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The differentiated effects of food price spikes on poverty in Uganda

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Abstract

This paper applies an integrated CGE-microsimulation model to analyse the impact of the 2006-08 increase in commodity prices on Uganda. Previous impact analysis studies suggested that the food price shock increased poverty in Uganda as there are more net food buyer than net food seller households. We show that the agriculture commodity price shocks were poverty-reducing, but the simultaneous increases in energy and fertiliser prices were poverty-increasing. Overall, poverty decreased in Uganda as a result of external price shocks in the 2006-08 period.

Keywords: Food price shock, Uganda, microsimulation, poverty

JEL classification: O55, Q18.

INTRODUCTION

The rapid increases in food prices during 2006-08 raised widespread concerns about their impact on poverty and hunger. High food prices affect the poorest in particular, because of the high proportion of their income they spend on staple foods. The World Bank published estimates that 105 million people may have been pushed into poverty as a consequence of the 2006-08 price spike (World Bank, 2008). The FAO estimated that, as a result of the increase in food prices and the financial crisis in 2008, a further 115 million people were now undernourished and that in 2009 the global total of those undernourished exceeded 1 billion for the first time (FAO, 2009). Dessus et al. (2008) using national estimates of food price inflation food found that the food price shock led to a 4 percentage point increase in the US$1 a day poverty rate.

Higher food prices hurt consumers, but at the same time they benefit those who produce food. Thus, the extent to which higher global food prices increase or reduce poverty in developing countries is an empirical question. The initial empirical work attempting to assess the poverty impacts used a first order analysis using household data that differentiates between net buyers and net sellers of food (Ivanic and Martin, 2008; Wodon et al., 2008; Zezza et al., 2008). In most countries, because the number of net food buyers exceeds the number of net food sellers, higher food prices are shown to increase poverty. This is not a surprising finding in the case of urban households, because relatively few urban households receive their income from agricultural production. However, these studies also found it was the case even in rural areas where in most countries net food selling households are in a minority relative to net food buying households.

These first-generation studies have drawn a variety of responses. Aksoy and Isik-Dikmelik (2008) drew attention to the different intensities of net food purchases among net-food-buyer households and distinguish between marginal and significant food buying households. Another critique is that these first-order studies show the impact effects of changes in food prices, but do not consider the possibility of second-round indirect as well as spillover and multiplier effects in rural areas (Aksoy and Hoekman, 2010). A third critique is that these studies vary in the extent to which they take into account imperfect price transmission from global to national markets. International evidence suggests that domestic food price inflation has been significantly lower than international levels (Dessus et al., 2008).

This paper seeks to extend these impact analyses by modelling the effects of food price changes on the consumption and income of Ugandan households. We apply a CGE model to analyse the impact of the 2006-08 increase in commodity prices on Uganda, an agriculture-dependent economy with a high proportion of its population living in poverty. Previous studies find that poor households in Uganda tend to be net buyers of food staples, and therefore suffer welfare losses when food prices increase (Benson et al., 2008; Simler, 2010). We use price shocks calculated from Ugandan trade statistics rather than imposing price shocks derived from world indicator prices. Given the generalised nature of the commodity increases in 2006-08, it seems inappropriate just to pick out the increases in food prices for analysis, in spite of their direct connection to hunger. We thus include in our analysis price changes for cash crop as well as for major agricultural inputs (fuel and fertiliser) to get a more complete picture of how the 2006-08 events impacted on Ugandan poverty. Following Estrades and Terra (2012), we also discuss different policy alternatives designed to compensate those sectors of the population most harmed by the shocks.

The paper proceeds as follows. Section 2 presents the combined CGE-microsimulation model and methodology used to undertake the simulations. Section 3 explains how the price shocks were constructed. Section 5 discusses the results obtained. Section 6 contains our conclusions.

MODEL AND DATA

The simulations are implemented using a combined CGE-microsimulation model integrating all 7426 households of the Uganda National Household Survey (UNHS) 2005/06 as individual agents into the CGE model. The CGE model builds on the IFPRI Standard Computable General Equilibrium Model in GAMS (Lofgren et al., 2002). The main modification to the standard model is that surplus labour for unskilled and self-employed labour markets is assumed so that demand changes are countered by changes in labour supply at a fixed wage rate. In this view, households are able to increase their number of hours worked if gainful work opportunities arise. The reallocation of land between different crop uses is limited by introducing a nested CET land supply function. Foreign savings are assumed to be constant so that the exchange rate adjusts to balance the current account. The CPI is fixed and serves as the numeraire for the model (for a fuller description of the model used, see Boysen and Matthews, 2011).

The SAM used in this study is based on two datasets. The first dataset is the UNHS 2005/06. The UNHS comprises, in particular, detailed socio-economic and agricultural questionnaire modules. The sample includes 7,426 households corresponding to 40,449 individuals and is nationally representative, see Uganda Bureau of Statistics (2006). Overall, the sample inflated using sample weights represents a population of 28,428,169 individuals. The second dataset is the 2007 SAM for Uganda constructed by Thurlow et al. (2008).

The CGE model is calibrated on the 2007 SAM for Uganda which is based on the above SAM but extended and modified to include all households from the UNHS. The final extended Uganda SAM comprises 21 agricultural and 29 non-agricultural sectors, five factors of production including three types of labour plus land and capital, and accounts for an enterprise, the government, household transfers, and the rest of the world. The SAM has been substantially modified to incorporate the full household sample of 7421 households.

The model requires additional parameter data which cannot be derived from the SAM. The CET elasticities are adopted from the documentation of a 1999 Uganda SAM, see Dorosh and El-Said (2004). For all agricultural, non-processed commodities as well as for forestry and fish the CET elasticities are set to 3, for all other goods and services the CET elasticities are set to 2.5. The Armington elasticities of substitution between domestic and imported goods are taken from Hertel et al. (2007) and it is assumed that the elasticity of substitution between imports from different origins is twice the corresponding Armington elasticities. The elasticities of factor substitution have been adopted from the GTAP project, see Dimaranan et al. (2006, Table 20.2).

For the LES, the expenditure elasticities are taken from demand system estimations in Boysen (2010). Expenditure elasticities of item groups in the demand system are matched to the SAM commodities. The Frisch parameters are set to -1 so that there is no fixed subsistence consumption share in the demand system.

To measure poverty, we employ an absolute poverty line and the measures $P\alpha$ introduced by Forster et al. (1984, henceforth called FGT). The poverty headcount index P0 measures the percentage of people falling below the poverty line. The poverty gap P1 measures the extent by which poor people fall under the poverty line as a percentage of the poverty line on average. The poverty severity index P2 squares that shortfall percentage of each person before averaging and thus gives more weight to more severely affected people.

Rural and urban poverty lines are used which have been recovered from the adjusted household survey data in order to reproduce the poverty headcounts reported in the UNHS Report on the Socio-Economic Survey (Uganda Bureau of Statistics, 2006, Table 6.3.2 (a)). This resulted in poverty lines of 232,957 UGS and 257,377 UGS for the 34.2% of rural and 13.7% of urban poverty headcounts, respectively. The UBoS poverty lines are based on the cost of basic needs approach, which accounts for the cost of meeting physical calorie needs and allows for vital non-food expenditure, such as clothing and cooking fuels, valued using the average consumption basket of the poorest 50% of the population (Uganda Bureau of Statistics, 2006, Section 6.3). The rural and urban poverty lines account for the differences in prices and consumption baskets of the respective subpopulations. Per capita income is used as the income measure. To facilitate the poverty analysis from the CGE-MS results, household income is measured as the sum of the values of market and home consumption, both valued at market prices, and savings which then is deflated by the household specific CPI. It should be noted that our poverty classification is not directly comparable with the classification in the official report of the Uganda Bureau of Statistics (2006) due to differences in data adjustments.

Since the sectoral trade structure of the 2007 Uganda SAM used has been constructed using 2002/03 supply-use tables for Uganda (see Thurlow et al., 2008) and the common external tariff of the East African Community (EAC) had not been fully implemented in 2002/03, we conduct a pre-experiment to simulate the impacts of Uganda's implementation of the EAC customs union in 2005 including the adoption of the common external tariff and the removal of the EAC market's internal tariffs. The results of this pre-experiment form the starting point for our simulations.

CONSTRUCTING THE SHOCKS

The main focus of this study is the impact of the world food price spike in 2008. However, as food prices are highly related with the prices of cash crops as well as the prices of fuel and fertilizer inputs, those price changes are included in the price shocks simulated. Thus three price shock scenarios are simulated: the prices changes for agri-food products (Agric) and for fuels, chemicals & fertilizers (Energy) separately and then combined (Agric+energy).

A second set of simulation scenarios examines government policies to support the goal of poverty reduction and to shield the poorest from adverse effects of rising world prices. In particular, three scenarios, building on the combined Agric+energy price shock, are implemented. The Agric import tariffs scenario abolishes all import tariffs on agri-food products. The Agric sales tax scenario removes all sales taxes on agri-food products. And lastly, the Energy sales tax removal scenario removes all sales taxes on fuels, chemicals & fertilizers. To keep the government fiscal deficit constant, we assume the lost revenue is raised by means of a uniform income levy.

To circumvent the problem of determining the transmission of prices from world markets to the Ugandan border, unit values for traded products are used as measured through trade statistics at the Ugandan border. Data are taken from the United Nations Commodity Trade Statistics Database (COMTRADE) which include quantities and values for Ugandan import and export trade for highly disaggregated products (Harmonized System (HS), six-digit) and thus allow the calculation of unit values at this level. To construct changes of world prices over the 2006 to 2008 period for the commodities as defined for the Uganda SAM, the detailed COMTRADE is aggregated by using 2006 trade quantities as weights. The data used are 2006 and 2008 import and export values and quantities for Uganda as reporter and the world as partner from COMTRADE. As COMTRADE values are given in current US dollars, 2008 trade values are adjusted for exchange rate changes between Ugandan Shillings and US dollars by using the 2008 to 2006 Ugandan Shilling to US dollar exchange rate taken from the World

Development Indicators of the World Bank. The resulting price shock scenarios are presented in Table 1. The price shocks for tea and other livestock have been excluded as the unit value calculations for these products are not considered to be reliable.

Table 1. Scenarios, percentage changes in Ugandan border prices

Scenario ➔	**Agric**	**Energy**	**Agric+energy**
Maize	-3.17		-3.17
Other cereals	29.12		29.12
Cotton	116.14		116.14
Tobacco	40.05		40.05
Oil seed crops	119.90		119.90
Beans	18.36		18.36
Vegetables	21.82		21.82
Other export crops	40.83		40.83
Coffee	21.39		21.39
Tea leaves	*-56.44*		*-56.44*
Fruits	84.75		84.75
Other livestock	*-75.37*		*-75.37*
Poultry	-8.08		-8.08
Meat processing	44.01		44.01
Other food processing	45.27		45.27
Grain milling	18.73		18.73
Fuels		39.91	39.91
Chemicals & fertilizer		40.72	40.72

Source: Own calculation from COMTRADE data. Rows in italics mark price changes which have not been applied as shocks.

This method of aggregating the detailed price change data to the SAM sectors using trade weighting is not without problems as the composition of detailed trade lines per SAM sector differs between imports and exports. Here, we use the 2006 quantity-weighted average of import and export values so that each side of the trade gets adequate weight in affecting the aggregate price change. Different options for these calculations might result in strongly differing price changes.

These border price shocks do not directly translate to domestic price changes in the Uganda CGE model. In order to mimic the real world where a country imports as well as exports the same good, the model employs a constant elasticity of scale (CES) function on the import side and a constant elasticity of transformation (CET) function on the export side. These functions implicitly assume that domestically produced products differ to some degree from their imported and exported variants and therefore also their changes in their prices can differ. Thus, as long as the elasticities specified for the CES and CET function are non-infinite, there is imperfect transmission of border price changes to the domestic market. Moreover, the model accounts for transaction costs including transportation costs which act as an additional wedge between the world market and domestic price developments.

The issue of price transmission does not stop at the border of the country. The spatial transmission to local markets is influenced by domestic transportation and information infrastructure and also depends on the local supply and demand conditions. In Uganda, the changes in price incentives faced by individual producers and consumers vary widely in spatial terms due to poor infrastructure and high transactions costs within the country (Fafchamps et al. 2003; Simler, 2010). In the absence of further information on the extent of domestic price transmission, both vertically and spatially, we assume that all producers and all consumers are equally affected by the domestic market price changes that occur. This is an important limitation of our results which it would be desirable to improve in future work.

Next to trade elasticities, the shares of imports in total domestic consumption and of exports in total domestic production importantly affect the transmission of world market prices to the domestic market. These relationships are given in Table 2. The self-sufficiency index, calculated as the ratio of domestic production over domestic production plus imports minus exports, indicates the net export position for the products and thus indicates the impact of this sector on the current account balance.

Table 2. Scenarios, percentage changes in world prices

	Share in production	**Export share in output**	**Import share in demand**	**Self-sufficiency index**
Maize	1.2	17.9	13.1	103.4
Rice	0.3			100.0
Other cereals	1.0	22.4	26.3	88.1
Cassava	1.7			100.0
Irish potatoes	0.4			100.0
Sweet potatoes	1.9			100.0
Cotton	0.1	100.0		
Tobacco	0.4	96.6		2922.5
Oil seed crops	0.6	3.2	4.5	98.1
Beans	2.2	26.7		136.4
Vegetables	0.6	0.6		100.6
Other export crops	0.2	63.2		272.0
Coffee	0.7	100.0		
Tea leaves	0.2	100.0		
Matooke	2.6			100.0
Fruits	0.7	4.3	4.3	98.4
Cattle	1.3			100.0

Other livestock	0.2	12.1		113.8
Poultry	0.4	1.9	1.8	100.0
Forestry	1.8	8.2		109.0
Fisheries	1.4	38.1		161.6
Mining	0.2	22.1	34.7	67.2
Meat processing	1.4	4.4	6.9	92.3
Fish processing	0.8	61.4	12.7	200.4
Other food processing	3.0	23.0	16.1	102.5
Grain milling	2.0		6.3	92.0
Animal feed processing	0.3			100.0
Beverages & tobacco	1.1	3.5	10.6	88.6
Textiles & clothing	0.9	12.0	19.4	66.1
Wood & paper products	0.4	2.0	35.2	61.9
Fuels	0.0		82.9	0.1
Chemicals & fertilizer	1.4	6.5	44.9	40.8
Other manufacturing	1.7	6.9	35.4	60.2
Machinery & equipment	1.4	25.6	63.1	21.8
Furniture	0.4	0.9	9.7	88.8
Utilities	2.6	5.4		105.7
Construction	14.1			100.0
Trade services	10.2			100.0
Hotels & catering	4.7	66.0		293.7
Transport services	3.5	43.9	58.6	72.6
Communication services	1.9	5.3	3.4	102.0
Financial & banking services	0.9	2.9	25.5	76.6
Real estate	6.3			100.0
Other private services	1.7	1.8	26.9	74.3
Public administration	4.7			100.0
Education	8.8			100.0
Health	4.3			100.0
Community services	1.2			100.0

Source: Simulation results from the pre-experiment

RESULTS

Table 3 shows the impact on GDP and its components in the different scenarios. The Agric scenario, which only considers the price increases in the agri-food sectors, results in a net positive shock to the current account balance. The positive shock to the terms of trade leads to a real exchange rate appreciation resulting in a strong 14% increase in the real volume of imports and a 4% decrease in exports. GDP increases by 1% and private consumption by 7%.

By contrast, the price shock on the fuels, chemicals & fertilizers sectors largely affects imports and thus corresponds to a negative shock on the current account balance. The real exchange rate depreciates thereby increasing exports and decreasing imports. The higher prices for imported inputs lead to a contraction of GDP at market prices by 2.1% and of private consumption by 4.3%.

The combination of the agri-food and inputs price shocks results in a 6.4% appreciation of the real exchange rate and a weaker decrease of GDP at market prices of 1.2%. Nevertheless, private consumption rises by 1.5%.

Table 3. Percentage changes in GDP components (volume changes)

	Base	Agric	Energy	Agric+ energy	Agric tariffs	Agric sales tax	Energy sales tax
	%	% change					
Absorption	109.8	4.84	-2.93	1.04	1.64	1.94	1.46
Private consumption	75.7	7.02	-4.25	1.50	2.38	2.81	2.12
Investments	20.6	0.00	0.00	0.00	0	0	0
Government consumption	13.2	0.00	0.00	0.00	0	0	0
Exports	15.6	-4.06	0.26	-4.40	-0.7	-2.19	-3.37
Imports	-25.4	14.06	-4.17	6.52	9.28	8.23	7.18
GDP at market prices	100.0	1.12	-2.12	-1.20	-0.66	-0.3	-0.74
Net indirect taxes	9.2	11.59	-8.70	-0.61	0.7	0.87	0.99
GDP at factor cost	91.0	1.14	-1.09	-0.13	0.42	0.82	0.24
Real exchange rate	90.2	-9.54	0.95	-6.38	-6.71	-7.01	-6.3

Source: Simulation results. Negative real exchange rate change implies an appreciation of the Ugandan Shilling.

Table 4 lists the real changes in domestic production activity. The Agric scenario results in an expansion of most agri-food sectors while the Energy scenario causes sectors to contract across the board. The combined Agric+energy shock results in a more differentiated picture with no clear pattern emerging.

Table 4. Percentage changes in domestic production activity

	Base	Agric	Energy	Agric+energy
	%	% change		
Maize	1.2	-5.7	-2.1	-6.8
Rice	0.2	11.5	-1.9	9.3
Other cereals	1.0	22.7	-3.6	21.0
Cassava	1.7	0.2	-0.5	-0.9
Irish potatoes	0.4	4.3	-2.6	1.2
Sweet potatoes	1.9	-0.2	-0.7	-1.2
Cotton	0.1	559.9	-24.6	580.2

Tobacco	0.4	93.5	-34.1	89.5
Oil seed crops	0.6	44.5	-1.7	43.9
Beans	2.2	-7.3	-1.6	-7.4
Vegetables	0.6	2.7	-2.0	0.6
Other export crops	0.2	81.1	-15.8	77.2
Coffee	0.7	7.2	-17.3	-1.0
Tea leaves	0.2	-53.9	-16.3	-68.9
Matooke	2.5	1.6	-0.5	0.8
Fruits	0.7	10.1	-1.6	8.8
Cattle	1.3	24.5	-3.1	21.9
Other livestock	0.2	-1.0	-5.4	-4.9
Poultry	0.4	6.1	-3.1	2.5
Forestry	1.7	-2.6	1.0	-2.2
Fisheries	1.5	-30.4	51.7	-32.5
Mining	0.2	-17.4	-5.4	-17.6
Meat processing	1.4	7.5	-3.6	4.8
Fish processing	0.8	-31.2	116.9	-33.9
Other food processing	2.9	107.5	-0.7	105.3
Grain milling	1.9	10.8	-1.9	8.6
Animal feed processing	0.3	14.0	-3.1	10.8
Beverages & tobacco	1.1	7.0	-3.3	3.7
Textiles & clothing	0.9	-7.9	-9.5	-12.0
Wood & paper products	0.4	-18.1	0.4	-16.1
Fuels	0.0	-30.9	230.9	143.1
Chemicals & fertilizer	1.3	-12.0	77.0	51.3
Other manufacturing	1.7	-20.6	-6.6	-21.5
Machinery & equipment	1.4	-34.9	-12.6	-36.6
Furniture	0.4	-0.4	-3.8	-4.0
Utilities	2.6	2.9	-2.3	0.7
Construction	13.9	1.0	-0.2	0.7
Trade services	10.5	8.7	2.5	7.0
Hotels & catering	4.7	-42.6	-17.3	-44.6
Transport services	3.7	-16.2	-10.3	-19.3
Communication services	2.0	3.2	-2.1	0.9
Financial & banking services	0.9	5.5	3.0	8.2
Real estate	6.1	3.8	-1.7	1.7
Other private services	1.7	5.2	0.6	4.9
Public administration	4.8	0.0	0.0	0.0
Education	9.0	4.2	-1.9	2.0

Health	4.4	8.6	-5.3	2.4
Community services	1.2	9.7	-4.1	5.1

Source: Simulation results

Changes in factor returns, which ultimately determine household income, in the different scenarios are shown in Table 5. The increase in GDP at factor cost in the Agric scenario is distributed across all factors but with land, as the only factor specific to agriculture, and unskilled labour gaining most. Self-employed labour gains relatively the least. The Energy scenario leads to remuneration losses for all factors but first and foremost for land. However, self-employed and unskilled labourers also lose about 3% of their returns. Finally, the combined Agric+energy shock results in gains for land owners and unskilled labourers but losses for, in particular, the self-employed.

Table 5. Percentage changes in factor returns

	Base	Agric	Energy	Agric+ energy	Agric tariffs	Agric sales tax	Energy sales tax
	%				%		
Labor self-employed	21.7	1.7	-2.8	-1.5	0.1	1.4	-0.6
Labor unskilled	15.8	5.9	-2.7	2.3	3.4	4.3	3.3
Labor skilled	13.0	3.0	-1.4	0.0	1.0	1.7	0.9
Land	8.0	42.6	-9.9	33.0	34.3	38.4	34.7
Capital	41.5	2.0	-1.5	-0.8	0.6	1.5	0.2

Source: Simulation results

Food security, in the well-known FAO definition, has three dimensions of availability, access and utilisation. Based on our simulation results, we can say something about how the price shocks affect the first two of these dimensions. The domestic price changes for both producers and consumers in the various scenarios are presented in Table 6. Comparing the results with the world price shocks in Table 1 clearly shows the dampening effect of imperfect price transmission into the domestic market. For example, considering the initial border price shock of 29 per cent on other cereals in the combined Agric+energy scenario, the producer price increases by 13 per cent and the consumer price by 10 per cent. In this scenario, all producer and consumer prices largely increase and producer prices tend to increase more strongly than consumer prices.

Table 6. Percentage changes in domestic prices for agri-food and input goods

	Producer price			Consumer price		
	Agric	Energy	Agric+ energy	Agric	Energy	Agric+ energy
Maize	10.63	-3.84	7.20	7.67	-3.33	4.81
Rice	6.21	-1.78	3.88	5.61	-1.68	3.41

Other cereals	15.03	-2.54	12.69	12.41	-2.59	10.37
Cassava	12.30	-3.39	8.90	10.61	-3.04	7.54
Irish potatoes	5.54	-1.66	3.76	4.55	-1.5	2.92
Sweet potatoes	8.65	-2.59	6.05	7.6	-2.37	5.19
Cotton	85.04	-4.25	82.28	-	-	-
Tobacco	19.33	-3.68	17.55	-2.06	9.48	-3.86
Oil seed crops	17.19	-2.14	14.31	10	-1.99	7.18
Beans	10.50	-3.53	7.40	10.92	-2.69	7.84
Vegetables	7.05	-1.80	4.79	1.82	-1	0.49
Other export crops	16.66	-1.61	15.11	8.83	2.49	7.86
Coffee	3.93	-4.25	2.38	-	-	-
Tea leaves	-14.39	-4.25	-15.66	-	-	-
Matooke	6.33	-3.36	2.56	5.1	-2.91	1.81
Fruits	10.70	-2.19	8.12	3.76	-1.77	1.56
Cattle	11.99	-2.20	9.15	10.6	-2.03	7.98
Other livestock	2.94	-0.67	2.11	4.14	-0.2	3.34
Poultry	1.63	-1.18	0.60	1.32	-1.17	0.3
Fisheries	0.87	-0.68	-0.55	6.51	0.64	5.12
Meat processing	9.13	-1.89	6.70	4.57	-1.39	2.86
Fish processing	3.61	0.17	2.38	4.83	-10.97	3.94
Other food processing	1.19	-1.66	-0.25	-5.19	-1.36	-6.26
Grain milling	6.63	-2.42	4.20	4.63	-2.21	2.61
Animal feed processing	2.69	-2.46	0.82	2.63	-2.43	0.77
Beverages & tobacco	-1.40	-1.18	-2.37	-2.68	-1.27	-3.63
Fuels	-3.96	-1.33	-4.99	-12.38	28.58	14.85
Chemicals & fertilizer	-3.95	4.05	0.57	-8.51	13.63	7.05

Source: Simulation results

Table 7 presents some indicators relevant to food availability. In reference to the Agric+energy scenario, national self-sufficiency decreases for many foods like maize, beans, fish or grain milling. Self-sufficiency increases, e.g., for oil seed crops, meat, and other food processing. The separate Agric and Energy shocks show that the self-sufficiency changes in many cases are in opposite directions.

However, even where food self-sufficiency increases, this does not translate into increases in household consumption of agri-food products. The right-hand columns of Table 7 show the changes in projected real consumption of different commodities under the various scenarios. In general, food consumption declines with few exceptions, indicating that the combined shock reduces access to food among Ugandan households. But this is not solely due to the higher agri-food prices as the Agric and Energy columns indicate. In fact, the household consumption for a number of agri-foods increases in the Agric scenario while the Energy shock reduces it for all commodities except fish.

Table 7. Changes in food self-sufficiency and household consumption indicators

	Self-sufficiency index				Household consumption			
	Base	**Agric**	**Energy**	**Agric+ energy**	**Base**	**Agric**	**Energy**	**Agric+ energy**
						%		% change
Maize	103.4	86.6	101.9	86.7	0.20	-0.5	-0.2	-1.5
Rice	100.0	100.0	100.0	100.0	-	-	-	-
Other cereals	88.1	81.0	84.7	81.0	0.40	-4.0	-1.3	-6.6
Cassava	100.0	100.0	100.0	100.0	1.20	-2.0	-0.5	-3.0
Irish potatoes	100.0	100.0	100.0	100.0	0.30	1.7	-1.9	-0.9
Sweet potatoes	100.0	100.0	100.0	100.0	0.80	-0.7	-0.6	-1.6
Cotton	-	-	-	-	-	-	-	-
Tobacco	2922.5	6440.6	1751.3	6530.8	-	-	-	-
Oil seed crops	98.1	132.9	97.4	134.8	0.90	-2.0	-1.3	-3.3
Beans	136.4	123.7	133.9	125.2	1.70	-2.1	-0.5	-2.9
Vegetables	100.6	100.8	100.4	100.8	2.00	3.8	-2.0	1.5
Other export crops	272.0	359.1	231.0	352.9	-	-	-	-
Coffee	-	-	-	-	-	-	-	-
Tea leaves	-	-	-	-	-	-	-	-
Matooke	100.0	100.0	100.0	100.0	2.30	0.1	-0.2	-0.6
Fruits	98.4	132.0	97.6	133.5	0.80	1.8	-1.2	0.3
Cattle	100.0	100.0	100.0	100.0	-	-	-	-
Other livestock	113.8	105.7	111.4	105.5	0.40	4.1	-3.9	0.1
Poultry	100.0	98.3	99.7	98.3	0.40	4.3	-2.3	0.9
Fisheries	161.6	124.8	152.3	124.6	1.20	0.3	-3.2	-1.9
Meat processing	92.3	99.1	90.8	99.2	4.90	2.2	-2.3	-0.6
Fish processing	200.4	136.8	574.2	133.9	0.90	2.1	6.2	-0.5
Other food processing	102.5	179.4	97.6	177.3	5.90	12.8	-2.2	9.4
Grain milling	92.0	90.5	91.5	90.4	3.80	2.2	-1.4	-0.2
Animal feed processing	100.0	100.0	100.0	100.0	-	-	-	-
Beverages & tobacco	88.6	85.2	87.6	85.0	3.20	9.6	-2.3	6.1
Fuels	0.1	0.0	0.2	0.1	7.60	23.0	-25.7	-10.9
Chemicals & fertilizer	40.8	31.4	63.2	48.3	4.10	19.7	-17.1	-4.2

Source: Simulation results

Table 8 shows the associated Foster-Greer-Thorbecke poverty indices as calculated from individual household income and consumption patterns from the simulation outcomes. On a national level, the poverty headcount decreases as a result of the combined Agric+energy shock. But the separate Agric and Energy scenarios show that the agri-food price spike reduced the poverty headcount while the fuels, chemicals & fertilizers shock increased it. This same pattern can be observed for the rural and urban poverty indices separately. Thus, albeit household consumption of food products is predominantly decreases, those at the lower end of the income distribution do share the increase in private consumption on a national level and poverty decreases by about one per cent.

Table 8. Percentage point changes in FGT poverty indices

	Base	Agric	Energy	Agric+ energy	Agric tariffs	Agric sales tax	Energy sales tax
National		% point change					
Headcount	29.6	-2.66	1.48	-0.96	-1.6	-1.86	-1.35
Gap	9.60	-0.92	0.59	-0.31	-0.54	-0.63	-0.44
Severity	5.60	-0.40	0.23	-0.17	-0.28	-0.31	-0.23
Rural							
Headcount	32.70	-3.01	1.70	-1.14	-1.81	-2.1	-1.57
Gap	10.40	-1.06	0.66	-0.37	-0.62	-0.72	-0.52
Severity	5.00	-0.53	0.31	-0.21	-0.34	-0.39	-0.28
Urban							
Headcount	13.20	-0.81	0.35	0	-0.46	-0.58	-0.16
Gap	5.10	-0.22	0.19	0	-0.11	-0.14	-0.05
Severity	8.60	0.34	-0.21	0.07	0.07	0.08	0.07

Source: Simulation results

Three additional scenarios examine policies to attenuate the negative impacts of rising agri-food and energy prices and to support the reduction of poverty. These are all simulated in addition to the combined Agric+energy scenario. Table 3 shows a reduction of GDP losses over the Agric+energy scenario and also that private consumption benefits. The abolition of agricultural import tariffs and sales tax on food have stronger effects than the abolition of the energy sales tax. Table 5 shows the same ranking for factor returns. Indeed, the Agric sales tax scenario raises the returns to self-employed and unskilled labour and land which will benefit the poor. Nevertheless, also skilled labour and capital gain income showing that such untargeted policies are quite inefficient with respect to reducing poverty.

The poverty effects presented in Table 8 confirm these results. The Agric sales tax scenario doubles the decrease in the poverty headcount resulting from the Agric+energy scenario. The effect is positive across rural and urban areas although the majority of the positive effect occurs in the earlier.

CONCLUSIONS

Given that the poor spend a very high share of their limited income on food, the rise in global food prices during the price spike of 2006-08 set off alarm bells that millions of poor households would find themselves pushed below the poverty line or pushed further below it as a result of these higher prices. These fears were underlined by early estimates from various international agencies and also by widespread political unrest in the wake of higher food prices. However, impact estimates can be misleading as a guide to what actually happened to poverty and food insecurity in those years for a variety of reasons. Changes in staple food prices in low-income economies are likely have indirect and spillover effects which may mitigate or even reverse the sign of the initial impact. It was not only staple food prices which spiked in those years; prices of other agricultural commodities, energy, energy products, minerals and other raw materials also rose significantly. How countries were affected depended on the composition of their exports and imports. Third, changes in world market prices may have been only imperfectly transmitted to national border prices, as often changes in regional market conditions or in neighbouring countries may have been more important for individual countries than what was happening on global markets. Thus, to understand the impact of the 2006-08 price shocks it is necessary to examine countries individually to see how they were affected.

We address some of these issues in this paper looking at the experience of Uganda in the period 2006-08. Our focus is on the impact of external price shocks in agricultural and energy markets on Ugandan poverty rates. Uganda is in many ways typical of low-income agriculture-dependent economies, but it has its own specific characteristics. Uganda experienced rapidly-rising food prices particularly in 2008, but these appear to have been driven more by regional events than by the rise in global food prices. Uganda is generally insulated from changes in world market conditions because of high transaction costs (particularly transport). Equally important, Uganda's food security is based upon many staples that are not actively traded globally. Previous studies (Benson et al, 2008; Simler, 2010) using impact analyses have suggested that poverty in Uganda increased as a result of the food price spike in 2006-08.

We use an integrated CGE-microsimulation model of the Ugandan economy which separately distinguishes all households in the Ugandan Household Budget Survey. To capture the external price shocks we use the changes in unit values calculated from national trade statistics rather than global indicator prices. While unit export and import values also have their weaknesses (not least because they can be easily influenced by changes in the composition of trade between the two time periods), they are a better indicator of the specific external prices shocks experienced by Uganda than using global indicator prices.

Our results show that, on their own, the increases in agricultural commodity prices during the 2006-08 period resulted in a positive shock to Ugandan GDP and helped to reduce poverty rates. On the contrary, the simultaneous increase in energy and fertiliser prices reduced Ugandan GDP and increased poverty. On balance, we estimate that the agricultural price effects dominated and that poverty in Uganda declined as a result of external shocks during the 2006-08 period. We also show that policy changes to restructure the tax system could further alleviate the impact of higher prices on poverty, although it is likely that universal tax changes are highly inefficient in targeting the poor.

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