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Abstract

The recent hike in food prices has been of great concern to policymakers, international organisations and donor agencies. In this paper we discuss, both from a partial and general equilibrium perspective, the impact of the recent price increase on maize on Kenyan households. Simulating a 100% increase in maize prices, we find that the headcount ratio in urban areas increased by 3-4 percentage unit points, depending on the size of windfall gain to producers. Based on the assumption that the price shock is passed through in total to the farmers, food poverty in the rural areas could be reduced by almost 14%. If incomes are not passed through, rural food poverty would increase quite significantly in some provinces. It is the poorest of the poor in both urban and rural areas who are most adversely affected. Policy reforms, which would reduce marketing margins and fertiliser prices, would be important factors in promoting a positive impact on performance in the maize sector. The regional maize trade within East Africa seems to have a role to play, and exploring the impact of total integration of the maize markets could be a topic of further research.

Keywords: Food crisis, maize, Kenya, poverty, distribution, net benefit ratio, CGE
JEL classification: O12, O18, Q11, Q18

1. Introduction

The recent hike in food prices has been of great concern to policymakers, international organisations and donor agencies. A number of recent studies have looked at the impact of escalating food prices and how these affect poverty both globally, and in a number of countries. A common finding is that poverty will generally rise in the short-term following increased food prices. For example, Zezza et al. (2008) find that the most vulnerable are the urban, rural non-farm, larger and less educated households. Dessus et al. (2008) find that additional costs of alleviating urban poverty could, for some countries, exceed 3% of GDP. Ivanic and Martin (2008) suggest that the increase in commodity prices has added 100 million additional people to the ranks of the poor. This corresponds to a loss of almost seven years of work in eradicating global poverty. Reviewing the evidence of the potential impact of higher food prices in sub-Saharan Africa, Wodon and Zaman (2008) find that the poor are likely to be significantly affected. For example, in West and Central Africa, a 50% price rise in cereals could increase, in the short term, the share of those in poverty by 4.4%. When potential gains for producers are factored in, the headcount index would still increase by 2.5 percentage points. This is in line with earlier results which find that higher food prices are likely to increase poverty in a number of African countries even after countervailing wage and productivity effects are taken into account (Christiansen and Demery 2006).

Other set of studies has focused on the country-specific impact of the food crisis. Arndt et al (2008), in a study on Mozambique, note that urban households and households located in the South are more vulnerable to food price increases, while rural households, on the other hand, often benefit from their net seller position, particularly those in the mid-income distribution bracket. They conclude that the macroeconomic and poverty impacts of a global price increase will be negative and substantial, particularly for urban households. Reys et al. (2009) analyse the impact of changes in the prices of rice and fuel on poverty in the Philippines. They conclude that the impact varies across different household groups, depending on the level of urbanity, income group and geographical location. Urban households are the more adversely affected group compared to those living in rural areas. In addition, the poorest household are the most vulnerable to price change. Although a large portion of the rice farmers would benefit from price increases, the poorest farmers tend to be adversely affected.

The Kenyan economy experienced significant improvement in its performance during 2004-2007. Annual average GDP growth was close to 6%, a remarkable improvement

compared to the 1990s. This also had a positive impact on poverty; the headcount ratio fell from 52.3% in 1997 to 45.9% in 2005. However, during 2008 the economy was severely affected by a number of domestic and external shocks. The post-election crisis was felt in the agricultural sector, as a large number of farmers had to abandon their farms. This had ramifications not only with regard to the stocks of cereals harvested late in 2007 but also for planting preparation for the 2008 season.

The Kenyan crisis seems to have had an impact on regional maize prices.[1] Benson et al. (2008) argue that higher global food prices may have a significant secondary effect on Ugandan food markets, particularly when coupled with the high demand of maize from Kenya.[2] Maize trade is still restricted by various non-tariff barriers (NTBs). Karugia et al (2009) observe that the NTB cost accounted for approximately 35% of the maize trade in Kenya, while the remaining 65% is due to cost of transportation.

Dry weather in some parts of Kenya delayed growth, and the surge in international food prices had a negative outcome on the economy, as the country is a net-importer of maize, rice, wheat and other cereals. Although oil prices have dropped, the surge in 2007-2008 affected the economy negatively. Finally, the global financial crisis also had economic ramifications, as the global recession reduced demand for Kenyan exports, particular in the flower industry. Despite the recession, remittances from Kenyans living abroad are still high.

The maize sector has been one of the most severely hit sectors. During the second half of the 2008, maize prices increased significantly and the Government reacted by introducing short-term emergency measures. Focusing on measures such as the re-introduction of price controls opened up several avenues for rent-seeking activities. In addition in order to keep domestic production within the country, exports of maize grain and flour were banned.[3] In November 2008, triggered by its rising price, the Government of Kenya announced that it would subsidize maize flour. The programme, however, was quickly abandoned because of mismanagement (IMF 2009).

One would expect that the recent maize price movements, coupled with other factors, have had a profound impact on households, particularly the poorer households. How these

[1] Kenya is usually a net importer of maize; in "normal" circumstances, it imports about 2.7 million bags from Uganda and Tanzania and it is likely that total imports are generally larger than those reported, because of unrecorded trade flows in the region (RATIN 2008).
[2] See Dessus (2008) and Benson (2008) for an impact analysis on Tanzania and Uganda, respectively.
[3] Both Kenya and Tanzania have recently instigated an export ban in order to protect consumers from adverse shocks. However, farmers in both countries would have gained from exporting maize as the producer price would have been higher. For an analysis of the Tanzanian case, see Dessus (2008). In chapter 3 we present the impact of an export ban on the Kenyan market.

price changes affect various households in the economy can be quite complex, and in this paper we discuss, both from a partial and general equilibrium perspective, the impact of the recent price increase on Kenyan households. We also discuss an appropriate policy-mix of actions.

The paper is organised as follows: The next chapter describes and summarises recent events in the agricultural sector, with a particular focus on maize in Kenya. The chapter also looks at price developments in the maize sector to determine whether they have converged over time within regions. The third chapter analyses the impact of the increased maize prices with two different methodologies. First, using household survey data, we calculate the Net Benefit Ratios (NBRs) across regions and deciles. Then, using a Computable General Equilibrium (CGE), we simulate the various shocks that have recently occurred in Kenya. The final section concludes.

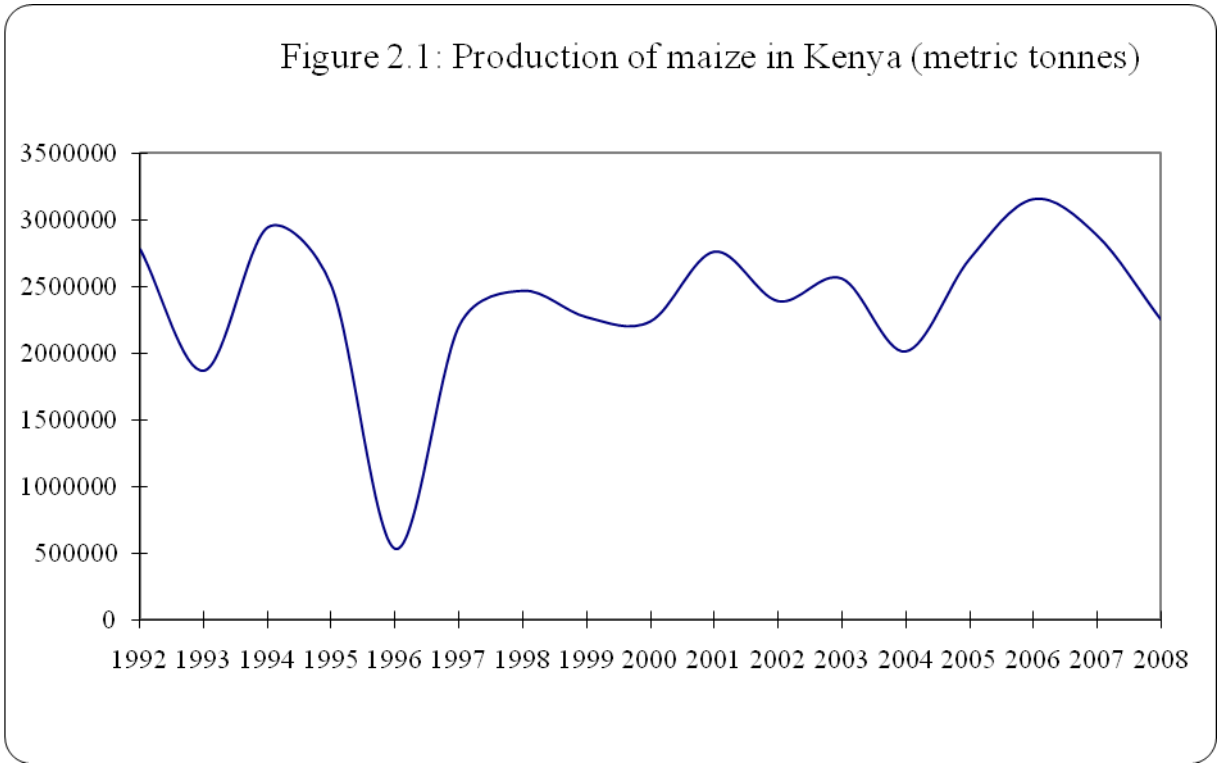
2. Agricultural performance

Agriculture is the largest sector in the economy, generating a quarter of Kenya's gross domestic product (GDP) and two-fifths of its export earnings (Kiringai et al. 2006). The agricultural sector provides employment to an estimated 70% of the total labour force (KNBS 2007). Although its performance has improved since 2000, its growth has been mediocre over the last two decades. Maize is the most important crop in Kenya, with over 90% of farming households growing maize (KNBS 2007). Figure 2.1 illustrates the production of maize in Kenya between 1992 and 2008 (metric tonnes). Production is volatile and there is no clear trend of improved production. Indeed, peak performance in 2006 is similar to that recorded in the late 1980s.[4]

Productivity in the maize sector increased steadily from independence until the mid-1980s (Kibaara et al. 2008), but declined between 1985 and 2004. However, Ariga et al. (2008) find that maize yields have improved quite impressively over the 1997-2007 period, partly due to increased use of fertilizer.[5] Fertilizer marketing costs declined substantially between mid 1990s and 2007 but the positive trends in fertilizer use were partially reversed in 2008 by the civil disruption as well as the surge in global fertiliser prices.

[4] See Nyoro et al. (2004) for historical records of maize production in Kenya.

[5] The proportion of farmers using fertiliser on maize in the main growing season has grown from 55% in 1996 to 70% in 2007 (Ariga et al. 2008), but these rates show considerably variation across the country. The highest proportion (80%) of smallholders using fertilizer is in Central, High Potential Maize Zone and Western Highlands Zones.



In the early 1990s the government partly liberalised the maize sector by eliminating the movement of grain and price control restrictions (Nyoro et al. 2004). Private traders were allowed to transport maize across districts and to purchase maize directly from the farmers. The National Cereal and Produce Board (NCPB), which previously had been the sole buyer, switched from being a near monopoly to becoming the agency to handle the strategic cereal reserves. Liberalisation has enabled private sector participation in maize marketing to expand significantly.

Analysing the impact of the reform, Nyoro et al. (2004) conclude that liberalisation of the domestic market reduced transaction costs in marketing and distribution, and increased incentives to traders and marketers. However, government involvement is still substantial with regard to the NCPB, which procures and sells maize at administratively determined prices, and imposes restrictions on external trade through import duty (normally 30% but eliminated temporarily in 2008 and 2009) and import quotas on maize. Following the crisis in 2008-2009, the government tightened restrictions in the sector by imposing price controls, and banning exports and consumer subsidies.

At the national level, farming contributes approximately 42% of Kenya's total income and half of the farm-income is derived from the maize sector (Table 2.1). As

expected, there is some variation within the different regions. In Western, Nyanza and Rift Valley Provinces, more than half of the farm income comes from the maize sector, while in Central, Coastal and Eastern Provinces its share is around 14% and 19%, respectively. Farming is less important in other provinces such as North Eastern and Nairobi.

Table 2.1: Source of income across regions (%)

	National	Nairobi	Central	Coast	Eastern	North Eastern	Nyanza	Rift Valley	Western
Other	3.3	3.4	2.6	3.0	4.1	4.9	2.9	3.7	3.1
Labour	47.0	90.6	45.6	62.7	33.9	67.2	36.4	50.1	26.8
Business	7.7	5.9	5.0	11.7	6.9	19.7	9.4	7.1	6.9
Farming	42.0	0.1	46.7	22.7	55.2	8.2	51.4	39.2	63.2
Maize	20.7	0.0	14.1	13.3	19.5	4.2	29.3	23.4	34.4
Non-maize	21.3	0.0	32.6	9.4	35.7	4.0	22.1	15.8	28.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

The share of food in total household expenditures varies across provinces. It is significantly lower in Nairobi than in other provinces where food accounts for 60%-75% of total expenditures (Table 2.2). As in other African countries, own production is important in Kenya, with almost 35% of total food consumption being self-produced.

Table 2.2: Food and non-food expenditure shares of total expenditures (%)

	Nairobi	Central	Coast	Eastern	North Eastern	Nyanza	Rift Valley	Western
Food expenditures	45.3	60.2	62.5	66.9	75.5	64.0	63.7	67.1
Subsistence	6.6	24.0	20.6	28.5	21.8	25.7	25.1	28.3
Maize	3.9	9.1	16.2	17.8	11.4	12.1	12.8	14.3
Rice	2.1	3.2	2.9	2.1	6.1	1.4	1.9	0.9
Wheat	0.5	0.5	0.3	0.5	0.3	0.1	0.2	0.1
Millet	0.4	0.3	0.2	0.7	0.0	1.0	0.8	0.7
Sorghum	0.0	0.1	0.0	0.5	0.0	1.0	0.2	0.6
Other cereal	0.1	0.2	0.0	0.3	2.4	0.0	0.0	0.0
Other food	38.4	46.7	42.9	45.0	55.4	48.4	47.9	50.6
Non-food expenditures	54.7	39.8	37.5	33.1	24.5	36.0	36.3	32.9
Total	100	100	100	100	100	100	100	100

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

Own production in Kenya, however, is significantly less than in Mozambique where it accounts for 75% of total food consumption (Arndt et al. 2008). With the exception of Nairobi, own production accounts for around 40% of total food expenditures in Coast and

North Eastern Provinces.[6] Maize, both in terms of subsistence and market-purchased crops, is the most important food-crop in Kenya (Table 2.3). It dominates food consumption, accounting for 9%-18% of total household expenditures across provinces. In Nairobi the share of maize is significantly lower, around 4% of total expenditures.

Table 2.3: Market and subsistence consumption (% of total food expenditures)

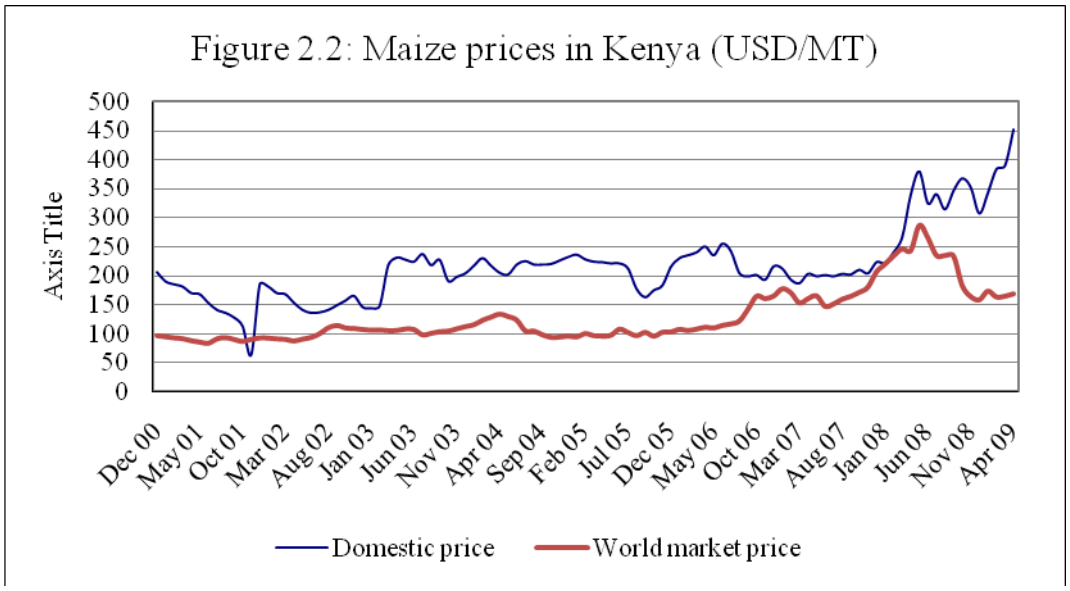
Subsistence consumption (% of total food expenditures)								
	Nairobi	Central	Coast	Eastern	North Eastern	Nyanza	Rift Valley	Western
Maize	2.1	6.2	9.0	13.8	5.9	10.8	10.2	12.0
Rice	1.3	0.6	1.0	0.4	1.3	0.3	0.4	0.2
Wheat	0.8	0.7	0.4	0.5	0.2	0.1	0.2	0.1
Millet	0.3	0.2	0.1	0.6	0.0	0.8	0.7	0.5
Sorghum	0.0	0.1	0.0	0.5	0.0	0.8	0.2	0.3
Other cereal	0.0	0.1	0.0	0.3	2.7	0.0	0.1	0.0
Other food	11.6	30.3	19.3	25.4	16.8	26.0	26.6	27.9
Total	16.0	38.2	29.8	41.5	26.9	38.8	38.3	41.0
Food purchased on the market (% of total food expenditures)								
	Nairobi	Central	Coast	Eastern	North Eastern	Nyanza	Rift Valley	Western
Maize	6.0	8.2	14.2	11.6	8.8	7.2	8.8	8.9
Rice	3.4	4.8	4.0	2.9	6.9	2.0	2.7	1.3
Wheat	0.1	0.2	0.0	0.2	0.1	0.1	0.1	0.1
Millet	0.5	0.3	0.2	0.5	0.1	0.8	0.5	0.5
Sorghum	0.0	0.1	0.0	0.3	0.0	0.7	0.1	0.5
Other cereal	0.1	0.3	0.0	0.1	0.0	0.0	0.0	0.0
Other food	73.9	48.0	51.7	43.0	57.3	50.5	49.4	47.6
Total	84.0	61.8	70.2	58.5	73.1	61.2	61.7	59.0
Overall total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

The importance of maize in Kenya implies that price changes could have significant impact – either positive and negative -- on welfare,. Before analyzing the welfare impact of the surge in maize prices, let us look at how maize prices have changed over time. Figure 2.1 shows the trend in maize prices (in USD per metric tonnes) between December 2000 and April 2009 in Nairobi. During 2001 prices declined, but remained relatively steady between 2003 and 2005. In December 2005 prices increased, remaining stable until the second half of 2006. The second half of 2007 witnessed another price hike, which coincided with the increase in the global market price of maize. Although prices increased consistently on world markets during

[6] Maize produced for market activities has increased over time. The calculations above estimate that 60% of maize production is marketed. This is higher than indicated by earlier studies which suggest that approximately 40% of the maize produced in Kenya is marketed (Friesen and Palmer 2002).

two periods: during the later part of 2006 and during the second half of 2007 until March 2008, domestic maize prices in Kenya, although not affected by the first period, certainly were by the second phase (June 2007 to March 2008). Despite the drop in world market prices from the first quarter of 2008, prices on the Kenyan market have remained high.



Source: RATIN (2008)

How have the recent shocks affected maize prices in different locations within Kenya? Maize prices vary between countries due to trade restrictions, and it can be expected that there are also substantial differences in prices within a specific country. Markets may be poorly coordinated across time and space, and inefficient marketing boards mean that surplus areas coexist with deficit areas. This might manifest itself as spatial price differences for the same commodity. A comparison of maize prices from December 1993 to April 2009 in Kisumu, Mombasa and Nairobi, indicates that with the exception of the early years, price patterns for these cities are relatively similar (Figure A2.1 in appendix). The standard deviation of maize prices between the three locations initially fell, but has been increasing lately (Figure 2.3).

This suggests that the reform process, started in the early 1990s when restrictions on the movement of maize across districts were abolished, has had a positive impact. But this converging trend has been reversed by the recent crisis: transport services between the Western regions (including parts of the maize surplus area of Rift Valley) and the rest of Kenya were at a complete standstill. Stocks of maize were looted or destroyed. As a result, trade between the regions was reduced, leading to a divergence of maize prices within the country. Figure 2.4 shows the divergence of the standard deviation of maize prices

between the three locations during the first quarter of 2008. Another divergence took place in November 2008 and April 2009, most likely the result of inadequate rainfalls in certain regions.

Figure 2.3: Standard deviation in regional Maize prices (Nairobi-Mombasa-Kisumu)

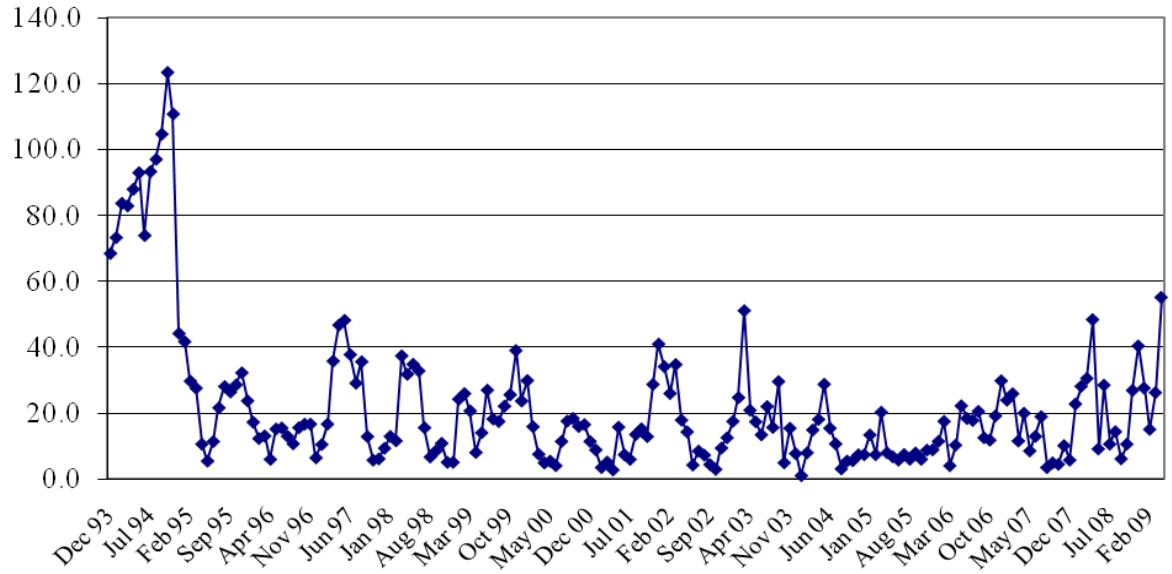
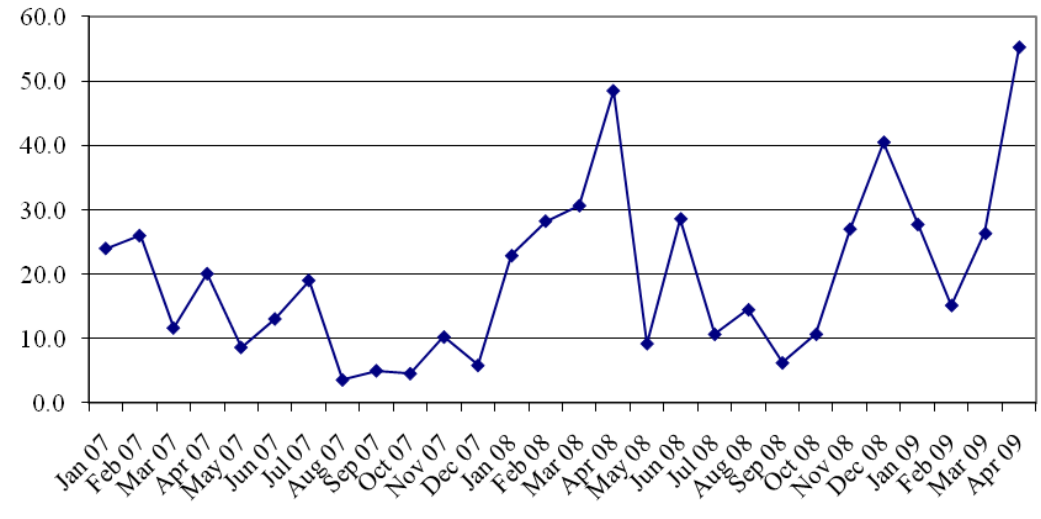


Figure 2.4: Standard deviation in maize prices January 2007 - December 2008



3. Methodology - Terms of trade shocks and the Impact on the poor

How do changes in the prize of maize impact on the poor? The effect of rising global food prices has generally been estimated using two approaches (Haq et al. 2008). The first approach considers the impact of increased international food prices on domestic prices using price transmission elasticities, and then estimates the impact of domestic food price increases on consumer expenditures and/or poverty. An alternative approach is to take the increase in domestic food prices as given; that is, higher global prices have already been transmitted to the domestic economy, and then to estimate the likely ex post impacts on poverty. To implement this approach we can either estimate price and income elasticities for disaggregate food commodities based on household expenditure data or identify net producers and net consumers. With both methods, we can derive the impact of a domestic price increase on households. Here we use the latter approach where the household analysis follows the approach by Deaton (1989) in that the first-order welfare impact of relative food price changes is proportional to the net benefit ratio (NBR).

The NBR can be interpreted as the elasticity of real income with respect to a maize price change. As described by Arndt et al. (2008) the basic model can be represented as follows for a single household: $\Delta w = \Delta p \cdot (PR - CR)$ where Δp is the maize price change, and PR and CR are the maize production and consumption ratios, respectively. The proxy used for the production ratio (PR) is the share of the value of maize sales and own production in total household income. The proxy used for consumption (CR) is the share of the value of maize purchases and own consumption in total household expenditures. Neither technique allows for any behavioural change of producers and consumers.

However, fluctuations in maize prices may lead consumers to alter their consumption patterns, while producers change their production mix to take advantage of new opportunities. In order to take into account these indirect effects of a shock, we use a computable general equilibrium model developed for the Kenyan economy to evaluate the impact. The model used in this paper is described in detail in Thurlow et al. (2008). It is a standard dynamic neo-classical model calibrated to a highly disaggregated 2002 social accounting matrix (SAM) that distinguishes between 212 productive activities (53 sectors in four sub-national regions) and 53 commodities. It is a spatial model and includes the three main agro-ecological zones (lowlands, midlands, and highlands) and the major metropolitan areas. The CGE model is linked to a micro-simulation module where standard poverty measures are estimated. The base year of the model is 2002 and is run over two periods of

time, representing here 2007-2008. The model captures import competition and export opportunities by allowing producers and consumers to shift between domestic and foreign markets depending on the fluctuating relative prices.

3.1 Impact analysis based on survey data

Higher maize prices would, *ceteris paretus*, have a positive impact on household that are net sellers of maize. However, net buyer households would be hurt, as wages are not adjusted immediately. Using data based on Tegemeo's household surveys, Jayne et al. (2000) classify farmers based on their marketing position, i.e., whether they were net buyers or net sellers of maize. They find that a large number of small-scale farm households are net buyers of maize and would, consequently, be hurt in the short-term by higher prices. For example, of the small-scale farm households surveyed in districts of the Western Lowlands and Eastern Lowlands, 82 and 66% were net buyers of maize. The main region where higher maize prices clearly help small-scale farmers is in the High-Potential Maize Zone, where roughly 70% of the households sell maize. Jayne et al. (2005) also observe that the maize-selling households have annual per capita incomes almost double that of the maize-buying households. A tentative conclusion, then, is that shocks or policies which would hike up maize prices would benefit a small proportion of the relatively rich rural Kenyans, but a large share of the urban and rural population would suffer.

In this study we focus on both producers and consumers, using the latest household budget survey: Kenya Integrated Household Budget Survey (KIHBS). Table 3.1 shows the population shares of net buyers and net sellers across the Kenyan provinces. More than half of the population (54.9%) have a NBR below zero, indicating that quite a number of households would suffer a loss of welfare as a result of increased maize prices. Approximately 95% of households located in Nairobi have a benefit ratio below zero, indicative again of the fact that increased maize prices would be felt by most of the households in Nairobi. A large part of the populations in Coastal and Northern Provinces have a negative NBR.

On average, the net benefit ratio is negative or low for Nairobi, Central, Coastal, Eastern and North Eastern Provinces. Nyanza, Rift Valley and Western are the provinces where a high share of households exhibits a positive net benefit ratio, as well as a relatively higher mean, implying that, on average, households in these regions would gain from increased producer prices on maize. On average, a 100% increase in maize prices would

reduce, in the short term, real incomes in Nairobi and the Coast by 3.2% and 1.8%, respectively. But a price increase of the same magnitude would raise real incomes in Nyanza, Rift Valley and Western Provinces by almost 20%, based on the assumption, of course, that the increase is passed onto both the producers and consumers. The last scenario (fifth column) assumes that producer prices do not adjust so that the price shock is felt only on the expenditure side. This short-term scenario reduces the NBR further, but Nyanza, Rift Valley and Western Provinces will still, on average, have a positive NBR. Overall real incomes would drop by 2.6%, but incomes in Nyanza, Rift Valley and Western would still increase. Coastal and Eastern Provinces would experience significant decline in income. The critical question is whether or not incomes in Kenya adjusted during the price hike. Höffler and Ochieng (2008) argue that price increases were passed onto farmers late in 2008, but as some smallholders had perhaps already sold their crops earlier, they missed out on the benefit from increased producer prices. It is difficult to establish the "actual" impact, but it would perhaps fall between the two "extreme" scenarios outlined above.

Table 3.1: Net benefit ratio – maize (%)

	Share of population NBR<0	NBR	NBR income effect	NBR no incomes effect
Nairobi	94.5	-3.2	-6.5	-6.9
Central	60.4	4.6	9.2	-4.5
Coast	75.2	-1.8	-3.7	-17.5
Eastern	59.0	1.1	2.2	-16.4
North Eastern	76.8	4.2	8.4	-5.5
Nyanza	35.7	17.7	35.4	5.7
Rift Valley	52.2	17.2	34.3	4.9
Western	33.8	20.8	41.5	6.6
Total	54.9	10.0	20.0	-2.6

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

The impact of higher maize prices might hurt the poor disproportionately. Table 3.2 shows the NBR across deciles and provinces. In Nairobi, Coastal and Eastern Provinces the low-income groups have a higher (negative) NBR than households in the higher deciles, indicating that poor households would be hurt by a price increase. But the pattern is less clear in regions with a higher NBR. For example in Nyanza, even the poorer groups have a relatively high NBR, while in Rift Valley the first deciles have the lowest NBR. The first income decile in Coastal Province could be seriously affected. Overall, it is the middle-income households that have the largest NBR. These results are based on the assumption that price changes are immediately passed on to both consumers and producers.

Table 3.2: Net benefit ratio – maize (%)

		Deciles									
	Total	1	2	3	4	5	6	7	8	9	10
Nairobi	-3.2	-13.4	-17.0	-10.7	-7.5	-9.4	-8.1	-5.7	-4.4	-3.7	-1.0
Central	4.6	14.4	3.1	7.7	3.3	4.0	4.8	2.9	3.0	3.4	4.6
Coast	-1.8	-20.5	-2.9	-1.6	9.6	3.4	4.0	3.5	-0.8	-0.4	-1.2
Eastern	1.1	-6.6	-8.2	-5.3	0.1	4.4	5.3	9.0	9.8	6.0	1.7
North Eastern	4.2	1.8	13.1	6.6	-1.4	0.3	37.2	-5.1	-1.5	-3.0	-1.6
Nyanza	17.7	22.5	17.7	21.6	22.2	22.7	18.7	14.7	14.9	14.1	4.5
Rift Valley	17.2	6.8	17.5	24.5	22.5	22.8	19.6	20.9	14.5	9.8	8.7
Western	20.8	14.5	21.5	25.4	23.2	14.9	24.0	23.9	22.7	17.3	15.2
Total	10.0	4.8	10.0	12.9	14.5	12.8	13.0	13.1	10.2	5.9	2.8

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

Table 3.3 shows the impact of a 100% increase in maize prices on the NBR based on the assumption that the price shock applies to consumer prices only. In Nairobi the NBR increases approximately 100% across the deciles, as city households' income from maize is minimal. However, in some regions, such as Coastal and Eastern, and in some income groups, the NBR increases quite dramatically, reflecting the importance of maize in the consumption basket. This means that welfare losses could be significantly more severe across households in the lower deciles.

Table 3.3: Net benefit ratio of maize - only expenditures adjust (%)

		Deciles									
ssmNBR	Total	1	2	3	4	5	6	7	8	9	10
Nairobi	-6.9	-26.7	-33.9	-21.5	-15.1	-19.0	-16.3	-11.3	-8.7	-7.4	-2.8
Central	-4.5	-0.6	-12.1	-5.9	-9.2	-7.0	-5.9	-5.3	-3.3	-0.8	1.9
Coast	-17.5	-54.3	-26.9	-25.2	-7.6	-14.5	-7.1	-4.3	-7.1	-4.0	-3.7
Eastern	-16.4	-35.3	-36.3	-26.7	-19.9	-13.6	-7.9	-2.2	-0.2	-1.0	-2.3
North Eastern	-5.5	-12.9	-3.4	-1.4	-13.6	-6.7	29.5	-10.1	-5.2	-6.0	-3.2
Nyanza	5.7	4.4	0.7	6.6	8.6	8.6	6.7	5.9	6.0	7.8	0.3
Rift Valley	4.9	-14.7	-1.1	9.1	9.3	10.0	9.5	11.1	6.9	3.4	5.3
Western	6.6	-4.4	4.5	9.0	9.2	2.2	12.1	10.8	12.8	7.7	10.9
Total	-2.6	-18.0	-10.1	-4.5	-0.3	-1.3	1.8	3.4	2.3	0.4	0.0

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

As noted in other studies, it seems that the impact is particularly severe on the poorer households (i.e., those in the lower income deciles). In order to obtain some poverty estimates, we scale up real incomes (approximated by per adult equivalent expenditures) with the welfare change derived above. In the poverty scenario, it is assumed that maize prices increase 100%. In addition, we assume various degrees of windfall (producer) gains: in the

first scenario, windfall gains are zero and in the final scenario, the price effect is passed, in total, on to the producers. Between these poles, windfall gains are assumed to be a fraction of the price increase.

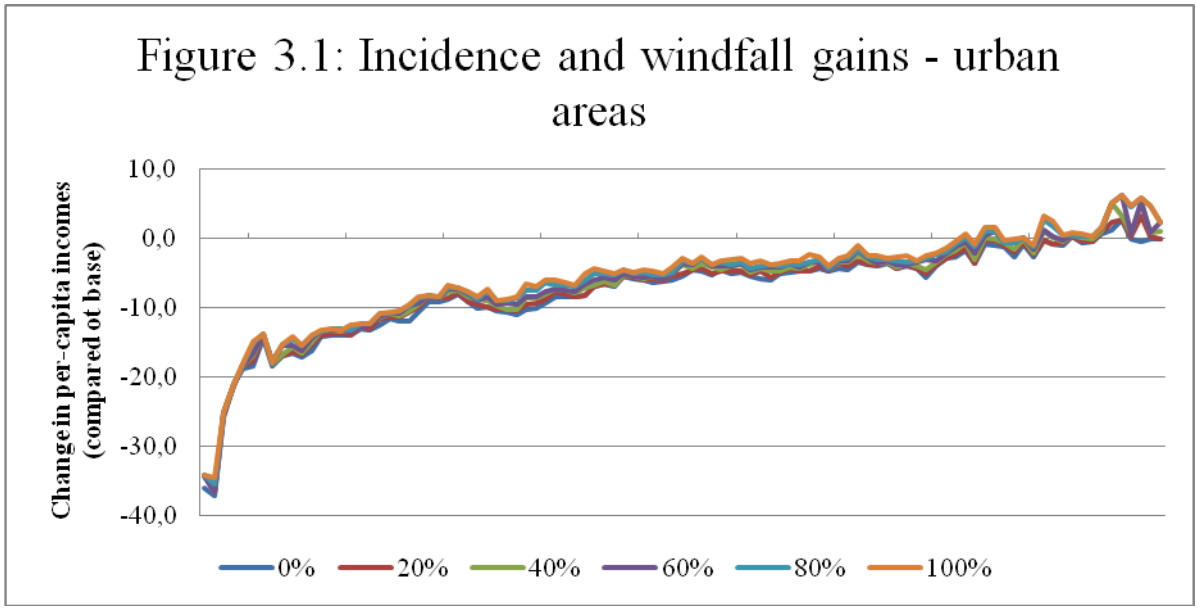
Table 3.4: Urban poverty impact of 100% increase in maize prices

		Windfall gains (%)					
		0	20	40	60	80	100
	Base	Headcount ratio (basic need)					
Nairobi	20.3	23.0	23.0	23.0	23.0	23.0	23.0
Central	30.9	34.5	34.4	33.9	32.4	31.7	30.8
Coast	38.8	43.2	43.2	43.2	43.2	43.2	42.9
Eastern	33.3	37.5	37.4	37.3	36.3	36.3	36.0
North Eastern	73.8	77.3	77.3	77.3	77.3	77.3	77.3
Nyanza	39.8	46.1	44.8	44.3	43.4	42.0	42.0
Rift Valley	42.0	49.1	48.6	48.4	48.0	47.6	47.4
Western	53.6	57.5	56.1	54.8	53.9	53.1	50.6
Total	32.9	37.2	36.9	36.7	36.3	36.0	35.8

Source: Author's calculations using the Kenya Integrated Budget Survey 2005

Overall, urban poverty increases due to the price mark-up on maize, and the headcount ratio increases by 3 to almost 4.5 percentage units, depending on how much of the price hike is transmitted to the producers (Table 3.4). The effect is quite large, considering that we are looking at maize only. As the urban population is less dependent on maize as an income source, as consumers they are mostly hurt. This is particularly true in Nairobi, Coast, Eastern and North Eastern provinces. The income effect does matter in other provinces and with the exception of Western, all provinces experience increased urban food poverty as a result of the price shock.

What is the distributional effect of the price shock? Figure 3.1 presents a set of incidence curves measuring changes in per capita incomes (on the vertical axis) and ranking (on the horizontal axis) households from the poorest (left-hand side) to the richest (right-hand side). Again we include the assumed windfall gains and almost all urban households are negatively affected, except the richest deciles. But as a higher percentage of the price mark-up is passed on to producers, rural poverty is reduced because those who become poor in the first scenario are now in a better position. It is the poorest households that experience the largest drop in per capita expenditures.

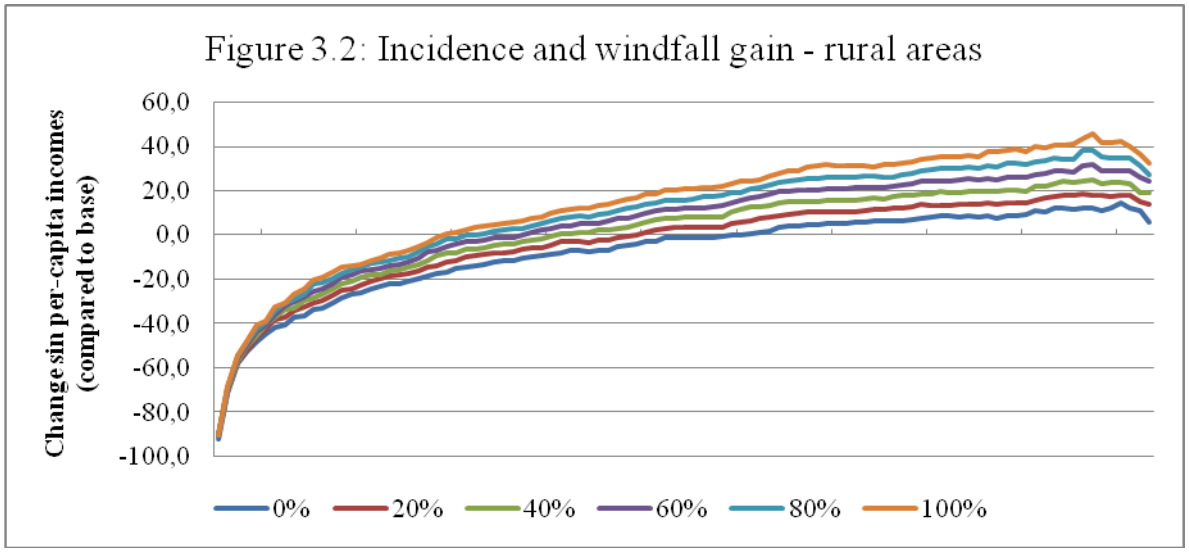


As would be expected, the income effect is more pronounced in the rural than the urban areas. Assuming that the price shock is passed through in total (100%), the headcount ratio is reduced by almost 8 percentage units (Table 3.5). The largest reduction would be in Nyanza, Rift Valley and Western provinces. Even with the assumption of a 60% pass-through effect, poverty increases in Central and Eastern Provinces. However, if the higher prices are not passed through, rural poverty would increase quite significantly in Central, Coast and Eastern provinces. It is important to note is that there is a spatial distinction within the provinces. For example, regardless of the level of producer prices being passed through to the farmers, rural poverty is reduced while urban poverty increases in Nyanza.

Table 3.5: Rural poverty impact of 100% increase in maize prices

		Income adjustments (%)					
	Base	0	20	40	60	80	100
Central	29.8	35.2	34.2	33.2	31.7	30.9	29.5
Coast	68.6	73.8	71.7	70.9	68.8	67.7	66.4
Eastern	50.5	57.0	55.2	53.7	52.1	50.7	49.2
North Eastern	72.0	72.6	71.3	71.3	70.0	68.4	67.7
Nyanza	47.5	46.0	43.3	41.0	38.6	36.4	34.6
Rift Valley	47.7	43.1	41.1	40.2	38.5	37.2	36.1
Western	53.5	50.6	47.9	44.4	42.2	40.4	38.2
Total	48.1	48.7	46.7	45.0	43.1	41.7	40.2

Source: Author's calculations using the Kenya Integrated Budget Survey 2005



Source: Own calculations

Figure 3.2 illustrates the distributional impact for the rural areas. The incidence curve shows that, as in the urban areas, the reduction in per capita incomes is the highest for the poorest of the poor. The cut-off point on the vertical axis (0.0) indicates the level of per capita income at which households are neutral to the price shock. Households on the left-hand side of the cut-off point lose while those on the right-hand side gain. Note that as the windfall gain increases (moving from 0% to 100%), the point where the incidence curves cut the axis moves to the left. This means that a higher pass-through effect also benefits individuals at lower income levels, which means falling poverty levels. Nevertheless, even with a 100% pass-through of the price increase to farmers, the poorest households will be faced with declining incomes.

3.2 Impact based on general equilibrium analysis

As discussed in chapter 1, the Kenyan economy has lately been confronted by several internal and external shocks. Here we try to capture how these shocks have influenced the Kenyan economy. As income and expenditure patterns vary considerably across households, we would expect the shocks to affect households differently. The impact on rural households would differ from those of the urban households but, as can be expected, also the consequences on households within the rural areas would be different, as was noted above. Table 3.6 outlines the various shock scenarios as well as some selected policy scenarios.

The base scenario assumes that the economy is growing at an average rate of 4% during 2007-2008, which is approximately equivalent to the actual average growth during 2007 and 2008. Agriculture in the baseline scenario expands at around 4%, as food crops

increase more slowly than cash crops and livestock. Manufacturing and the service sectors are assumed to grow at approximately 4%. While the economy grows at 4% per year, household consumption expenditure rises by 4.2% per year or 2.3% in per capita terms. Under the baseline scenario, headcount poverty falls from 49.7% to 46.5% in the rural areas and from 34.5% to 33.8% in the urban areas.

The next three scenarios focus on the recent price fluctuations. The second scenario looks at the impact of the increased world market (export) price of maize; the third scenario captures a price shock resulting from an adverse maize output development in the Kenyan economy, while the fourth scenario evaluates the impact of an adverse shock in fertiliser prices.

Table 3.6: Shock and policy scenarios

Shock scenarios	Details
1. Base scenario	Average GDP growth of 4.1%
2. Price shock in the maize sector (WMS)	World market on exported price increases by 100%
3. Price shock in the maize sector (DMS)	Price shock due to domestic shock
4. Fertiliser price shock (FS)	World market price on fertiliser increases by 100%
Policy scenarios	
5. Productivity improvements in the maize sector (PROD+)	Productivity increasing
6. Changes in marketing margins, domestic (MM)	Marketing margins reduced by 80% in the agricultural sector
7. Export ban (EXB)	Export tax on maize introduced removing exports
8. Import liberalisation (TLIB)	Import duties on maize removed
9. Tax reduction on fuel (TFU)	Fuel taxes reduced
10. Tax reduction on fertiliser (TFE)	Fertiliser subsidy across agric. Sectors

The remaining scenario evaluates the impact of the different policy reforms targeted mainly to the maize sector but also in some instances to entire agricultural sector. Our fifth scenario evaluates the impact of productivity improvements in the maize sector. Scenario six examines the impact of reduced marketing margins in the agricultural sector,[7] while the seventh scenario simulates the introduction of an export ban in the maize sector. The eighth scenario considers the removal of import duties on maize, and the ninth and tenth scenarios review the impact of removing domestic commodity taxes on fuel and fertiliser.

Before we go into the actual results let us clarify what we expect from an economy-wide general equilibrium model. First, changes in relative prices in a CGE model

[7] A reduction in marketing margins is modeled as a reduction in the input use of the marketing services. As such it will also affect the trading sector which supplies the service.

are the key signal affecting both producers and consumers. For example, in the second scenario where world market (export) prices increase significantly, this spills-over into the domestic market and has a positive impact on producer prices to the benefit of the farmers, provided that markets can deliver the inputs needed for increased production. In the third scenario, higher producer prices for maize are the result of a significant adverse output shock in the maize market. While the first scenario captures the impact of higher prices in an environment of good policy and adequate rainfall, the second scenario is a more likely outcome in crisis or drought circumstances.

In both scenarios, from the consumer point of view there is a substitution effect and an income effect. Higher price for maize implies that consumers switch to other food products. Higher prices also reduce real incomes, reducing demand in turn. From a producer point of view, higher prices are an incentive to increase production. If, however, costs of intermediate inputs increase, the value added is reduced, becoming a disincentive to expand supply. The model also considers inter-sectoral linkages, which imply that reduced supply in one sector might affect other sectors as well. With regard to trade, reform that cuts import duties would reduce the price on imported substitutes, and thus encourage consumers to switch from domestically produced goods to imported goods. The model allows for imperfect substitution, the ease of substitution depends on the elasticities chosen for the model.

3.2.1 Results

In the second simulation (WMS), a favourable terms-of-trade shock would benefit the maize sector and GDP growth would increase to 5.7% compared to the 4.1% baseline growth (Table 3.7). As producer prices increase, it would benefit farmers both in terms of the higher value of existing sales but also provide incentives to expand production in the second period. Land and labour would be allocated to the maize sector and production would increase. Consumers would substitute the relatively more expensive maize for other food products such as wheat and rice. As the real exchange rate appreciates after the favourable terms-of-trade shock, imported food products become cheaper, lowering prices on non-maize food products. In this case, both urban and rural household benefit from higher export prices on maize. Poverty is reduced in both rural and urban areas but comparably more in the rural areas than the urban areas.

Table 3.7: Baseline Scenario Macro-economic Developments

		Shock scenarios			Policy scenarios					
Variables	Base	WMS	DMS	FS	PROD+	MM	EXB	TLIB	TFU	TFE
GDP	4.1	5.7	2.7	2.9	5.9	3.9	4.1	4.1	4.4	4.3
Agriculture	3.9	7.5	-0.2	0.4	9.9	5.7	3.8	3.8	4.0	4.6
Staple crops	3.0	20.2	-13.3	-1.2	27.8	4.8	2.9	2.9	3.0	3.7
Cash crops	4.4	-2.2	4.2	0.8	4.4	6.1	4.4	4.4	4.9	5.3
Other agric.	3.0	4.1	3.1	2.5	2.8	4.1	3.0	3.0	3.1	3.1
Manufacturing	4.3	2.9	3.7	4.7	4.5	5.7	4.3	4.3	4.9	4.3
Food	5.0	4.1	3.4	5.0	5.7	7.1	5.0	5.0	5.2	5.0
Light mfg.	4.0	2.7	3.9	4.5	4.1	5.5	4.1	4.0	5.2	4.0
Heavy mfg.	3.9	2.1	3.9	4.5	4.0	4.6	3.9	3.9	4.2	3.9
Other industries	4.0	5.1	3.8	3.5	4.1	4.3	4.0	4.0	4.5	4.1
Private services	4.3	6.2	3.5	3.4	4.9	2.1	4.3	4.3	4.6	4.3
Public services	4.0	4.4	4.0	3.8	4.0	4.1	4.0	4.0	4.0	4.0
Producer price of maize	1.3	51.9	104.8	6.3	-47.2	5.3	1.1	0.8	1.4	0.5
Consumer price of maize	1.3	50.4	101.4	6.1	-45.6	2.5	1.1	0.9	1.4	0.6
Poverty (headcount ratio)										
Urban areas	33.8	30.8	36.7	34.9	30.7	34.4	33.8	33.8	33.1	33.8
Rural areas	46.5	34.3	45.0	50.8	46.7	42.6	46.5	46.5	46.9	45.9
Total urban (% change compared to base)		-8.6	8.6	3.4	-8.9	1.8	0.1	0.0	0.1	-3.5
Nairobi		-1.4	11.9	1.3	-8.0	-1.8	0.0	0.0	0.0	0.6
Central		-10.5	14.3	13.3	-2.2	14.5	0.0	0.0	0.4	-3.9
Coast		-10.1	7.5	1.2	-12.8	-2.4	0.0	0.0	-0.2	-4.1
Eastern		-16.6	5.9	6.6	-7.5	5.3	0.0	0.0	0.0	-7.2
North Eastern		-10.0	5.2	4.9	-4.5	7.0	0.0	0.0	0.0	-2.7
Nyanza		-4.8	7.0	2.3	-8.8	3.2	0.0	0.0	0.0	-2.9
Rift Valley		-14.1	7.6	4.5	-10.9	1.8	0.3	0.0	0.6	-6.7
Western		-13.1	5.6	4.6	-6.6	7.1	0.6	0.6	-0.1	-6.8
Total rural (% change compared to base)		-26.3	-3.2	9.3	0.4	-8.2	0.0	0.0	-1.3	-9.4
Central		-32.1	-7.1	15.0	1.0	-11.6	0.0	0.0	-2.5	-16.1
Coast		-21.7	-4.8	6.9	-0.3	-8.5	0.0	0.0	-2.5	-8.2
Eastern		-27.5	-3.5	10.0	1.5	-8.1	0.2	0.2	-0.9	-6.9
North Eastern		-17.3	0.0	3.0	3.3	-3.6	0.2	0.2	0.0	-1.5
Nyanza		-30.0	-1.7	4.9	-1.5	-8.6	0.0	0.0	-0.7	-5.5
Rift Valley		-24.0	-1.4	13.6	-0.4	-7.1	0.0	0.0	-1.7	-13.4
Western		-27.7	-5.5	5.9	1.4	-9.6	0.0	0.0	-0.8	-9.2

Source: Own scenarios

The third scenario looks at the impact of an adverse domestic supply shock (DMS). The adverse shock generates almost a 100% increase in consumer prices, as the supply of maize in all regions (lowland, midland and highlands) is reduced. However, as prices increase dramatically, this might compensate for the reduction in supply, and does not necessarily reduce incomes. Significantly hit are the urban households that have to cope with higher

prices. Even if they switch from maize to other food products, it is not total substitution (100%), because the alternatives are imperfect substitutes.

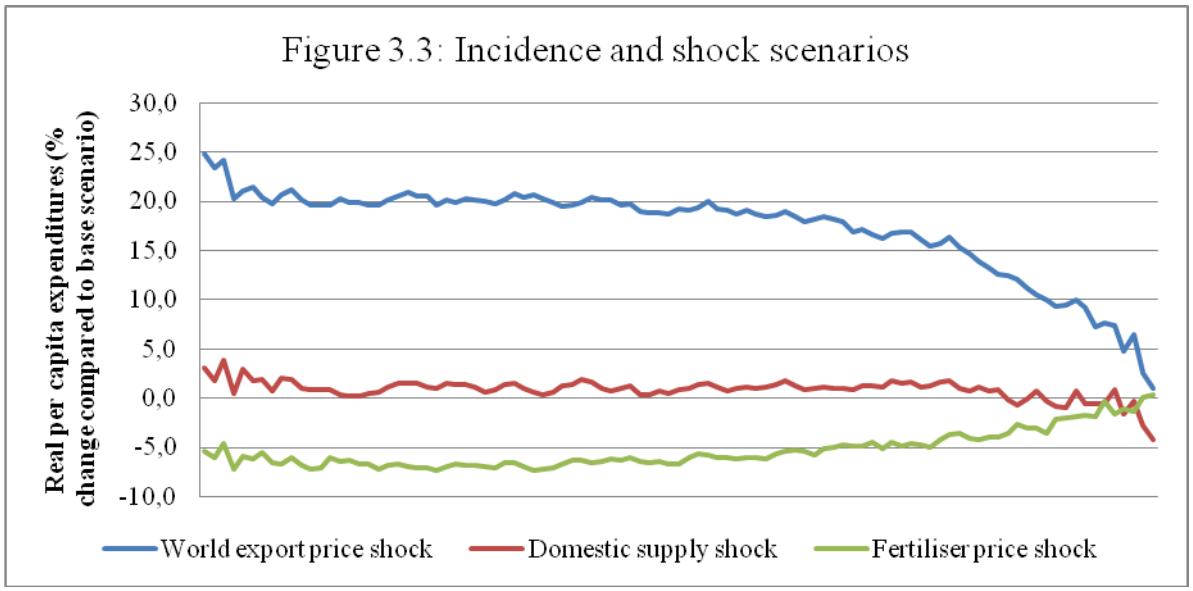
The impact of the price shock reduces rural poverty by 1.5 percentage units (compared to the base scenario) but increases urban poverty by 3.1 percentage units. The results -- both in the urban and the rural cases -- are along the same lines as in the partial analysis discussed above. Increased world market price for fertiliser would have a significant impact on the Kenyan agrarian economy (FS scenario). Two important factors here are the significantly increasing use of fertiliser over the last few years,[8] and the lack of a locally produced substitute for chemical fertiliser. Here we simulate a 100% increase in fertiliser prices across agricultural sectors. Compared to the baseline, GDP growth would be 2.8 percentage units lower. Because we simulate higher fertiliser prices across all agricultural sectors, the impact is rather significant and poverty increases in both urban and rural areas. Specifically, the urban areas of the Central Province would witness high growth in poverty, as would the rural areas such as Central, Rift Valley and Eastern Provinces.

What are the distributional effects of the shocks? A set of growth-incidence curves is derived from the micro-simulation module linked to the CGE model. With regard to the shock scenarios, Figure 3.3 illustrates the change in real per capita expenditures per income centiles. An export price shock would be favourable to most households, particularly the low- and median income households, whereas a fertiliser price shock would hurt the same households more than the rich ones. Although a domestic shock has a less dramatic impact, it would have an adverse (neutral) outcome on income distribution in urban (rural) areas (Figure A3.1-A3.2).

In the last six scenarios we examine some policy measures that could be seen as counteractive to some of the shocks discussed above. The fifth scenario reviews the impact of a productivity increase in the maize sector (PROD+). Here it is assumed to be a costless productivity shock, so that it can be perceived as being "manna from heaven". Overall, higher productivity in the maize sector induces positive results: GDP and output of maize increase significantly. Nevertheless, the boost in supply also reduces the price of maize, to the benefit of the urban households who see a reduction in poverty. For the rural poor there is not much change with regard to poverty compared to the base scenario. Some regions are adversely affected by the productivity shock, and compared to the baseline scenario, poverty increases

[8] Use of fertiliser has been increasing over the years. As reported from the latest household budget survey (KIBS) fertiliser was applied on 69 % of parcels of land. Inorganic fertiliser is more prevalent than organic fertiliser.

in Coastal, Eastern, North Eastern and Western provinces. Productivity improvements in the agriculture sector, and particularly in the maize sector, are important but this scenario also shows that agricultural growth alone is not the key to sustained development process. Other non-agricultural sectors in the economy have to grow as well in order for demand to increase.



Alternatively, efforts to encourage exports of maize could keep producer prices at a higher level, to the benefit of the farmers. However, in responding to the crisis, the Kenyan government did the opposite, and introduced an export ban. As exports in the base year are rather small, we would not expect any major change. What can be expected, however, is that the producer price decreases, as more maize is supplied to the domestic market. The ramifications would be negative for the producers and positive for the consumers. The export ban scenario shows that the maize supply is lower than in the baseline scenario, and reduced producer prices for maize encourage the shift to other agricultural products. Thus, in a longer term-perspective, an export ban would hurt the maize sector.

More trade could reduce the volatility in maize prices in the East Africa region. Ideally, we would like to simulate a trade reform in the maize sector across East Africa but that would require a regional model or three separate linked national models. Here we consider total liberalisation of import duties on maize, in that the Kenyan Government would abolish import duties and allow free access for any dealer to import maize.[9] Complete

[9] In 2008 at the height of the food-crisis the Government still administratively allocated import licenses to various millers allowing them to import maize subject to import duties. Early in 2009 the government abolished import duties but only a certain quota can be imported.

removal of import duties on maize would reduce its price and increase imports. However, as domestically produced maize and imported maize are not perfect substitutes, the impact is not dramatic.[10] Some reduction in domestic production will occur, but it will not have any significant impact on poverty.

Another policy option to support the agricultural sector is to implement reforms which would reduce marketing margins. In looking at the impact of reduced (domestic) marketing margins on the agriculture sector as a whole, we assume that the input of the transaction services needed in this sector is reduced, which could be seen as an approximation of reduced prices of the service. The impact of lower margins has a positive result on agricultural performance, benefitting both staple- and cash crop sectors. As the supplied services, such as transport, usually originate from the urban areas, reduced demand would affect urban households negatively. Compared to the base scenario, poverty increases in the urban areas while in the rural areas, it decreases. Rural poverty is reduced across regions, while urban poverty is significantly increased in Central, North Eastern and Western regions.

The distributional impact of the policy scenarios above is examined with growth-incidence curves (Figure 3.4-3.6). From a national perspective, policies that reduce marketing margins are progressive. Productivity improvements have a negative impact on the lower tail and offer the greatest benefits to the richer households. Elimination of fertiliser and fuel taxes has no major impact on income distribution.

Distributional outcome, however, can be quite different in urban and rural areas. For example, a positive productivity shock benefits the lower tail of urban households more than the richer households (Figure 3.5). The removal of a fuel tax has a positive effect on incomes and is distributed equally. But policies that reduce marketing margins are regressive, reducing incomes at the lower tail.

The distributional impact in the rural areas is different (Figure 3.6). A reduction in marketing margins would benefit poorer households relatively more than the richer ones. With regard to productivity, the poorest households are hurt relatively more than middle-income households. Removing fertiliser tax and fuel taxes does not seem to have a major impact on income distribution, but the overall results point to the important issue that policy reforms do affect income distribution differently, depending whether households are located in urban or rural areas.

[10] In addition, in the base year of the model the import share was rather small which makes the impact smaller.

Figure 3.4: Incidence and policy scenarios - national

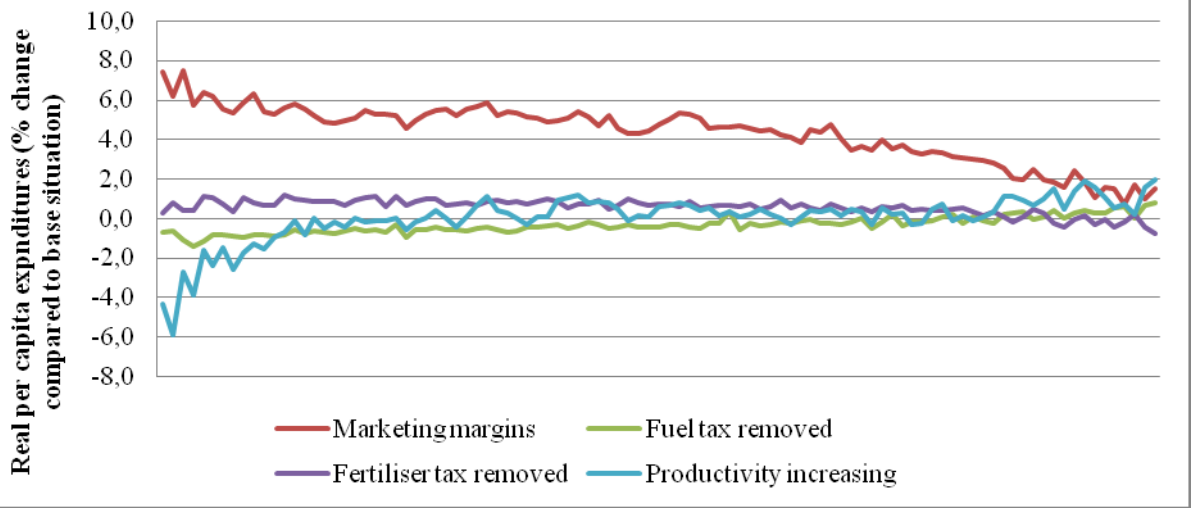
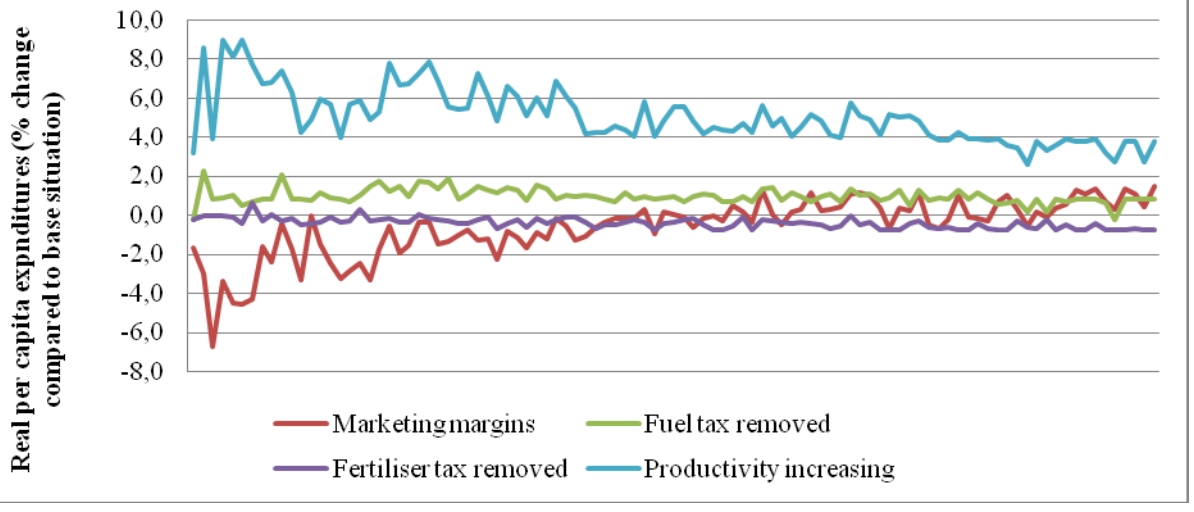
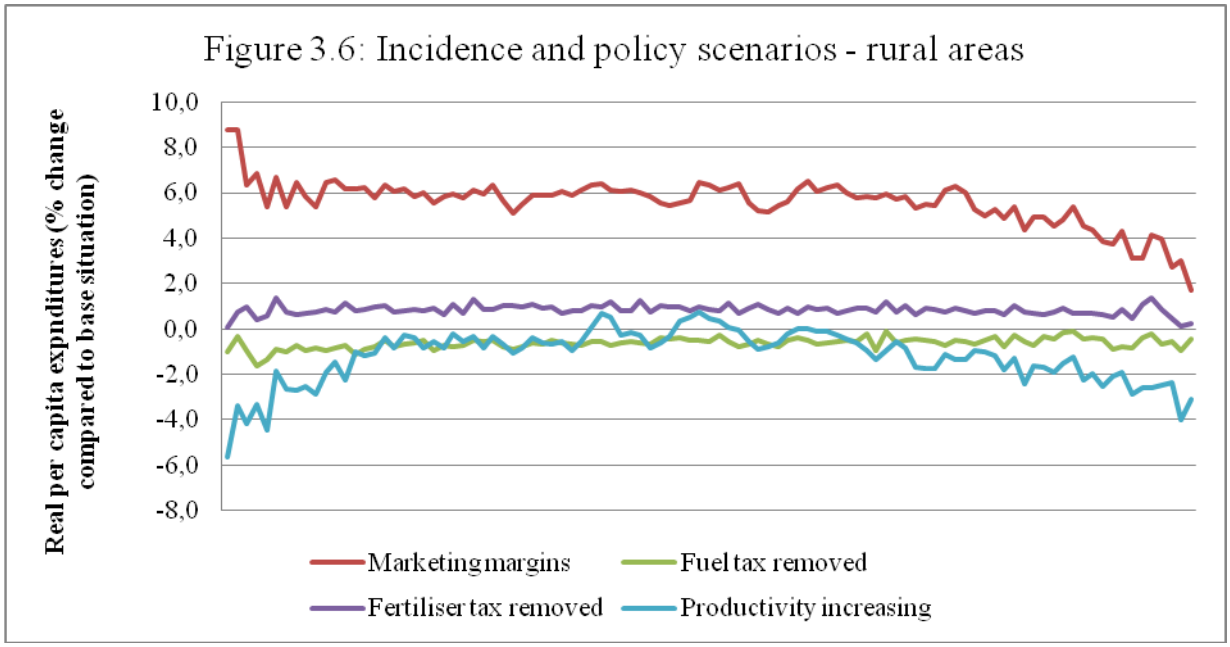


Figure 3.5: Incidence and policy scenarios - urban areas





An important policy consideration is the introduction of fertiliser subsidies. Arndt et al. (2008) argue that a reduction in fuel taxes in the case of Mozambique would be better option for supporting farmers than specific measures targeted to the agriculture sector itself. In the case of Kenya, it seems that a fertiliser subsidy is the more cost-effective option in terms of lost government revenue and its impact on poverty eradication. This conclusion is drawn from a set of fuel and fertiliser tax scenarios, which include the results of sixteen different tax reduction options (Table 3.8). In both the fuel and fertiliser tax scenarios, the initial tax (17%) is reduced first by 10% and then by a subsequent 25% for each scenario[11] so that the tax is eliminated in the fourth scenario and a subsidy provided in the subsequent scenarios.

At the national level a fertiliser subsidy has a more pronounced impact on national poverty than a fuel subsidy at a given cost. It also seems that the marginal impact of an additional fuel (fertiliser) subsidy on poverty is low (high). The impact on rural poverty follows the same pattern. The effect is the reverse with regard to urban poverty. In urban areas, the fertiliser subsidy increases poverty, whereas the fuel subsidy has a significant effect on poverty reduction.[12]

[11] Fertiliser is zero-rated with regard to the value added tax (VAT). In order to capture the impact of fertiliser subsidies we have introduced an indirect tax on fertiliser. In our base scenario the tax rate is set at 17%.
[12] In all tax scenarios a revenue neutral reform is assumed where direct taxes are adjusted.

Table 3.8: Poverty impact of reduced commodity taxes on fuel and fertiliser

	% change in headcount ratio (compared to initial)						Tax revenue (real)	
	Rural		Urban		National			
Tax rate	Fuel	Fertiliser	Fuel	Fertiliser	Fuel	Fertiliser	Fuel	Fertiliser
18	-6.5	-6.5	-2.3	-2.3	-5.9	-5.9	109.0	109.0
13	-6.3	-6.9	-2.5	-2.3	-5.7	-6.2	101.6	107.4
9	-6.1	-7.3	-3.3	-2.2	-5.7	-6.5	94.7	105.9
4	-5.9	-7.5	-4.1	-2.1	-5.7	-6.7	88.4	104.7
0	-5.7	-7.7	-4.3	-2.2	-5.5	-6.9	82.3	103.4
-4	-5.8	-7.9	-4.5	-2.2	-5.6	-7.1	76.7	102.3
-9	-5.6	-8.1	-4.6	-2.2	-5.5	-7.3	71.4	101.3
-13	-5.5	-8.3	-4.9	-1.5	-5.4	-7.3	66.4	100.3
-18	-5.1	-8.3	-5.5	-1.3	-5.2	-7.3	61.6	99.5
-22	-5.0	-8.6	-5.6	-1.3	-5.1	-7.5	57.1	98.7
-26	-4.9	-8.9	-5.8	-1.2	-5.0	-7.7	52.8	97.9
-31	-4.8	-9.1	-6.9	-1.3	-5.1	-7.9	48.7	97.2
-35	-4.9	-9.2	-7.4	-1.3	-5.3	-8.0	44.8	96.5
-39	-4.9	-9.4	-7.4	-1.3	-5.3	-8.2	41.0	95.8
-44	-4.9	-9.6	-7.4	-1.2	-5.2	-8.4	37.3	95.2
-48	-4.9	-9.8	-7.9	-1.3	-5.4	-8.5	33.9	94.7

Source: Own scenarios

Conclusion

The recent hike in food prices has been of great concern to policymakers, international organisations and donor agencies. A number of studies have looked at the impact of escalating food prices in developing countries and found that urban poverty will generally increase in the short term. Also, the rural poor might be affected negatively in the short term but the impact might revert to positive in the longer term.

Kenya has been faced by both external and internal shocks and it seems that the domestic shocks have had a significant impact on the maize sector. Maize prices started to diverge early in 2008 between the different regions, as a result of a complete standstill in transport services between the Western parts of Kenya and the rest of the country. As a result trade among the regions was reduced, which led to a divergence in prices of maize within Kenya.

Higher maize prices do have a significant welfare impact on the population, causing more than half of the Kenyans to suffer welfare losses. In Nairobi, Coastal and Northern Provinces, a large part of the population are net buyers and are experience a loss in welfare. Moreover, in Nairobi, Coastal and Eastern Provinces low-income households would be disproportionately hurt by a price increase. The simulations indicate that welfare in other

regions would increase if maize producers were able to capture the windfall gains from higher prices. But simulating a 100% increase in maize prices with no windfall gains indicates that welfare could deteriorate quite significantly among households in Nairobi, Coastal and Eastern provinces.

In terms of food poverty, different scenarios were simulated based on different windfall gains ranging from 0 to 100%. Overall, urban food poverty increases by 7-10%, depending on how much producers gain from marked-up prices. The effect is quite large when considering the fact that we are looking at maize only. Regardless of whether farmers benefit from the windfall gains, urban poverty would increase in all provinces, with the exception of Central and Western provinces. As would be expected, the income effect is more prominent in the rural than the urban areas. Assuming that the price shock in total is passed through to the farmers, food poverty in rural areas is reduced by almost 14%, with the largest reductions in Nyanza, Rift Valley and Western provinces. However, Eastern Province, even when assuming complete income adjustments, faces a 10% increase in rural food poverty. If incomes are not passed through, rural food poverty increases quite significantly in Central, Coast and Eastern provinces.

In a general equilibrium framework, we find that after a domestic price shock on maize, poverty is reduced by almost 3% in the rural areas but increases in the urban areas by close to 9%. Although the results are similar to those in the partial analysis discussed above, magnitudes differ. The impact of a price shock resulting from improvements in the terms of trade would be favourable for both the urban and rural populations. The rural population is better off, because maize prices increase, but the urban population substitutes to other food commodities. This means declining prices as the exchange rate appreciates, which makes imported food products cheaper.

Several other shocks have recently hit the Kenyan economy and the impact of these shocks can be quite significant. For example, increased world market price for fertiliser could have a significant impact on the Kenyan agrarian economy. In simulating a 100% increase in fertiliser price across agricultural sectors, we find that the effect on poverty is quite significant, and would apply to both urban and rural areas.

Total removal of import duties on maize would reduce its price and increase imports. However, as domestically produced maize is not a perfect substitute for imported maize, the impact is not dramatic. Some reduction in domestic production will occur and poverty in rural areas will increase slightly but to varying degrees across regions. Coastal and Eastern Provinces would be negatively affected while Rift Valley could benefit.

In the longer term productivity has to be increased in the agriculture sector. Higher productivity in the maize sector has overall positive results: GDP increases and output of maize expands significantly. But the boost in supply also reduces the price of maize, which is a good outcome for urban households but bad for the rural areas. This illustrates the importance of a broad-based strategy in which increased demand can keep prices at a level that benefits both urban and rural households.

A more important policy consideration is the introduction of fertiliser subsidies. A subsidy has a positive impact on both staple and cash-crop sectors, and poverty is significantly reduced in the rural areas, but this depends on the efficient and transparent delivery of inputs. An alternative policy would be to reduce fuel taxes to reduce the cost of diesel and petroleum used as input in both agriculture and non-agriculture activities. In the Kenya case, it seems that a fertiliser subsidy is the more cost-effective option. At the national level a fertiliser subsidy has a more pronounced impact on national poverty than a fuel subsidy at a given cost. It also seems that the marginal impact of an additional fuel (fertiliser) subsidy on rural poverty is low (high). The opposite effect is true for urban poverty. While urban poverty would increase from a fertiliser subsidy, the fuel subsidy here has a significant effect on poverty reduction.

What becomes evident from the scenarios above is the observation that a package of reforms that decreases marketing margins in conjunction with reduced fertiliser prices would be important for stimulating a positive impact on performance in the maize sector as well as in other agricultural sectors. These reforms would also have a significant impact on poverty eradication, but the distributional impact would vary among households, depending on their location.

Finally, regional trade within East Africa seems to have a role to play, not only in order to bridge shortfalls in a specific country but also perhaps to stabilise prices in the region. How to address regional issues in connection with the efforts to facilitate trade is a policy recommendation to be explored further. More specifically, what would be the likely impact of mutually liberalised regional trade on the poorer households in Uganda, Tanzania and Kenya?

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Appendix:

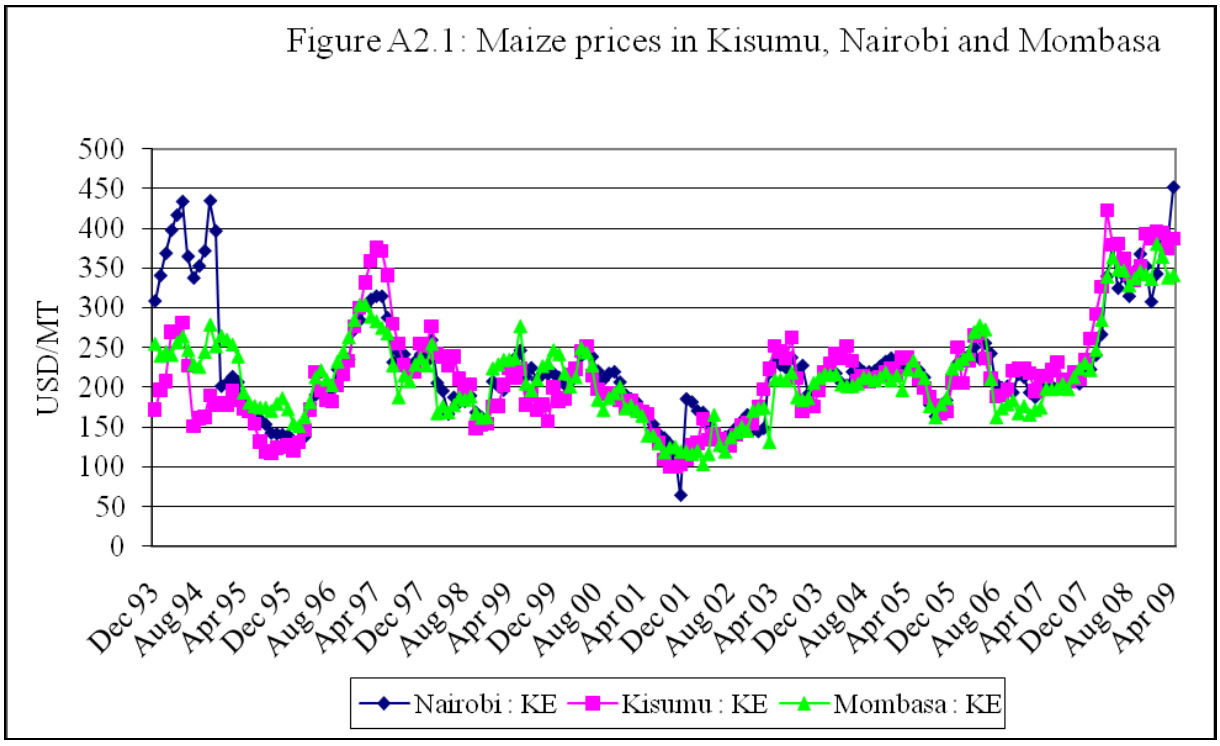
Figure A2.1: Maize prices in Kisumu, Nairobi and Mombasa
USD/MT
500
450
400
350
300
250
200
150
100
50
0
Dec 93
Aug 94
Apr 95
Dec 95
Aug 96
Apr 97
Dec 97
Aug 98
Apr 99
Dec 99
Aug 00
Apr 01
Dec 01
Aug 02
Apr 03
Dec 03
Aug 04
Apr 05
Dec 05
Aug 06
Apr 07
Dec 07
Aug 08
Apr 09
Nairobi : KE
Kisumu : KE
Mombasa : KE

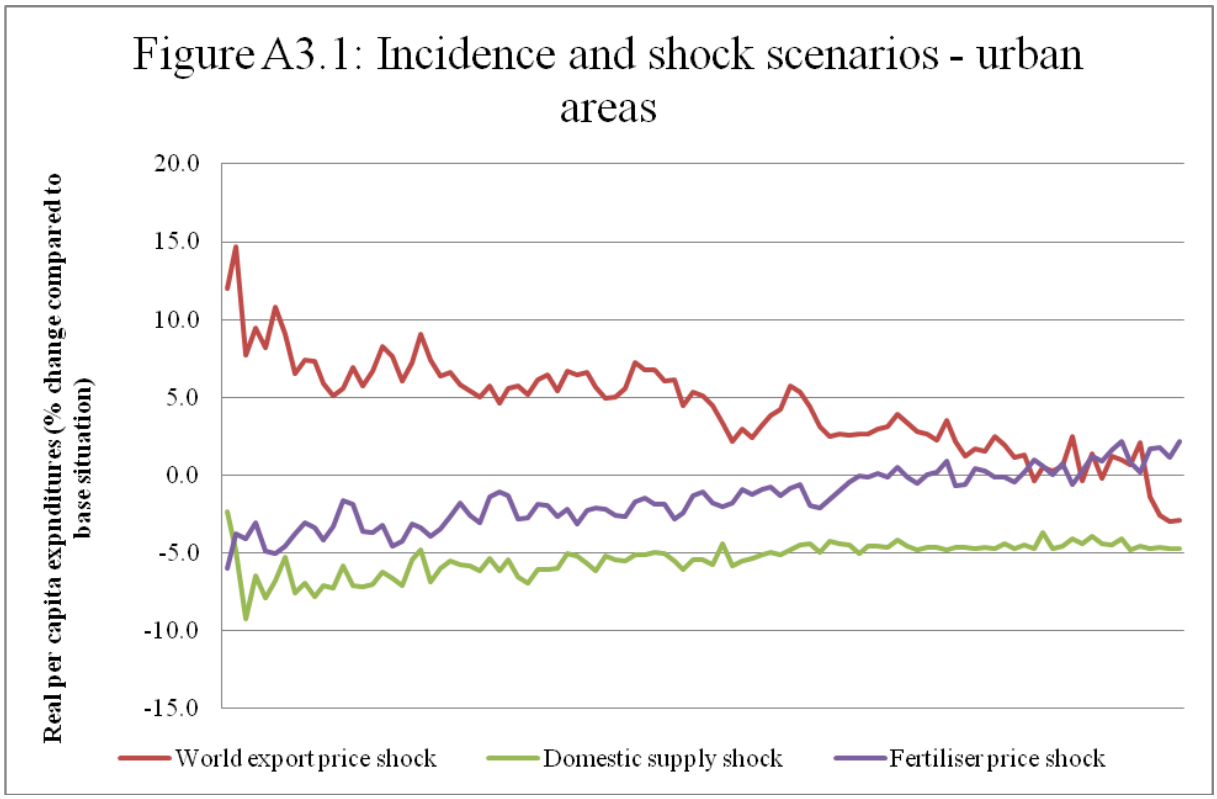
Figure A3.1: Incidence and shock scenarios - urban areas
Real per capita expnditures (% change compared to base situation)
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
World export price shock
Domestic supply shock
Fertiliser price shock

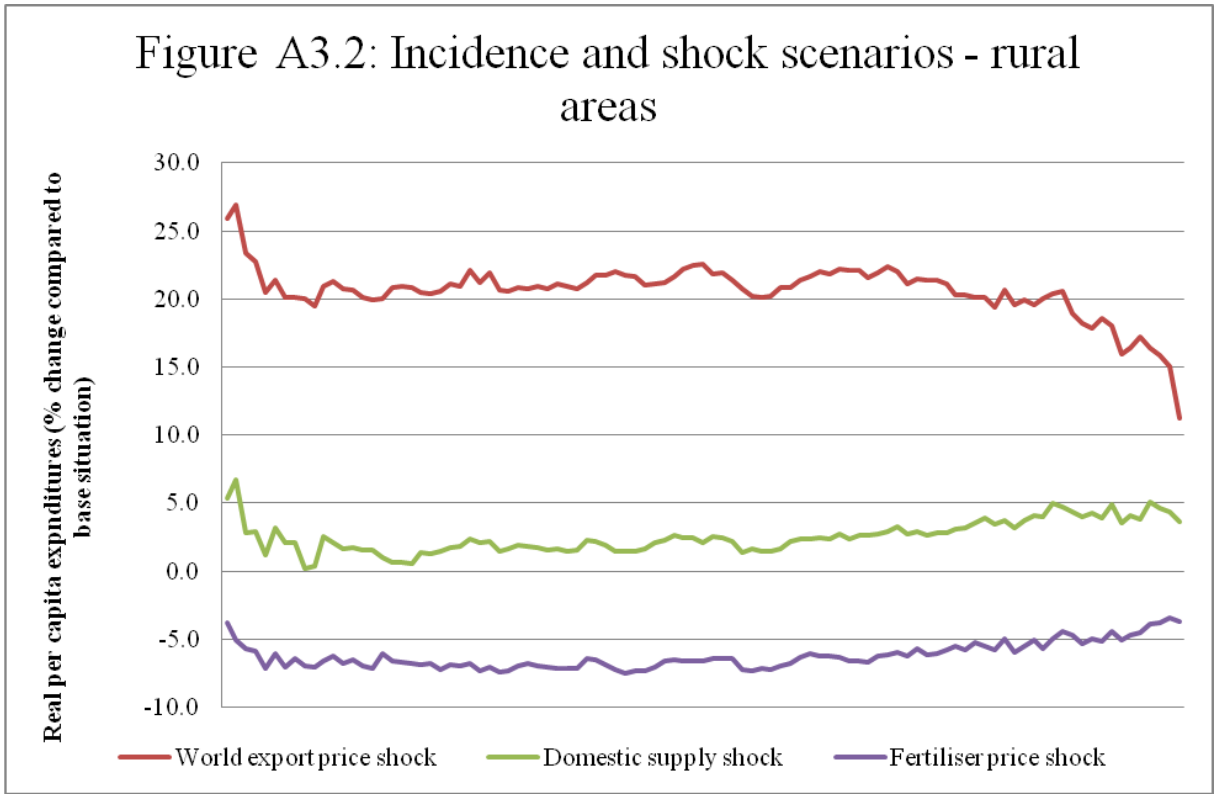
Figure A3.2: Incidence and shock scenarios - rural areas
Real per capita expnditures (% change compared to base situation)
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
World export price shock
Domestic supply shock
Fertiliser price shock