Manufacturing products:	Construction and electricity, hotels and restaurants, transportation and communications and other services.
Services:	
13 Institutions	10 households (rural and urban disaggregated by quintile), companies, government and rest of the world.

Characteristics of food products as modeled in the 2006/07 SAM are highlighted in Table A1.2.

Table A1.2. Characteristics of Food Products according to SAM 2006/07

Characteristics	No private consumption	No imports	No exports	No imports, no exports (non-tradable)
Sectors	Paddy rice, sugar crops, oil crops and crude oil	Paddy rice, sugar crops, subsidized bread, non subsidized rice, construction, and hotels and restaurants	Paddy rice, sugar crops, subsidized bread, subsidized flour, subsidized food.	Paddy rice, sugar crops, subsidized bread.

Economic decision making is modeled as an outcome of decentralized optimization by producers and consumers. Concerning production, producers (activities) are assumed to maximize their profits subject to technological constraints. Technology in each sector is specified by a constant elasticity of substitution (CES) production function combining primary factors: labor, land and capital. Like most CGE models, intermediate input demands are modeled as fixed input-output technology (Leontief function). Table (A1.3) presents the main features of the model.

Table A1.3. Model Features

Feature	Treatment
Time frame	Static with updating specific exogenous variables and parameters to be solved in various years other than the base year
Theoretical basis	Neo-classical structuralist
Production technology	Primary factors: CES Intermediate inputs: Leontief functions
Household consumption demand	LES (linear expenditure system)
International prices	Exogenous
Import demand	Endogenous (through CES domestic supply function)
Export supply	Endogenous (through CET production function)
Export demand	Downward sloping
Export transformability and import substitution	Imperfect
Land and capital	Fixed supply with endogenous rental rates
Labor	Fixed wages with endogenous national unemployment rate

Finally, a set of macro equilibrium conditions are imposed to close the model. They present the closure rules of the model or the system constraints that the whole economy must satisfy. For each market a variable should be specified through which its movements' equilibrium is brought between the supply and demand sides. These are divided into nominal and real system constraints.

Nominal constraints cover markets for commodities and factors of production whereas real ones refer to government, rest of the world and savings-investment accounts.

For all commodities, price flexibility achieves equilibrium in each market. However, imports and domestic output of subsidized food products are the only exceptions. For subsidized food products prices are assumed to be fixed and markup pricing serves to clear the market. In the case of imports, supply is infinitely elastic at fixed world import prices. The quantity supplied adjusts to equal the quantity demanded. Therefore, imports' domestic market is the only market that clears through quantity adjustment (Löfgren 1993).

Market equilibrium for immobile factors of production (land and capital) is achieved through changes in their relevant prices. In the labor market, existence of Keynesian unemployment is assumed. Fixed labor supply is set to be equal to the sum of sectoral labor demand, fixed government labor demand and unemployment. The national level of unemployment serves to achieve equilibrium in the labor market in the sense of equating national fixed labor supply with aggregate labor demand.

Table A1.4 summarizes the way in which real and nominal constraints in the model are brought into balance. For example, the balance between savings and investment is achieved by setting total investment to be equal to the sum of domestic and foreign savings. This means that total savings determine the level of investment in the model. Moreover, foreign savings endogenous variations are assumed to achieve the balance of the current account given the assumption of fixed nominal exchange rate.

Table A1.4. Closure Rules

Constraint	Equilibrating variable
Goods markets (perfect competition)	Prices (except for the domestic output of subsidized food where equilibrium is reached via variations in the markup pricing variable and imports where the market adjusts through changes in the quantity supplied).
factor markets	Capital and land: prices (full employment) Labor: national unemployment rate
Government account	Government savings
Current account	Foreign savings
Savings-investment	Investment (savings driven model)

Model Equations

Prices Block

$$PM_i = \overline{PWM_i} \cdot ER[1 + tm_i]$$

$$PE_i = PWE_i \cdot ER[1 + te_i]$$

$$PQ_i = PD_i\left[\frac{D_i}{Q_i}\right] + PM_i\left[\frac{M_i}{Q_i}\right] \qquad \text{where} \quad Q_i = D_i + M_i$$

$$PX_i = PD_i\left[\frac{D_i}{X_i}\right] + PE_i\left[\frac{E_i}{X_i}\right] \qquad \text{where} \quad X_i = D_i + E_i$$

$$AVC_i = \left(\sum_j a_{ji} PQ_j X_i + FD_{fi}.W_{fi}\right)\Big/ X_i \quad \text{where } i \text{ refers to subsidized food sectors}$$

$$PX_i = AVC_i(1 + \tau_i) \quad \text{where } i \text{ refers to subsidized food sectors}$$

$$PN_i = PX_i - PX_i \cdot td_i - \sum_j a_{ji} \cdot PQ_j - PX_i.sub_i$$

$$CPI = \sum_i \omega_i \cdot PQ_i$$

Quantities Block

$$X_i = A_i^P\left[\sum_f \delta_i^P FD_{fi}^{-\rho_i^P}\right]^{\frac{-1}{\rho_i^P}}$$

$$PN_i A_i^P\left[\sum_f \delta_i^P FD_{fi}^{-\rho_i^P}\right]^{\frac{-1+\rho_i^P}{\rho_i^P}} \delta_i^P FD_{fi}^{-(1+\rho_i^P)} = W_{fi}$$

$$V_i = \sum_j a_{ij} \cdot X_j$$

$$Q_i = A_i^Q\left[\delta_i^Q M_i^{-\rho_i^Q} + \left(1 - \delta_i^Q\right)D_i^{-\rho_i^Q}\right]^{\frac{-1}{\rho_i^Q}}$$

$$X_i = A_i^X\left[\delta_i^X E_i^{\rho_i^X} + \left(1 - \delta_i^X\right)D_i^{\rho_i^X}\right]^{\frac{1}{\rho_i^X}}$$

$$\frac{M_i}{D_i} = \left[\frac{PD_i}{PM_i} \frac{\delta_i^Q}{1-\delta_i^Q} \right]^{\frac{1}{1+\rho_i^Q}}$$

$$\frac{E_i}{D_i} = \left[\frac{PE_i}{PD_i} \frac{1-\delta_i^X}{\delta_i^X} \right]^{\frac{1}{\rho_i^X-1}}$$

$$E_i = \overline{EO} \left[\frac{\Pi_i}{PWE_i} \right]^{\eta_i}$$

$$GDPFC = \sum_i PN_i \cdot X_i$$

$$GDPMP = GDPFC + \sum_i td_i \cdot PX_i \cdot X_i + \sum_i sub_i.PX_i.X_i + \sum_i tm_i \cdot \overline{PWM}_i \cdot ER \cdot M_i$$

Institutional Income and Expenditure Block

$$Y_f = \sum_i FD_{fi} \cdot W_{fi}$$

$$T_{FN} = sh_{FN} Y_F$$

$$T_{N^D N} = sh_{N^D N} Y_{N^D}$$

$$Y_{N^D} = \sum_F T_{FN} + \sum_{N^D} T_{N^D N} + ER \cdot \overline{trow}_N + \overline{trg}_N \qquad \left(N = N^D \right)$$

$$CY_{N^D} = Y_{N^D} \left[1 - \sum_N T_{N^D N} - tx_{N^D} - sv_{N^D} \right] \qquad \left(N^D = hh \right)$$

$$CD_{N^D_i} = \gamma_i + \left[\frac{\beta_i}{PQ_i} \left(CY_{N^D} - \sum_i PQ_i \gamma_i \right) \right] \qquad \left(N^D = hh \right)$$

$$Gov\,Rev = \sum_{N^D} T_{N^D N} + \sum tx_{N^D} Y_{N^D} + ER \cdot \overline{trow}_N + \sum_i td_i \cdot PX_i \cdot X_i + \sum_i tm_i \cdot \overline{PWM}_i \cdot ER \cdot M_i$$
$$+ \sum te_i \cdot PWE_i \cdot ER \cdot E_i + \overline{trg}_{N(N=GOV)} + sub_i PX_i X$$

$$GovExp = \sum_N \overline{trg}_N + \sum_N PQ_i \cdot \overline{GCD}_i + \sum_i (\tau_i^{base} - \tau_i) X_i$$

System Constraints Block

$Q_i = D_i$ where i refers to non importing sectors

$X_i = D_i$ where i refers to non exporting sectors

$$Q_i = V_i + \sum_{N^D} CD_{N^D_i} + \overline{GCD}_i + INV_i + E_i$$

$FD_{fi} = \overline{FS}_{fi}$ where f refers to land and capital

$\overline{LS} = \sum_i FD_{fi} + UE$ where f refers to labor

$INV_i = shinv_i.TINV$

$$\sum_{N^D} sv_{N^D} Y_{N^D} + (GOVREV - GOVEXP) + ER \cdot FSAV = TINV$$

$$\left\{ \begin{array}{l} \sum_N trow_N + \sum_i PWE_i \cdot E_i + FSAV = \\ \dfrac{1}{ER}\left(\sum_{N^D} T_{N^D N(N=ROW)} + \overline{trg}_{N(N=ROW)} \right) + \sum_i \overline{PWM}_i \cdot M_i \end{array} \right\}$$

Model Variables

Exogenous Variables

$\overline{PWM_i}$ world price of imports (measured in US dollars)

ER foreign exchange rate

PX_i market price for domestic output (where i refers to subsidized food sectors)

$\overline{EO}$ base year exports

Π_i aggregate world price of exports

$\overline{trow}_N$ transfers from ROW to all institutions

$\overline{trg}_N$ government transfers to all institutions

$\overline{GCD}_i$ government consumption demand for good i.

$\overline{FS}_{fs}$ sectoral factor supply

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Endogenous Variables

PM_i domestic price of imports

PE_i domestic price of exports

PWE_i world export supply price (measured in US dollars)

PQ_i domestic supply price

PD_i domestic price for output directed to the domestic market

PX_i market price for domestic output

PN_i net or value added price

CPI price level

AVC_i average variable cost (where i refers to subsidized food sectors)

τ_i markup pricing (where i refers to subsidized food sectors)

X_i domestic output

FD_{fi} demand for factor f by sector i

W_{fi} price of factor f in sector i

V_i intermediate demand

Q_i domestic composite supply

M_i imports

D_i domestic output directed to domestic market

E_i exports

$GDPFC$ GDP at factor cost

$GDPMP$ GDP at market price

Y_f factor income

T_{FN} transfers from factor F to all institutions

$T_{N^D N}$ transfers from domestic non-government institutions to all institutions

Y_{N^D} income of domestic non-government institutions

CY_{N^D} Consumption spending of domestic non-government institutions

$CD_{N^D_i}$ consumption demand of households on good i

$Gov\,\mathrm{Re}\,v$ government revenue

$GovExp$ government expenditure

INV_i investment demand by sector of origin

$TINV$ total investment

$FSAV$ foreign savings

UE national level of unemployment

Parameters

tm_i tariff rate

te_i export subsidy rate

td_i indirect tax rate

sub_i subsidy rate

a_{ji} fixed input output coefficients

ω_i price level index weights

A_i^P shift parameter in CES production function

δ_{fi}^P share parameter in CES production function

ρ_i^P substitution parameter in CES production function

A_i^Q shift parameter in CES domestic supply function (Armington function)

A_i^X shift parameter in CET output transformation function

δ_i^Q share parameter in CES domestic supply function (Armington function)

ρ_i^Q substitution parameter in CES domestic supply function (Armington function)

$shinv_i$ fixed investment shares

δ_i^X share parameter in CET output transformation function

ρ_i^X substitution parameter in CET output transformation function

sh_{FN} share of institution N in income of factor F

$sh_{N^D N}$ share of institution N^D in income of institution N

tx_{N^D} direct tax rate

sv_{N^D} savings rate

γ_i subsistence purchases of good i.

β_i marginal propensity to consume from the income above that needed for subsistence purchases

sub_i subsidy rates directed to various activities

Indices

$i =$ activities (agriculture, industry, and services)

$j =$ transpose of i

$F =$ factors of production; labor, land and capital

$N =$ all institutions; urban and rural households (hh), companies, government and the rest of the world (ROW).

$N^D =$ domestic non-government institutions (households and companies)

Table A1.5. Elasticity Values Used in the Model

	CES (production function)	CES (Armington)	CET	Export demand
Wheat	0.3	0.45	0.6	1.5
Paddy rice	0.3			
Maize	0.3	0.45	0.6	1.5
Other crops	0.3	0.45	0.6	1.5
Oil crops	0.3	0.45	0.6	1.5
Vegetables and fruits	0.3	0.45	0.6	1.5
Sugar crops	0.3			
Bovine meat	0.3	0.45	0.6	1.5
Crude oil extractions	0.1	2.0	2.0	2.0
Beverages and tobacco	0.6	0.3	1.5	1.5
Subsidized bread	0.6			
Subsidized flour	0.6	0.45		
Subsidized food	0.6	0.45		
Non subsidized processed rice	0.6		0.6	1.5
Non subsidized processed food	0.6	0.45	1.5	1.5
Textiles	0.6	0.3	1.5	2.0
Chemicals and petroleum products	0.1	2.0	1.5	2.0
Other industries	0.6	0.3	1.5	2.0
Construction	0.5		1.5	1.0
Transportation	0.6	0.3	1.5	1.0
Hotels and restaurants	0.6		1.5	1.0
Other services	0.6	0.3	1.5	1.0

Source: Authors' assessments, drawing on Löfgren and El-Saïd (1999) and Löfgren (2001).

Notes: CES Elasticity of factor substitution in CES production function. CES Armington Elasticity of substitution between imports and domestic goods in CES aggregation function. CET Elasticity of transformation between exports and domestic sales in CET function.

Table A2.1. Set of Policy Options in the Various Simulations and Main Changes in Closure Rules

Policy simulations \ Variables	Scenario a: Complete elimination of food subsidies	Scenario b: Elimination of food subsidies except bread	Scenario c: Elimination of food subsidies + cash transfers to poorest quintiles	Scenario d: Elimination of food subsidies except bread + cash transfers to poorest quintiles	Scenario e: Elimination of import tariffs on food products	Scenario f: Imposing export ban on processed rice
Flour subsidy rate	0	0	0	0	As base year (13%)	As base year (13%)
Bread subsidy rate	0		0		As base year (52%)	As base year (52%)
Rice, oil and sugar subsidy rate	0	0	0	0	As base year (26%)	As base year (26%)
Exports of processed rice	Endogenous	Endogenous	Endogenous	Endogenous	Endogenous	As base year * Fixed in quantity
Tariff rates on non subsidized processed food products	As base year (3.3%)	As base year (3.3%)	As base year (3.3%)	As base year (3.3%)	0	As base year (3.3%)
Output and composite prices of subsidized products	Fixed (markup-pricing)	Endogenous except for subsidized bread	Endogenous for all subsidized products	Endogenous except for subsidized bread	Fixed (markup-pricing)	Fixed (markup-pricing)
Government transfers to two lowest urban and rural quintiles	Fixed	Fixed	endogenous	endogenous	Fixed	Fixed
Real income of two lowest urban and rural quintiles	Endogenous	Endogenous	Fixed	Fixed	Endogenous	Endogenous

*By setting $\eta = 0$ in the export demand function.

Table A2.2. Assumptions of International Food Prices for Scenarios I and II: High and Moderate Price Increases

Scenario I				
	2007 average	**June 2008**	**Nominal % change**	**Real % change**
Edibles index	115.8	178.5	54.1	44.4
Food index: Cereals, vegetable oils, protein meals, meats, seafood, sugar, bananas and oranges	115.9	179.7	55.0	45.2
Index of agricultural raw materials (2005=100)	114.3	119.4	4.5	-2.2
Wheat; US number 1 HRW, fob Gulf of Mexico	201.9	348.6	72.6	61.7
Maize; US number 2 yellow, fob Gulf of Mexico	150.2	287.1	91.2	79.1
Rice; 5 percent broken, nominal price quote, fob Bangkok	315.3	834.6	164.7	148.0
Sugar; EC import price, cif European	32.1	32.6	1.6	-4.8
Other food sectors (average of edibles and food indices)			54.6	44.8

Source: Authors' calculations based on the IMF Commodity Price Database (2009a). The IMF commodity price database is all in nominal US$ terms; a simple way of getting real price changes was by taking US Consumer Price Index from the October 2009 IMF World Economic Outlook database, which gave 2006-2008 US inflation rate at 6.8 percent (average consumer price index, 2000= 100). The figures for 2007 are averages for July 2006 till June 2007.

Scenario II				
	2007 average*	**2008 average****	**Nominal % change**	**Real % change**
Edibles index	115.8	151.3	30.6	22.4
Food index: Cereals, vegetable oils, protein meals, meats, seafood, sugar, bananas and oranges	115.9	152.3	31.4	23.1
Index of agricultural raw materials (2005=100)	114.3	114.1	-0.2	-6.5
Wheat; US number 1 HRW, fob Gulf of Mexico	201.9	343.7	70.2	59.4
Maize; US number 2 yellow, fob Gulf of Mexico	150.2	200.9	33.8	25.3
Rice; 5 percent broken, nominal price quote, fob Bangkok	315.3	539.2	71.0	60.2
Sugar; EC import price, cif European	32.1	33.2	3.7	-2.9
Other food sectors (average of edibles and food indices)			31.0	22.7

Source: Authors' calculations based on the IMF Commodity Price Database (2009a). The IMF commodity price database is all in nominal US$ terms; a simple way of getting real price changes was by taking US Consumer Price Index from the October 2009 IMF World Economic Outlook database, which gave 2006-2008 US inflation rate at 6.8 percent (average consumer price index, 2000= 100).

* Figures for 2007 are averages for July 2006 till June 2007. ** Figures for 2008 are averages for July 2007 till June 2008.

Table A2.3. Main Macro Indicators Growth Rates Compared to Base Year under the Two Assumptions for World Food Price Surge

	Initial values in 2006/2007 in LE billions	I. High growth rates		II. Moderate growth rates	
		Nominal % change	Real % change	Nominal % change	Real % change
Current account surplus	15.338	-89.246	-89.855	-77.681	-78.527
CPI	1	6.006		3.942	
Exports	226.350	3.312	-2.541	1.326	-2.516
Imports	259.400	7.944	1.829	5.583	1.579
Export import gap	-33.050	39.670	31.757	34.736	29.627
Investment	155.300	14.714	8.215	12.109	7.858
GDPMP	745.850	4.562	0.789	3.444	0.740
GDPFC	742.968	4.343	0.577	3.275	0.576
HH consumption	539.200	4.076	-1.821	3.074	-0.834
Government revenue	199.844	2.520	-3.288	1.907	-1.957
Government expenditure	241.659	3.845	-2.039	3.071	-0.837
Budget deficit	41.815	10.177	3.935	8.636	4.516
Unemployment	0.093		4.125		-1.582
Subsidy bill	52.909	14.474	7.989	11.572	7.341

Source: Results of CGE simulations.

Table A2.4. Households' Share in Factors' Income (%) according to SAM 2006/07

	Labor	Capital	Land
HHURB-1	5.9	2.7	1.5
HHURB-2	8.5	3.9	1.9
HHURB-3	10.6	5	1.7
HHURB-4	13.6	6.9	1.3
HHURB-5	24.5	20	1.6
HHRUR-1	4.9	3.1	8.7
HHRUR-2	5.9	4.4	14.3
HHRUR-3	6.8	5.5	18.5
HHRUR-4	8.1	6.8	21.2
HHRUR-5	11.1	15.1	29.3

Source: Authors' calculations based on Egypt's Social Accounting Matrix (SAM) 2006/07.

Table A2.5. Main Macro Indicators Growth Rates Compared to Base Year: Scenarios Ia and Ib, Complete and Partial Food Subsidy Elimination

	Initial values in 2006/2007 in LE billions	Scenario Ia: Complete food subsidy elimination		Scenario Ib: Partial food subsidy elimination	
		Nominal % change	Real % change	Nominal % change	Real % change
Current account surplus	-15.338	-4.073	-5.881	-47.946	-50.107
CPI	1	1.921		4.332	
CPI subsidized food products	1	2.185		5.171	
Exports	226.350	3.711	1.756	3.503	-0.795
Imports	259.400	3.655	1.701	5.835	1.440
Export import gap	-33.050	3.271	1.324	21.805	16.747
Investment	155.300	2.531	0.598	8.284	3.788
GDPMP	745.850	-1.450	-1.035	1.852	0.014
GDPFC	742.968	-2.718	-2.308	1.340	-0.489
HH consumption	539.200	-2.405	-4.245	1.306	-2.901
Government revenue	199.844	3.457	1.507	2.364	-1.886
Government expenditure	241.659	-0.288	-2.167	1.848	-2.381
Budget deficit	-41.815	-18.186	-19.728	-0.616	-4.743
Unemployment	0.093		11.087		7.244
Subsidy bill	-52.909	-18.535	-20.070	1.457	-2.756

Source: Results of CGE simulations.

Table A2.6. Main Macro Indicators Growth Rates Compared to Base Year: Scenarios Ic and Id, Complete and Partial Food Subsidy Elimination (Keeping that on Bread) and Compensating the Poorest Two Quintiles through Cash Transfers

	Initial values in 2006/2007 in LE billions	Scenario Ic: Scenario Ia + cash transfers to poorest quintiles		Scenario Id: Scenario Ib + cash transfers to poorest quintiles	
		Nominal % change	Real % change	Nominal % change	Real % change
Current account surplus	-15.338	-4.272	-6.927	-49.282	-51.609
CPI	1	2.852		4.809	
CPI subsidized food products	1	4.970		5.103	
Exports	226.350	3.805	0.926	3.561	-1.191
Imports	259.400	3.694	0.818	5.930	1.070
Export import gap	-33.050	2.938	0.083	22.159	19.475
Investment	155.300	0.480	-2.307	7.267	2.345
GDPMP	745.850	-0.453	-0.729	2.498	0.245
GDPFC	742.968	-1.779	-2.051	1.935	-0.305
HH consumption	539.200	-0.578	-3.335	2.502	-2.201
Government revenue	199.844	4.120	1.232	2.837	-1.881
Government expenditure	241.659	2.435	-0.406	3.553	-1.199
Budget deficit	-41.815	-5.620	-8.238	6.971	2.062
Unemployment	0.093	10.939			5.221
Subsidy bill	-52.909	-18.471	-20.732	0.814	-3.812

Source: Results of CGE simulations.

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Table A2.7. Real GDP at Factor Cost Growth Rates Compared to Base Year

	Scenario I	Scenario Ia	Scenario Ib	Scenario Ic	Scenario Id
Wheat	12.217	7.101	10.754	-2.190	0.293
Paddy rice	65.920	49.124	55.301	51.605	56.089
Maize	6.951	1.644	5.082	-1.099	0.620
Other crops	3.006	-1.114	1.372	1.001	2.367
Oil crops	47.766	53.322	50.041	51.564	49.249
Vegetables and fruits	1.028	-2.859	-0.594	-0.473	0.886
Sugar crops	-14.898	-25.485	-22.273	-29.481	-24.280
Bovine meat	2.612	-4.495	-0.590	-3.341	-0.316
Oil	-3.608	0.434	-1.800	-0.275	-2.199
Beverages and tobacco	-3.206	-7.096	-4.322	-1.343	0.181
Sub-bread	-8.975	-53.830	-7.741	-50.342	-7.413
Sub-flour	-36.695	-59.724	-50.979	-47.686	-43.977
Sub-food	-17.729	-47.373	-45.324	-47.173	-46.461
Non-sub-processed rice	7.593	13.463	11.548	13.071	11.433
Non-sub Food	-8.185	-8.221	-8.861	-12.309	-11.089
Textile	-2.200	-4.805	-3.053	-1.143	-0.162
Chemicals	-1.559	0.207	-0.855	-0.496	-1.197
Other industries	4.817	1.373	2.723	-0.235	2.063
Construction	17.348	3.911	9.934	0.438	7.951
Transportation	-1.549	-3.009	-1.923	-0.902	-0.377
Hotels and restaurants	-5.947	0.030	-3.202	-0.739	-3.624
Other services	-0.006	-1.869	-0.734	-0.842	0.176

Source: Results of CGE simulations.

Table A2.8. Government Transfers to Households (Scenario I: High Price Increases)

	Government transfers in base year (LE billion)	Government transfers shares out of households' incomes in base year	Government transfers shares out of households' incomes after change % (Scenario Ic)	Government transfers shares out of households' incomes after change (Scenario Id)
HHURB-1	0.350	1.211	5.397	4.102
HHURB-2	0.464	1.110	5.314	4.008
HHURB-3	0.759	1.412	1.434	1.389
HHURB-4	1.204	1.632	1.657	1.606
HHURB-5	2.519	1.393	1.417	1.371
HHRUR-1	0.223	0.781	4.878	3.352
HHRUR-2	0.254	0.658	4.749	3.146
HHRUR-3	0.309	0.656	0.665	0.642
HHRUR-4	0.421	0.724	0.734	0.708
HHRUR-5	1.106	0.953	0.969	0.935

Source: Authors' calculations based on HIECS 2008/09.

Table A2.9. Main Macro Indicators Growth Rates Compared to Base Year: Scenarios Ie and If, Trade Measures

	Scenario I: No policy response		Scenario Ie: Food tariff elimination		Scenario If: Imposing export ban on processed rice	
	Nominal % change	Real % change	Nominal % change	Real % change	Nominal % change	Real % change
Current account surplus	-89.246	-89.855	-94.786	-95.078	-81.795	-82.446
CPI	6.006		5.949		3.710	
Exports	3.312	-2.541	3.303	-2.498	1.355	-2.270
Imports	7.944	1.829	8.254	2.175	5.976	2.186
Export import gap	39.670	31.757	42.162	34.180	37.627	32.704
Investment	14.714	8.215	14.800	8.353	8.869	4.975
GDPMP	4.562	0.789	4.591	0.690	1.038	-0.057
GDPFC	4.343	0.577	4.520	0.622	0.960	-0.133
HH consumption	4.076	-1.821	4.239	-1.614	0.927	-2.683
Government revenue	2.520	-3.288	2.040	-3.690	0.626	-2.974
Government expenditure	3.845	-2.039	3.896	-1.938	2.051	-1.599
Budget deficit	10.177	3.935	12.766	6.434	8.863	4.969
Unemployment		4.125		4.374		-0.725
Subsidy bill	14.474	7.989	14.607	8.172	8.364	4.488

Source: Results of CGE calculations.

Table A2.10. Real Per Capita Consumption Losses by Quintile

Per capita consumption quintiles	Scenario I	Scenario Ia	Scenario Ib	Scenario Ic	Scenario Id	Scenario Ie	Scenario If
	All Egypt						
1	-1.78	-4.12	-2.84	0.00	0.00	-1.57	-2.64
2	-1.69	-4.13	-2.79	0.00	0.00	-1.49	-2.63
3	-1.71	-4.13	-2.80	-4.18	-2.74	-1.51	-2.64
4	-1.79	-4.16	-2.86	-4.21	-2.79	-1.58	-2.67
5	-1.89	-4.40	-2.99	-4.41	-2.90	-1.68	-2.73
All	-1.80	-4.24	-2.89	-3.30	-2.18	-1.59	-2.68
	Urban						
1	-2.11	-4.17	-3.05	0.00	0.00	-1.91	-2.69
2	-2.10	-4.19	-3.05	0.00	0.00	-1.91	-2.69
3	-2.18	-4.18	-3.09	-4.24	-2.99	-1.99	-2.71
4	-2.23	-4.21	-3.13	-4.26	-3.03	-2.04	-2.74
5	-2.16	-4.41	-3.15	-4.43	-3.04	-1.96	-2.77
All	-2.16	-4.28	-3.11	-3.45	-2.40	-1.97	-2.74
	Rural						
1	-1.48	-4.07	-2.65	0.00	0.00	-1.27	-2.60
2	-1.31	-4.07	-2.55	0.00	0.00	-1.09	-2.58
3	-1.25	-4.07	-2.51	-4.11	-2.49	-1.03	-2.57
4	-1.31	-4.12	-2.56	-4.15	-2.53	-1.09	-2.59
5	-1.50	-4.38	-2.75	-4.38	-2.69	-1.28	-2.67
All	-1.38	-4.18	-2.62	-3.13	-1.92	-1.16	-2.61

Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Table A2.11. Poverty and Inequality Measures by Different Scenarios

	Scenario I	Scenario Ia	Scenario Ib	Scenario Ic	Scenario Id	Scenario Ie	Scenario If	Actual
P0	22.85	24.95	23.73	22.38	22.06	22.69	23.63	21.56
P1	4.43	4.89	4.63	4.15	4.14	4.39	4.58	4.10
P2	1.33	1.48	1.39	1.21	1.22	1.32	1.37	1.20
Gini	0.3068	0.3066	0.3066	0.2990	0.3017	0.3065	0.3068	0.3070
Theil	0.1565	0.1562	0.1562	0.1492	0.1517	0.1563	0.1564	0.1566

Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Table A2.12. Proportion of Poor and Non-poor under Different Scenarios Compared to Original Classification

		Scenario I		
		non poor	poor	Total
Base	non poor	76.20%	2.20%	78.40%
	poor	0.90%	20.60%	21.60%
		77.10%	22.90%	100.00%

		Scenario Ia		
		non poor	poor	Total
Base	non poor	75.00%	3.50%	78.40%
	poor	0.10%	21.50%	21.60%
		75.00%	25.00%	100.00%

		Scenario Ib		
		non poor	poor	Total
Base	non poor	77.10%	1.40%	78.40%
	poor	0.60%	21.00	21.60%
		77.60%	22.40	100.00%

		Scenario Ic		
		non poor	poor	Total
Base	non poor	75.80%	2.70%	78.40%
	Poor	0.50%	21.10%	21.60%
		76.30%	23.70%	100.00

		Scenario Id		
		non poor	poor	Total
Base	non poor	77.30%	1.20%	78.40%
	poor	0.70%	20.90%	21.60%
		77.90%	22.10%	100.00%

		Scenario Ie		
		non poor	poor	Total
Base	non poor	76.30%	2.10%	78.40%
	poor	1.00%	20.60%	21.60%
		77.30%	22.70%	100.00%

		Scenario If		
		non poor	poor	Total
Base	non poor	76.40%	2.10%	78.40%
	poor	0.00	21.60%	21.60%
		76.40%	23.60%	100.00%

Source: Authors' calculations based on CGE simulations and HIECS 2008/09.

Table A2.13. Main Macro Indicators Growth Rates in Nominal Terms Compared to Base Year, Moderate World Price Changes (Scenario II) with Various Policy Options

	Initial values in 2006/2007 in LE billions	**Scenario IIa**	**Scenario IIb**	**Scenario IIc**	**Scenario IId**	**Scenario IIe**	**Scenario IIf**
Current account surplus	-15.338	-5.639	-48.793	-6.279	-46.301	-82.817	-74.084
CPI	1	0.350	2.742	1.064	2.890	3.900	3.010
Exports	226.350	1.652	1.454	1.679	1.468	1.318	0.565
Imports	259.400	1.963	4.110	1.984	3.965	5.870	4.780
Export import gap	-33.050	4.091	22.302	4.068	21.066	37.044	33.645
Investment	155.300	2.258	7.949	0.976	6.810	12.204	9.673
GDPMP	745.850	-1.717	1.553	-0.984	1.726	3.479	2.006
GDPFC	742.968	-2.970	1.059	-2.279	1.207	3.446	1.896
HH consumption	539.200	-2.648	1.035	-1.345	1.542	3.232	1.791
Government revenue	199.844	3.309	2.195	3.800	2.379	1.471	1.134
Government expenditure	241.659	-0.283	1.781	1.600	2.591	3.123	2.333
Budget deficit	-41.815	-17.448	-0.197	-8.913	3.600	11.017	8.062
Unemployment	0.093	3.775	0.358	4.442	-0.397	-1.355	-3.272
Subsidy bill	-52.909	-18.493	1.253	-18.503	0.171	11.710	9.047

Source: Results of CGE calculations
Scenario IIa: Complete food subsidy elimination
Scenario IIb: Partial food subsidy elimination (keeping that on bread)
Scenario IIc: Complete food subsidy elimination + cash transfers to the poor
Scenario IId: Partial food subsidy elimination (keeping that on bread) + cash transfers to the poor
Scenario IIe: Eliminating tariffs on food imports
Scenario IIf: Imposing export ban on processed rice.

Table A2.14. Main Macro Indicators Growth Rates in Real Terms Compared to Base Year, Moderate World Price Changes (Scenario II) with Various Policy Options

	Initial values in 2006/2007 in LE billions	Scenario IIa	Scenario IIb	Scenario IIc	Scenario IId	Scenario IIe	Scenario IIf
Current account surplus	-15.338	-5.968	-7.266	-50.160	-47.810	-83.462	-74.842
Exports	226.350	1.297	0.609	-1.254	-1.383	-2.486	-2.373
Imports	259.400	1.607	0.910	1.331	1.044	1.895	1.718
Export import gap	-33.050	3.728	2.972	19.037	19.357	31.900	29.740
Investment	155.300	1.901	-0.087	5.06	3.810	7.992	6.469
GDPMP	745.850	-0.826	-0.609	0.216	0.291	0.651	0.385
GDPFC	742.968	-2.090	-1.909	-0.271	-0.221	0.620	0.277
HH consumption	539.200	-2.988	-2.384	-1.662	-1.311	-0.644	-1.183
Government revenue	199.844	2.949	2.707	-0.533	-0.497	-2.338	-1.821
Government expenditure	241.659	-0.631	0.530	-0.935	-0.291	-0.748	-0.658
Budget deficit	-41.815	-17.737	-9.872	-2.861	0.690	6.849	4.904
Subsidy bill	-52.909	-18.777	-19.361	-1.449	-2.643	7.516	5.861

Source: Results of CGE calculations.

Table A2.15. Government Transfers to Households (Scenario II: Moderate Price Increases)

	Government transfers in base year (LE billion)	Government transfers shares out of households' incomes in base year	Government transfers shares out of households' incomes after change (Scenario IIc)	Government transfers shares out of households' incomes after change (Scenario IId)
HHURB-1	0.350	1.211	4.072	2.861
HHURB-2	0.464	1.110	3.982	2.761
HHURB-3	0.759	1.412	1.439	1.397
HHURB-4	1.204	1.632	1.663	1.614
HHURB-5	2.519	1.393	1.423	1.379
HHRUR-1	0.223	0.781	3.780	2.337
HHRUR-2	0.254	0.658	3.716	2.196
HHRUR-3	0.309	0.656	0.670	0.648
HHRUR-4	0.421	0.724	0.739	0.714
HHRUR-5	1.106	0.953	0.975	0.942

Source: Results of CGE calculations.

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