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Comparing the Impact of Food and Energy Price Shocks on Consumers:

A Social Accounting Matrix Analysis for Ghana

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Abstract

Many countries have been affected by food and oil price shocks. Rising energy costs have manifested themselves through higher prices of gas at the pump and through price increases for many other goods such as kerosene and transport. But in some countries there has also been some degree of protection for consumers for example when authorities have chosen to try to keep electricity tariffs affordable through implicit subsidies (which are unfortunately often poorly targeted). For food prices, the effect on consumers has often been more rapid than for oil-related products, as the increase in import prices have been typically fully passed on to consumers and has often been accompanied by increases in the prices of domestically produced foods. Recent attention has therefore rightly been focused on food prices, but the issue of oil prices is important as well. While food prices tend to have a larger direct impact on consumers due to the larger share of food in total household consumption, oil prices may have larger multiplier effects than food prices because oil-related products are used as intermediary products in many productive sectors. It therefore remains an open question as to whether the medium-term impact of food or oil prices is likely to be larger in any given country. It also remains open to question as to whether urban as opposed to rural households are most likely to be affected. While urban households are likely to rely on consumption of imported goods more than rural households, the weight of food and possibly oil-related products may well be larger in the consumption patterns of rural than urban households. Answering these questions may be useful to guide discussions on compensatory measures that governments can take to respond to the twin crisis of higher food and oil prices. In this context the objective of this paper is to provide a comparative analysis of the multiplier impact of both types of price shocks using a recent Social Accounting Matrix for Ghana. The paper finds that both the direct impacts of food prices and the indirect impacts of oil prices are potentially large, so that both should be dealt with by authorities when considering compensatory measures to protect households from higher consumer prices.

This paper—a product of the Development Dialogue on Values and Ethics, Human Development Network—is part of a larger study by the Africa Chief Economist Office and the Development Dialogue on Values and Ethics on the impact of the food price crisis in Africa and the policy responses available to governments. This research was started in the Africa PREM department and benefits from funding from the Africa Region Regional Studies Program as well as the Belgium and Luxemburg Poverty Reduction Partnerships. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at qwodon@worldbank.org.

Comparing the Impact of Food and Energy Price Shocks on Consumers: A Social Accounting Matrix Analysis for Ghana[1]

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1. Introduction

The recent increase in food and oil prices is having a major effect on the poor in developing countries (see e.g., Ivanic and Martin, 2007; International Monetary Fund, 2008; Wodon et al., 2008; Wodon and Zaman, 2008; and World Bank, 2008a and 2008b). Much of the recent discussion has focused on the impact of food prices, while that of oil prices seems to have been somewhat downplayed in order to deal with the food crisis. Yet it is unclear which type of shock is likely to have the largest impact on consumer prices and thereby on poverty in the medium term. While there has been substantial empirical work on assessing the impact of both types of shocks separately, there are few analyses that aim to compare the two shocks in a common analytical framework. The aim of this paper is to provide a comparative assessment in a simple general equilibrium framework of the potential impact on the cost of living for urban and rural households in Ghana that would follow from an increase in the price of either oil or food products, with an emphasis in the case of food on the price of cereals.

This topic is important in general, but also for Ghana. Indeed, food prices have increase rapidly in recent months in Ghana as in other sub-Saharan countries, and the population of many of these countries has been affected, with in some cases demonstrations taking place in the streets to request interventions by governments. Oil prices have also increased rapidly over the last few years, with direct and indirect effects for consumers as well as for firms such as utilities which rely on oil for their production.

The oil price shock has manifested itself through increases in prices of gas at the pump as well as through price increases for other goods such as kerosene and transport. In some countries, higher energy costs have also led to higher deficits by government controlled electric utilities, especially where a large part of power generation is thermal and where governments have resisted an increase in electricity tariffs. For food prices, the effect on consumers has often been more rapid and severe than for oil-related products, as the increase in import prices has been typically fully passed on to consumers and has often been accompanied by similar increases in the prices of domestically produced foods.

As a result of these price shocks, many governments are now struggling to implement compensatory measures, especially in order to offset part of the negative impact of food prices on the poor. These measures range from reducing import and other taxes to providing food subsidies, expanding social safety nets and food distributions (for example through school feeding) and implementing public works schemes. While attention has focused on food prices in recent months, the issue of oil prices is important as well. Food prices tend to have a larger direct impact on consumers due to the large share of food in total consumption, but oil prices may have larger multiplier effects than food prices because oil-related products are used as intermediary products in many productive sectors. It therefore remains an open question as to whether the impact of food or oil prices is likely to be larger in any given country. It also remains open to question as to whether urban as opposed to rural households are most likely to be affected. While urban households are likely to rely on consumption of imported goods more than rural households, the weight of food and possibly oil-related products may well be larger in the consumption basket of rural as opposed to that of urban households. Answering these various questions may be important in order to provide at least some guidance for the discussion of the compensatory measures that governments could take to respond to this twin crisis.

From a methodological point of view, both partial and general equilibrium models can be used to assess the impact of an increase in prices on households. While general equilibrium effects often include strong assumptions, they have the benefit to take multiplier effects into account. In this paper, we rely on the simplest form of general equilibrium models, namely the Social Accounting Matrix framework (SAM hereafter). A SAM is primarily a data framework which functions as a double-entry square matrix recording in columns payments (or expenditures) and in rows receipts (or incomes) of transactions made by the different activities, commodities, and agents in the economy. When SAMs are used as models, for example to assess the impact of quantity or price shocks, they are typically static models with fixed technical coefficients (i.e., Leontief technology) and prices. A key advantage of SAMs over Input-Output tables is that data from household surveys on incomes and consumption patterns can be integrated into the analysis. On the other hand, as compared to computable general equilibrium models, SAMs cannot take into account behavioral reactions to various types of shocks.

There is a very large literature on the use of SAMs for economic work which cannot be reviewed here. In developing countries, examples of studies include Adelman and Taylor (1990), Dorosh (1994), Taylor and Adelman (1996), Thorbecke and Jung (1996), Khan (1999), Arndt et al. (2000), Bautista et al (2001), and Taylor et al. (2002). A good review of the SAM approach to modeling can be found in Thorbecke (2000) which builds on an earlier synthesis by Defourny and Thorbecke (1984). While SAMs have a number of limitations, one of those we wish to emphasize here is that the "traditional" SAM model assumes that average expenditure propensities hold for exogenous demand shocks, implying income elasticities equal to one. A more realistic alternative mentioned in Pyatt and Round (1979) and Lewis and Thorbecke (1992) is to use marginal expenditure propensities.

While most of the applications of the SAM technique have focused on the impact of exogenous quantity or demand shocks, in this paper, our objective is instead to use a recent SAM for Ghana to assess the potential impact of the increase in oil and food prices on the cost of living for the consumption basket of various types of households. The structure of the paper is as follows. Section 2 provides our methodology for assessing the impact of oil and food price shocks on the cost of living in Ghana for urban and rural households in a social accounting matrix framework. In section 3, we present our empirical results. A brief conclusion follows.

2. Methodology

Algebraically, a SAM is a schematic representation of the flow transactions between different sectors or institutions in an economy. The convention that is used defines the cell T_{ij} of the SAM as the value of payments from sector/institution *j* to sector/institution *i*. In order to use the SAM as a price model, some accounts have to be considered exogenous. Exogenous accounts are the accounts for which the expenditures can be set independently from income, or said differently the accounts for which changes in incomes do not affect expenditure levels. The choice of which sectors to consider as exogenous usually depends on the nature of the simulation experiment, but Government, Capital Account, and the Rest of the World are often candidates.

Let n be the number of endogenous accounts, and $r-n$ the number of exogenous accounts. Summing down the j-th column of the SAM ***T***, we get

$$Y_j = \sum_{i=1}^{n} T_{ij} + \sum_{m=n+1}^{r} W_{mj} \qquad (1)$$

where Y_j denotes total expenditures of sector *j*, and W_{mj} denotes total payments to the *m*-th exogenous account made by sector *j*. If P_j denotes the price of the good produced by sector *j*, Q_j denotes the total output (in physical units) of sector *j*, and s_{ij} denote the amount of sector *i*'s good (in physical units) that is used by sector *j*, then equation (1) can be rewritten as

$$P_j Q_j = \sum_{i=1}^{n} P_i s_{ij} + \sum_{m=n+1}^{r} P_m s_{mj} \tag{2}$$

Dividing both sides by Q_j, we get

$$P_j = \sum_{i=1}^{n} \frac{P_i s_{ij}}{Q_j} + \sum_{m=n+1}^{r} \frac{P_m s_{m,j}}{Q_j} \tag{3}$$

Denote the *physical* technical coefficients for the endogenous accounts as $c_{ij} = \frac{s_{ij}}{Q_j}$ for $i = 1,\ldots n$

and define $b_j = \sum_{m=n+1}^{r} \frac{P_m s_{mj}}{Q_j}$ as the value of total payments to exogenous accounts per physical unit of sector *j*'s output. Now the equation (3) can be rewritten as

$$P_j = \sum_{i=1}^{n} P_i c_{ij} + b_j \tag{4}$$

which implies that the price of output of sector *j* is a weighted average of the prices of goods sector *j* buys with weights given by the *physical* technical coefficients, plus exogenous payments per unit of sector *j*'s output. Using matrix notation the resulting system of price equations can be written as

$$P = C'P + B \tag{5}$$

where C' is the transpose of $C = \left[c_{ij}\right]$. The system defined in (5) can be solved (under mild conditions[2]) as

$$P = \left(I - C'\right)^{-1} B \tag{6}$$

This is known as the Leontief price formation model. At first sight, this price model does not seem to be very useful since the *physical* technical coefficients are very rarely available. Instead, *value* technical coefficients a_{ij} can be computed by dividing each cell in T by the respective

[2] See ten Raa (2005), theorem 2.1.

column sum. The matrix $A=\left[a_{ij}\right]$ is usually referred to as the technical coefficients matrix, where $a_{ij}=\frac{T_{ij}}{\sum_{k=1}^{r} T_{kj}}$. According to Blair and Miller (1985), these value-based technical coefficients can also be given a physical interpretation using "dollars worth of output" as a measure of physical quantity. Under this interpretation, since the physical measure is equivalent to the monetary measure, all prices are equal to one. In physical terms, the technical coefficient a_{ij} represents the dollars worth of output of sector *i* per each dollar worth of output of sector *j*. Then equations (5) and (6) become

$$P=A'P+B \tag{7}$$

$$P=\left(I-A'\right)^{-1}B=M'B \tag{8}$$

One of the key features of the SAM model is the constancy of the technical coefficients implied by the excess capacity assumption for all sector/institutions. This not only implies the constancy of the physical technical coefficients, but also the constancy of the price ratio. For details see Miller and Blair (1985) or Moses (1974). That is:

$$\Delta P=\left(I-A'\right)^{-1}\Delta B \tag{9}$$

which means that the effect on prices of a change in the exogenous payments per unit of output, or simply a change in exogenous per unit costs, is given by the inverse (multiplier) matrix $M'=\left(I-A'\right)^{-1}$. Note that since all prices are equal to one, the absolute change in prices/costs is exactly equal to the percentage change.

The economic interpretation of most of the prices in the model is straightforward. The prices of activities can be understood as producer prices, the prices of commodities as consumer prices, and so on. The price of households can be understood as a cost of living index since it is computed as a weighted average of all the goods the households buy (in and outside the household), plus tax payments. In this paper, we consider the Rest of the World account to be the only exogenous account.

Since we are assuming that the price of oil (or food) is given by the international market, oil (or food) is modeled as a fixed price sector (the equivalent of a supply constrained sector in the value model). This means that the price of the sector can only be increased exogenously from its current level. Following the notation used by Lewis and Thorbecke (1992) after adapting it to the price model, it can be shown that the final effects on prices, given an exogenous price shock, are given by

$$d\begin{bmatrix} p_{nc} \\ b_c \end{bmatrix} = \left[\begin{array}{c|c} \left(I - C'_{nc}\right) & 0 \\ -R' & -I \end{array}\right]^{-1} \left[\begin{array}{c|c} I & Q' \\ 0 & -\left(I - C'_c\right) \end{array}\right] d\begin{bmatrix} b_{nc} \\ p_c \end{bmatrix} = M'_m d\begin{bmatrix} b_{nc} \\ p_c \end{bmatrix} \tag{10}$$

where p_{nc} is a vector of prices of unconstrained sectors; b_c is a vector of endogenous costs for fixed price sectors; C_{nc} is a matrix of expenditure propensities among unconstrained sectors; R is a matrix of expenditure propensities of unconstrained sectors on fixed price sectors; Q is a matrix of expenditure propensities of fixed price sectors on unconstrained sectors; C_c is a matrix of expenditure propensities among fixed price sectors; b_{nc} is a vector of exogenous costs for unconstrained sectors; p_c is a vector of exogenous prices of fixed price sectors; and I and 0 are the conformable identity and the null matrices, respectively; M_m is called the mixed multiplier matrix, and the prime symbol (‘) denotes the transpose of a matrix.

In the next section all the computations are performed using SimSIP SAM, a powerful and easy to use Microsoft® Excel based application with MATLAB® running in the background that can be used to conduct policy analysis under a Social Accounting Matrix (SAM) framework. It was developed by Parra and Wodon (2008), and it is distributed free of charge, together with the necessary MATLAB components. The accompanying user's manual describes how to use it and the theory behind the computations. The application can be used to perform various types of analysis and decompositions, and to obtain detailed and graphical results for experiments.

3. Data and Empirical results

3.1. Structure of the Ghana SAM

The 2005 SAM for Ghana used here was provided by IFPRI (2007). The SAM has 56 activities and 59 commodities, self-employed labor, skilled and unskilled labor; agricultural capital and other capital, land, rural and urban households, 5 accounts for government (government, direct taxes, sales taxes, import tariffs, and export taxes), 1 account for investment, and one for the rest of the world.

The technical coefficients of the macro SAM in table 1 give us an overall picture of the macroeconomic profile of the Ghanaian economy. Some 48.9 percent of the costs of production for activities are accounted for by intermediate inputs, 35.2 percent by labor payments, 12.2 percent by payments to capital, and 3.9 percent to land payments; 0.2 percent of total production is received as subsidies from government. The supply of commodities is satisfied at 68.2 percent by the marketed domestic output, 2.2 percent by the marketing margins of imported products, 6.0 percent by indirect taxes, and 23.6 percent by imports. Labor and land resources are used solely to pay households for their own use, and 19.4 percent of capital resources is used to pay direct taxes. Households spend 92.9 percent in final consumption, 3.5 percent paying income taxes, and 3.7 percent as savings. The government spends 30.9 percent of its income purchasing goods and services, 9.5 percent in transfers to households, 13.5 percent as savings, and 1.8 percent paying interest on its foreign debt. Finally, exports represent 57.6 percent of the rest of the world account, 3.3 percent of external resources go to households in form of remittances, 9.4 percent to the government as foreign grants, and 29.7 percent of the account represents saving of the rest of the world.

Table 2 provides data on the sources of income of urban versus rural households as well as their expenditure patterns. Urban households receive 69 percent of their income from labor, 22 percent as payments for the use of their capital, five percent as transfers from the government, one percent as remittances from the rest of the world and no income from land. Households in rural areas receive 15 percent of their income from land, which means that the share of total income received from labor and capital is lower. On average households in both urban and rural areas spend 93 percent of their resources in final consumption, leaving little room for savings after taking taxes paid to the government into account.

We present simulation results for the impact of price shocks on the cost of living for households. The way we simulate the price shocks is consistent with the assumption that the price of imports is set in international commodity markets, and will not be affected by supply and demand decisions in Ghana. This means that shocking the price of oil or rice/food will affect other sectors in the economy only through the size of the shock, absent all feedback effects that could generate the sector being shocked. This is equivalent to the shocked sector being exogenous when applying the price shock. If there are price ceilings above the base prices (as will be considered later) then a sector becomes exogenous after reaching its ceiling[3].

[3] Equation (10) illustrates this point.

3.2. Impact of an increase in oil and other fuels prices

In this section, we simulate the impact of a 34 percent increase in the prices of oil and other fuels on the cost of living for different types of households. The choice of the level of the increase in prices (34 percent) is arbitrary, but it does not matter since the model is linear[4] (this means that, for example, the effects of a shock of 68 percent would simply be twice as large as what we have obtained for 34 percent). The share of imports for the supply of crude oil in Ghana is 95.6 percent and the one for other fuels is 92.0 percent, with shares of total imports of 9.5 and 4.7 percent, respectively (oil has been discovered recently in Ghana, but for the moment the country is still importing oil for its consumption).

Table 3 provide a first set of results. The activities that are most affected by the increase in the oil and other fuels prices are diesel, petrol, transport services, trade services, and fishing (electricity does not seem to be affected as much, probably because generation in Ghana relies in part on hydraulic power). The table also provides the decomposition of the price increases. The activities that are impacted the most by the price shock typically have the largest direct effects. For example, more than 90 percent of the price change in petrol and diesel is explained by direct effects, and more than 40 percent in the case of fishing. Overall however, the indirect effects account for a larger share of the total effect than the direct effects. While this may lead to an overestimation of the total effects since we assume that there are no behavioral adjustments in the economy, it does suggest that at least in theory, the total effects may be large. Indeed, the total potential effect is large with the producer price index potentially increasing by a total of 7.18 percent.

Table 4 provides the effects on the cost of living for households. Overall, the increase in cost of living is estimated at 6.19 percent. The indirect effects contribute the bulk of the total

[4] This is true for the model without price controls.

effects, with the direct effects accounting for less than 14 percent of the final change in cost of living. Note that the direct effect is simply computed as the product of the share of total consumption accounted for by oil and other fuels (for example, 1.14 percent in urban areas) times the share of total income allocated to consumption (93.1 percent in urban areas), times the price increase for oil (34 percent). Thus, the direct effect is estimated at 0.36 percent in urban areas. The direct effect represents itself about 10.69 percent of the total effect we obtain the total effect at about 6.19 percent. These results suggest that the impact of an increase in crude oil and other fuels on household expenditure could be large. This result is not too surprising given that crude oil and other fuels imports represented 9.6 percent of GDP in 2005 (according to the SAM), and their share in total imports was 14.2 percent. While households spent only 2.13 percent of their total consumption on this commodity, crude oil and other fuels are used in many sectors of the economy, which means that the multiplier or indirect effects are large. Indeed crude oil and other fuels represented 8.5 percent of all intermediate consumption[5].

Urban households are slightly more affected than rural households, and exhibit lower direct effects. The slightly higher impact on the cost of living of urban households can be partly explained by the higher consumption share for diesel, petrol, transport, and community services in urban areas, which experience higher price changes. However, if we were looking at poverty (using for example poverty gap measures), since rural households tend to be much poorer to start with than urban households, the negative impact of the oil shock would probably be larger for rural households.

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[5] This compares to 5.6% in Lesotho in 2000, 1.1% in Tanzania in 2001, 4.1% in South Africa in 2000, and 11.1% in Uganda in 1999 according to SAMs for these countries.

3.3. Impact of an increase in the price of rice

The same approach can be used to simulate the impact of food prices, and we start with a single commodity, namely rice (this commodity is chosen as Ghana is a net importer of rice). For comparability purposes, we also simulate the impact of a 34 percent increase in the price of rice. Imports account for 54.8 percent of the total supply of rice in Ghana, and represent 3.4 percent of aggregate imports. Table 5 summarizes the results. The activities that are most affected by the increase in the price of rice are informal and formal food processing, other services and public administration. The total potential effect on the producer price index would be of 1.46 percent.

Table 6 provides the effects on the cost of living for households. Overall, the increase in cost of living is estimated at a much lower 1.74 percent. There are three main reasons for this lower impact as compared to oil. While rice represents a larger share of total consumption than oil-related imports, the indirect effects of the price increase are substantially lower for rice than for oil imports. In addition, urban households are, again, slightly more affected than rural households.

3.4. Impact of an increase in the price of cereals

While rice prices have increase substantially, the price of other food items, and especially other cereals, has also increased. It is therefore useful to assess the overall impact of the increase in cereal prices. The 2005 SAM for Ghana includes four accounts for cereals: Maize, rice, sorghum and millet, and other grains. The prices for the four accounts are each increased by 34 percent. Imports account for 27.4 percent of the total supply of these commodities in Ghana and import propensities vary, reaching 95.7 percent for other grains, as compared to 54.8 percent for rice (because rice is locally produced). Table 7 contains the resulting price change for all the sectors in the SAM. The activities most affected by this price shock are, by far, chicken broiler, and eggs and layers, big consumers of maize as intermediate consumption. Informal food processing and other meats are also affected, again through maize consumption for intermediate demand in both cases, and through other grains in the case of informal food processing. The final impact on the Producer Price Index (PPI) would be 3.16 percent.

In terms of the increase in the cost of living, rural households are this time more affected by the increase in the prices of cereals than urban households. The main explanation for this result is a consumption share for cereals in rural households that is twice as high as the corresponding share for urban households. The total increase in cost of living for households in Ghana would be 3.65 percent as a result of this combined price shock on all key cereal products. The results are summarized in Table 8.

3.5. Impact of an increase in the overall price of food

At the extreme, one could argue that the price of other food items might also increase if the price of cereals increases. We therefore run one last simulation, with a 34 percent increase in the price of all food products. The 2005 SAM for Ghana includes twenty five accounts for food, with imports accounting for 8.5 percent of the total food supply in Ghana. Table 9 contains the resulting price change for all the sectors in the SAM. The activities most affected by this price shock are, by a large margin, cocoa processing (27.2 percent), and formal (22.2 percent) and informal food processing (25.3 percent). Textiles (17.0), dairy products (16.6), and meat and fish processing (14.9) follow in impact size. The final impact on the Producer Price Index (PPI) would be 11.6 percent.

The food share in final consumption by households is 34.1 percent, which is probably on the low side. Judging by the increase in the cost of living, rural households are again slightly more affected by the increase of the prices of all food items than urban households. Even though the food share in final consumption, and therefore the share of direct effects is much higher for rural households than for rural households (97.1 percent versus 68.9 percent), the indirect effects compensate for the initial difference and make the impact on the cost of living fairly similar in urban and rural areas. The total increase in cost of living for households in Ghana would be 12.86 percent as a result of the price shock. The results are summarized in Table 10.

4. Conclusion

This chapter has used a simple SAM-multiplier approach to examine the impact of oil and food price shocks on rural and urban households in Ghana. In other words, assuming that Ghana faces oil and/or price shocks, we analyzed which sectors of the economy would be mostly affected and what would be the distributional implications of these shocks on households given the patterns of consumption observed for urban as opposed to rural households. At least two important results stand out from the analysis.

First, while the impact of an increase in the overall level of prices for food would have a larger negative impact on the cost of living of households, the impact of an increase in oil prices could be larger than that of an increase of cereal prices only. Second, whether one looks at the impact of price increases for rice, all cereals, all food items, or oil imports, the differences in increases in cost of living for urban and rural households are fairly similar. To the extent that rural households are significantly poorer than urban households, and thus have fewer means to deal with price shocks than urban households, this would suggest that special attention should be given to compensatory mechanisms in rural areas, even though the consumption of imported goods which are most susceptible to price increases is indeed higher in urban areas.

While the results from our analysis should be treated with caution (among others because the SAM multiplier analysis may overstate the impact of price shocks due to its inability to take into account behavioral reactions to price increases), they do provide some pointers and stylized facts that are worth considering when implementing policies to aim to offset part of the negative impact of higher oil and food prices for the population.

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Table 1: Technical coefficients for the macro SAM, Ghana 2005 (in percentages)

	Activities	Commodities	Labor	Capital	Land	Households	Government	Capital account	Rest of World
Activities		68.2							
Commodities	48.9	2.2				92.9	30.9	100.0	57.6
Labor	35.2								
Capital	12.2								
Land	3.9								
Households			100.0	80.6	100.0		9.5		3.3
Government	-0.2	6.0		19.4		3.5	44.3		9.4
Capital account						3.7	13.5		29.7
Rest of World		23.6					1.8		

Source: Authors' estimations using SimSIP SAM.

Table 2: Sources of incomes and expenditures, Ghana SAM, 2005 (in percentages)

	Sources of income						**Expenditure categories**			
	Labor	**Capital**	**Land**	**Households**	**Government**	**RoW**	**Commodities**	**Households**	**Government**	**Capital account**
Rural	64.0	15.3	15.4	-0.8	5.2	0.9	92.6	0.8	1.8	4.8
Urban	69.0	21.7	0.0	0.7	5.2	3.4	93.1	-0.7	5.0	2.7

Source: Authors' estimations using SimSIP SAM.

Table 3 Impact of increase in oil-related prices on activities prices, Ghana SAM, 2005 (%)

Activity	**Price increase**	**Activity**	**Price increase**
Maize	6.43	Informal food processing	6.89
Rice	6.13	Cocoa processing	6.25
Sorghum and millet	6.81	Dairy products	7.87
Cassava	6.94	Meat and fish processing	6.82
Yams	6.91	Textiles	6.33
Cocoyams	7.07	Clothing	6.68
Cowpea	7.18	Leather and footwear	6.46
Soyabean	6.90	Wood products	7.52
Palm oil	6.80	Paper products	6.90
Groudnuts	7.00	Petrol	27.91
Tree nuts	7.13	Diesel	27.50
Fruit (domestic)	7.04	Other chemicals	5.69
Fruit (export)	6.84	Metal products	6.59
Vegetables (domestic)	6.32	Capital goods	5.94
Vegetables (export)	5.97	Construction	5.90
Plantains	7.61	Water	4.84
Cocoa beans	6.14	Electricity	5.55
Other crops	6.70	Trade services	9.31
Export industrial crops	6.10	Other services	7.91
Chicken broiler	7.58	Transport services	16.58
Eggs and layers	7.25	Communication	6.33
Beef	6.90	Business services	6.37
Sheep and goat meat	6.85	Real estate	6.50
Other meats	7.04	Community services	7.72
Forestry	6.31	Public administration	6.81
Fishing	8.56	Education	6.95
Mining	6.45	Health	6.96
Formal food processing	6.78		
Total (Producer Price Index)	**7.18**		

Source: Authors' estimations using SimSIP SAM.

Table 4 Impact on household cost of living of crude oil and other fuels, Ghana, 2005

Category	Change in cost of living (1)	Direct effect (2)	Direct effect as share of total effect (2)/(1)	Share of oil and other fuels in final consumption	Share of aggregate households expenditure
Rural	6.07	1.00	16.50	3.20	48.11
Urban	6.31	0.36	5.69	1.14	51.89
Total (Consumer Price Index)	**6.19**	**0.67**	**10.79**	**2.13**	

Source: Authors' estimations using SimSIP SAM.

Table 5 Impact of increase in rice price on activities prices, Ghana SAM, 2005 (%)

Activity	Price increase	Activity	Price increase
Maize	1.45	Informal food processing	3.08
Rice	2.67	Cocoa processing	1.65
Sorghum and millet	1.54	Dairy products	1.45
Cassava	1.59	Meat and fish processing	1.34
Yams	1.60	Textiles	1.25
Cocoyams	1.52	Clothing	1.45
Cowpea	1.52	Leather and footwear	1.27
Soyabean	1.56	Wood products	1.47
Palm oil	1.44	Paper products	1.34
Groudnuts	1.49	Petrol	0.36
Tree nuts	1.50	Diesel	0.38
Fruit (domestic)	1.58	Other fuels	0.39
Fruit (export)	1.52	Other chemicals	1.15
Vegetables (domestic)	1.45	Metal products	1.03
Vegetables (export)	1.23	Capital goods	1.20
Plantains	1.44	Construction	1.39
Cocoa beans	1.44	Water	0.98
Other crops	1.44	Electricity	0.88
Export industrial crops	1.26	Trade services	1.21
Chicken broiler	1.43	Other services	1.69
Eggs and layers	1.45	Transport services	0.98
Beef	1.52	Communication	1.60
Sheep and goat meat	1.60	Business services	1.61
Other meats	1.56	Real estate	1.57
Forestry	1.48	Community services	1.54
Fishing	1.17	Public administration	1.67
Mining	1.26	Education	1.66
Formal food processing	1.69	Health	1.66
Total (Producer Price Index)	**1.46**		

Source: Authors' estimations using SimSIP SAM.

Table 6 Impact on household cost of living of a 34% increase in rice price, Ghana, 2005

Category	Change in cost of living (1)	Direct effect (2)	Direct effect as share of total effect (2)/(1)	Share of rice in final consumption	Share of aggregate households expenditure
Rural	1.67	1.26	75.31	4.03	48.11
Urban	1.79	1.28	71.47	4.08	51.89
Total (Consumer Price Index)	**1.74**	**1.27**	**73.25**	**4.06**	

Source: Authors' estimations using SimSIP SAM.

Table 7 Impact of increase of 34% in maize, rice, sorghum and millet, and other grains prices on activities prices, Ghana SAM, 2005 (%)

Activity	Price increase	Activity	Price increase
Cassava	3.61	Dairy products	3.52
Yams	3.67	Meat and fish processing	3.07
Cocoyams	3.46	Textiles	2.62
Cowpea	3.45	Clothing	2.95
Soyabean	3.49	Leather and footwear	2.58
Palm oil	3.25	Wood products	3.03
Groudnuts	3.36	Paper products	2.70
Tree nuts	3.40	Petrol	0.73
Fruit (domestic)	3.62	Diesel	0.77
Fruit (export)	3.47	Other fuels	0.78
Vegetables (domestic)	3.27	Other chemicals	2.31
Vegetables (export)	2.76	Metal products	2.07
Plantains	3.22	Capital goods	2.41
Cocoa beans	3.19	Construction	2.80
Other crops	3.24	Water	1.96
Export industrial crops	2.85	Electricity	1.76
Chicken broiler	12.71	Trade services	2.45
Eggs and layers	13.13	Other services	3.48
Beef	5.00	Transport services	1.97
Sheep and goat meat	3.86	Communication	3.22
Other meats	6.36	Business services	3.22
Forestry	3.11	Real estate	3.16
Fishing	2.39	Community services	3.07
Mining	2.53	Public administration	3.35
Formal food processing	4.31	Education	3.26
Informal food processing	6.28	Health	3.26
Cocoa processing	3.47		
Total (Producer Price Index)	**3.16**		

Source: Authors' estimations using SimSIP SAM.

Table 8 Impact on household cost of living of a 34% increase in cereals price, Ghana, 2005

Category	Change in cost of living (1)	Direct effect (2)	Direct effect as share of total effect (2)/(1)	Share of cereals in final consumption	Share of aggregate households expenditure
Rural	4.03	3.55	88.30	11.37	48.11
Urban	3.30	1.75	53.12	5.58	51.89
Total (Consumer Price Index)	**3.65**	**2.62**	**71.79**	**8.36**	

Source: Authors' estimations using SimSIP SAM.

Table 9 Impact of increase of 34% in food prices on activities prices, Ghana SAM, 2005 (%)

Activity	Price increase	Activity	Price increase
Forestry	10.98	Other chemicals	8.27
Fishing	8.51	Metal products	7.42
Mining	9.10	Capital goods	8.66
Formal food processing	22.18	Construction	10.05
Informal food processing	25.31	Water	7.07
Cocoa processing	27.24	Electricity	6.33
Dairy products	16.55	Trade services	8.77
Meat and fish processing	14.94	Other services	12.44
Textiles	17.00	Transport services	7.07
Clothing	10.75	Communication	11.57
Leather and footwear	9.23	Business services	11.58
Wood products	10.75	Real estate	11.34
Paper products	9.68	Community services	11.05
Petrol	2.61	Public administration	12.05
Diesel	2.76	Education	11.81
Other fuels	2.80	Health	11.80
Total (Producer Price Index)	**11.60**		

Source: Authors' estimations using SimSIP SAM.

Table 10 Impact on household cost of living of a 34% increase in food prices, Ghana, 2005

Category	Change in cost of living (1)	Direct effect (2)	Direct effect as share of total effect (2)/(1)	Share of food in final consumption	Share of aggregate households expenditure
Rural	13.48	13.08	97.06	41.84	48.11
Urban	12.29	8.47	68.92	26.97	51.89
Total (Consumer Price Index)	**12.86**	**10.69**	**83.10**	**34.11**	

Source: Authors' estimations using SimSIP SAM.