Welfare Impacts of Food Price Inflation in Ethiopia

Klugman, Jeni and Loening, Josef

World Bank

15 December 2007

ETHIOPIA

EXPLAINING FOOD PRICE INFLATION

POLICY NOTE

Revised, Final version

December, 2007

VI. WELFARE IMPACTS

74.   For the average Ethiopian, food amounts to 58 percent of total consumption. Cereals form the lion share – about half of food consumption and one-fourth of average expenditure. In this section, we first present a descriptive analysis of basic consumption patterns of the major cereals (*teff*, wheat, maize, sorghum and barley) across various household groups. We then examine the effects of price changes on household welfare using on individual households' food consumption and production.

Consumption of Major Cereals

75.   Not surprisingly, given the size and diversity of Ethiopia, the level and type of grain consumption varies by region, due to differences in household preferences, income, prices, and so on. Among rural households, per capita consumption of *teff* is significantly higher for non-poor households than for poor households and is higher in the northern highlands than the south-central highlands. The regional pattern is reversed for maize and wheat, for which per capita consumption of rural households is higher in the south-central highlands than in the northern highlands, controlling for total expenditures (Figure 16).

Figure 16: Per Capita Cereal Consumption by Region, 2000
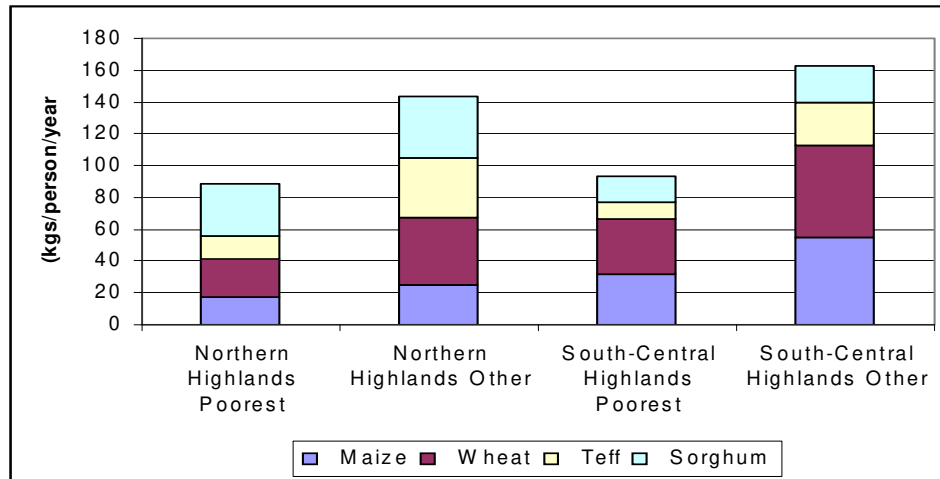
Note: 'Poorest' refers to the bottom 40 percent of rural households in the national distribution.
Source: Data base for IFPRI Multi-market model (Diao, 2007).

76.   Using nationally representative household data (HICES, 2004) available at the time of the analysis we can examine patterns of household expenditure. This shows that there are also major differences in urban and rural consumption, with expenditure shares of *teff* higher and those of maize and sorghum lower than in rural areas (Table 13).

77.   Of course, given the agricultural basis of the Ethiopian economy, many households also produce some grain. Net sellers of grain benefit from higher prices. We can use the HICES data to

establish net sellers and net buyers, with the qualification that incomes tend to be under- reported. Looking at the effects of price changes by crop on farmers in terms of net sellers and buyers, *teff* price increases tend to benefit farm households since 40 percent of farmers are net sellers of *teff* and only 10 percent of farmers are net buyers of *teff*. Wheat and maize price increases have mixed effects on farm households, since 20 percent of farmers are net buyers of wheat and more than 30 percent of farmers are net buyers of maize (Figure 17).

Table 13: The Importance of Grain in Household Expenditures, 2004

Category	Ethiopia		Urban		Rural	
	Mean	Share (%)	Mean	Share (%)	Mean	Share (%)
Total household expenditure (Birr/month)	682		907		639	
Total food expenditure	354	56.2	354	49.9	354	57.4
Teff	30	4.7	54	7.9	25	4.2
Wheat	26	4.3	14	2.2	28	4.6
Barley	12	2.0	2	0.4	14	2.3
Maize	27	4.5	6	1.1	31	5.1
Sorghum	25	4.2	5	1.0	29	4.7

Note: Statistics are weighted and show averages for all households in the sample. "Share" is mean share of selected categories out of total household expenditure.
Source: HICES 2004 data.

Figure 17: Net Seller and Buyers of Grain Among Farmers
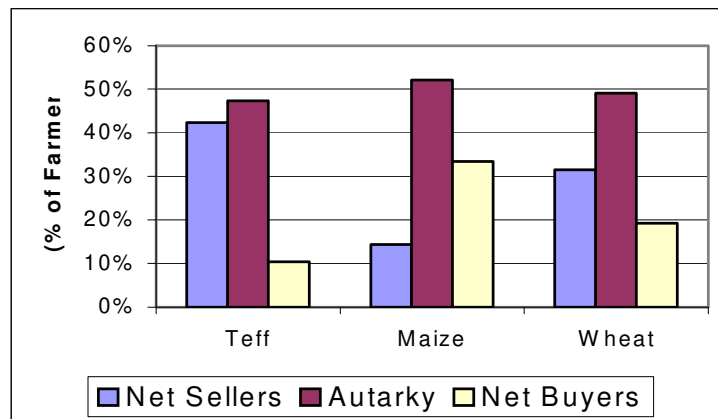
Source: Calculated from IFPRI/CSA Survey, 200.5

Price Changes and Household Welfare: Total Food Expenditures

78.   Analysis of distributional impacts of changes in overall food prices (including cereals, as well as other food) needs to account for differences in production and consumption patterns, and behavioral responses to price changes. Numerous studies have analyzed the welfare impact of food price changes in various countries (see Box 9). Most obviously, food prices changes affect average rural and urban households differently. Overall, rural households tend to gain from increases while urban households tend to lose, though the final rural effects depend on the composition of net buyers and sellers and the importance of induced wage responses.

Box 9: Summary Overview of Household Welfare and Food Price Change Literature

General findings:
- The pioneering statistical work of Deaton (1989, 1997) analyzes the increase of rice prices and their distributional implications in rural and semi-rural Thailand. Higher rice prices provide direct benefits to all households, but the main beneficiaries are not the poorest or the richest households, but middle-income groups.
- Ravallion (1990) looks at the welfare effects of food price changes in rural Bangladesh. The short-run distributional effects are likely to benefit the rural rich while the rural poor lose. Considering induced wage responses, however, the long-run effects appear to be more positive for the poorest households.
- Barret and Dorosh (1996) address rice price changes in rural Madagascar. The welfare increase of rice price changes is concentrated among larger and richer farmers in particular regions. Poor farmers face significant negative welfare effects.
- Budd (1993) examines food price changes in rural Côte d'Ivoire. Most households are net sellers, but the magnitudes sold are small. Income elasticities with respect to food price change are small. The effects are quite diverse and depend on composition of the food basket and geographical location.
- Mude (2005) looks at welfare and distributional impacts of rice price policy in rural and urban Kenya. A reduction in maize price would decrease rural and urban poverty, and inequality will fall.
- Minot and Goletti (2000) analyze rice price changes in Viet Nam. Surplus regions in rural Viet Nam would gain, while food deficit regions and urban areas would lose from change in rice prices. Higher rice prices would benefit the average urban household to the expense of urban households. The quantitative effects of rice price change are small.
- Christiaensen and Demry (2007) review case studies for Eastern Africa. Their findings suggest that a number of factors matter, such as the net marketing position, productivity and wage induced changes, and the integration of markets. On balance, they conclude that many poor households are net food buyers. Higher food prices may further impoverish rural and urban populations.

For Ethiopia:
- Levinson and McMillan (2004) look at the welfare impacts of wheat price change associated with food aid in Ethiopia using the 2000 HICES and WMS. Households would generally benefit from a reduction in wheat price, with the benefits being proportionally larger for the poorest households.
- Through regression analysis, Dercon (2006) identifies the determinants of poverty changes during the 1990s in 15 villages in rural Ethiopia. The main factors driving consumption changes are relative price changes. Higher relative food prices would benefit the poor, though this would not be the only factor.

In sum, results and methods differ considerably. Authors focus at individual crops or food baskets, such as Budd (1993) and Ravallion (1990). All studies consider hypothetical food price changes, typically 10 percent. With the exception of Ravallion (1990) and to some extent also Mude (2005), studies do not consider induced wage responses. Authors typically do not discuss the inherent statistical problems measuring food production, incomes, and expenditures. This may partly contribute to the varying results.

79.   Country specific econometric analysis was commissioned to inform this note (see background papers by Loening and Oseni (2007), and Abebe and Delegn (2007)). Using data from the 2000 WMS/HICES, Loening and Oseni (2007) estimates that a hypothetical 10 percent increase in food prices, holding production levels and other sources of income constant, would increase rural income levels by 1-2 percent while decreasing the urban incomes by 4 percent. The benefit for rural households is biased towards better-off households than low income smallholders. Interestingly,

however, in the case of urban households, the hardest hit in the short run are those falling in the middle income brackets (Figure 18).[11]

80.   There are intra-rural differences as well, between net sellers and net buyers. More than half of rural households are net food sellers and on average they gain from food price increases. A 10 percent rise in food prices increases rural net sellers' income levels by 4 percent in the short run. Net food buyers tend to lose from the same price change, decreasing the rural net buyers' income levels by 4 percent.

Figure 18: Impact of Food Price Increases
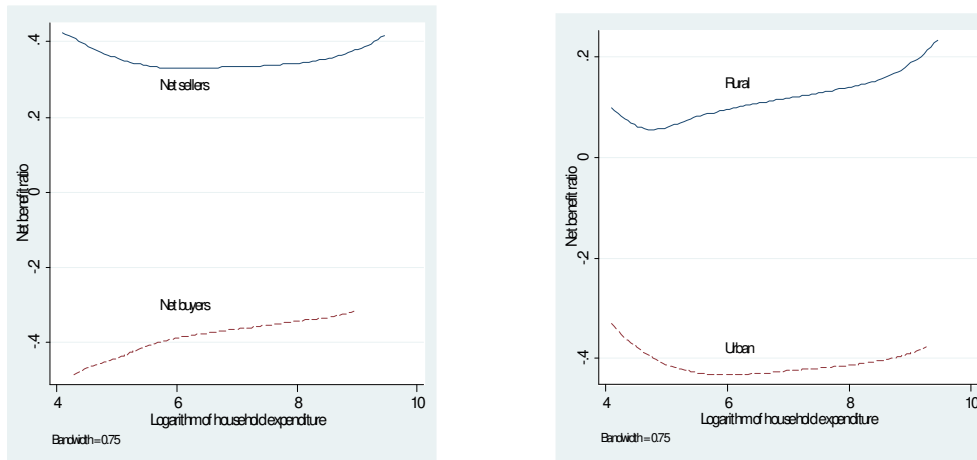
Source: Loening (2007).

81.   At the same time, the aggregate welfare impacts of the observed food price changes at national level in Ethiopia are small, reflecting opposing welfare impacts between urban and rural net sellers, and rural net buyers) Based on the relative food price change of 23 percent during January 2000 to April 2007, and holding per capita non-agricultural incomes and non-food prices constant in real terms, the expected total welfare effect is an increase of 0.7 percent relative to initial household income. Using national expenditure quintiles, the middle-income groups benefited most from the food price increase.

82.   Looking behind the national averages, the net welfare results are mixed.

- A distinction by location indicates that rural household real income increases by about 4 percent, while income for urban households decreases by 8 percent.

- Regionally (albeit using uniform national prices), we find that the main urban centers and Tigray experience the largest net welfare decreases because of the direct effect of price changes, while net welfare in SNNPR and Benishangul increased.

---

[11] We rely on the 2000 WMS/HICES since both income and expenditure data is required for the analysis. The 2004 HICE income data has not been made public. Nor also that analyzing the welfare impacts of food price changes requires some approximation techniques. The robustness of the conclusions has been tested with a sensitivity check and analysis of changes of the asset structure of rural households (see Loening and Oseni, 2007).

- For the rural net buyers, we find a decrease of about 7 percent and for rural net seller households, an increase of around the same magnitude.

- The decomposition of rural households by quintile shows that high-income groups gain relatively more, though the top quintile represents relatively few wealthy households.

- Differentiated urban welfare effects show that the effects have been negative for all income groups but in particular the urban poor.

83.   Decomposing by time period, we find that most of the relative price change occurred prior to 2005. About 70 percent of the total welfare effects arose during the period between January 2000 and December 2005.

84.   Detailed analysis of the effects of price changes of individual commodities using the Addis Ababa University and University of Gothenburg household panel data set provides similar results for total food expenditures (background paper by A. Shimeles and A. Delegn).[12] As in the 2000 WMS/HICES data, the panel data set shows that consumption expenditures between 1994 and 2004 went largely to food and drink (Table 14). Cereals account in rural areas about 42 percent and in urban areas about 22 percent of total consumption expenditure, of which *teff*, wheat and maize play a major role.

Table 14: Commodity expenditure shares in urban and rural Ethiopia: 1994-2004

Items	Urban	Rural
Food and drinks	0.61	0.80
Clothing	0.05	0.05
Health and education	0.11	0.02
Energy	0.07	0.02
Transport	0.05	0.01
Others	0.11	0.11
Total	1.0	1.0
Number of observations	6250	5125

Source: Shimeles and Delegn (2007) using data from the Gothenberg/ AAU panel household survey.

Concentration Curve Analysis

85.   To establish empirically the extent of the bias that inflation may have against the poor, the simplest approach is to construct concentration curves: the expenditure profile of a specific commodity (or sets of commodities) can be used to infer whether the rise in price affects households in different income groups differently or uniformly. Concentration curves are generalized forms of the popular summary distributional measure known as the Lorenz curve. This exercise can provide

---

[12] The panel survey sample consists of data on 3000 households (equally divided between urban and rural) collected in five rounds between 1994 and 2004. Further description of the nature of the data, the sampling methods involved in collecting it, and other features are discussed in Bigsten et al. (2005).

rich information on the welfare implications of increases in commodity prices (see e.g., Yitzhaki and Slmerod, 1991).

86.   As shown in Figure 19, the rural concentration curves for *teff* and wheat lie slightly above the Lorenz curve and in some quintiles the three curves cross, which implies that there is mixed welfare dominance for the poor and non-poor households (Howe, 1993). Consumption of maize seems to be consistently closer to the 45^0 line, suggesting that this is an essential good consumed by low consumption groups. In contrast, in general, price increases in *teff* and wheat could hurt non-poor groups more.

Figure 19: Concentration curve for cereals: rural areas 1994-2004
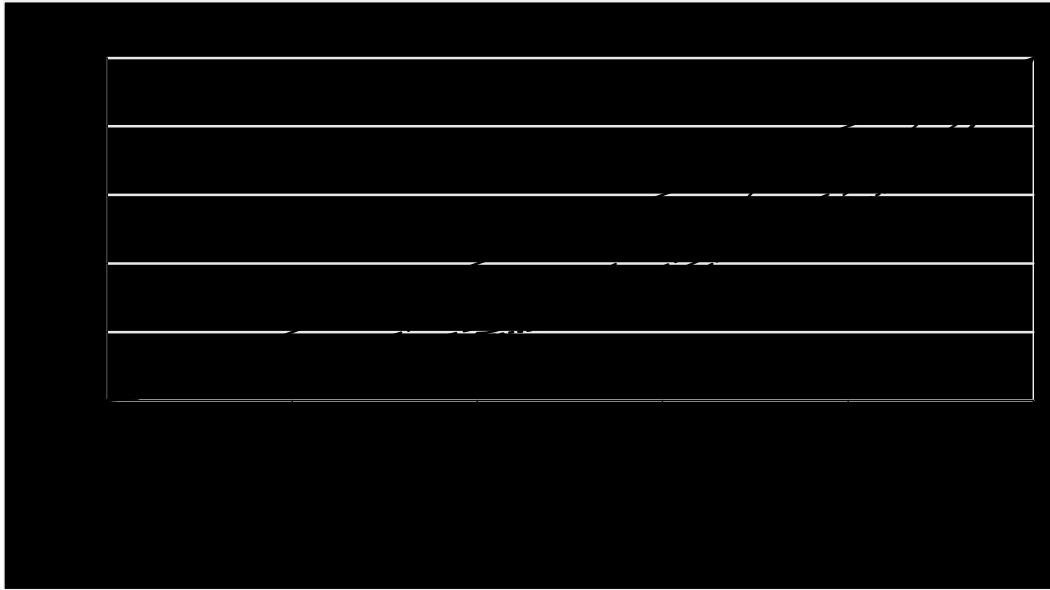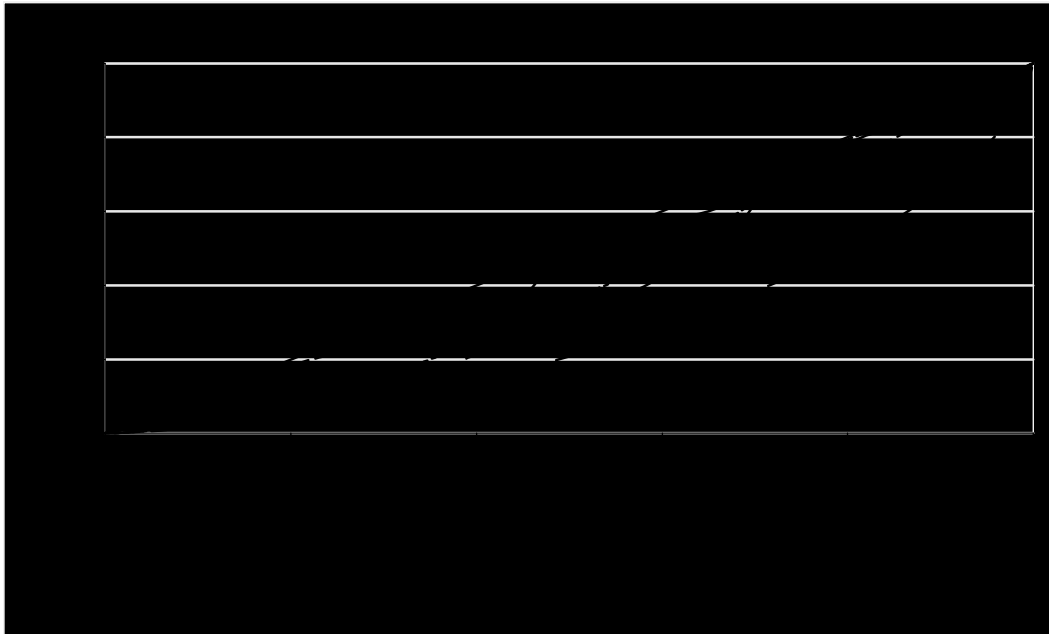

Source: Shimeles and Delegn (2007) using data from the Gothenberg/ AAU panel household survey.

87.   In urban areas the situation seems to be different (Figure 20). *Teff* and wheat tend to be necessities for all income groups; with maize above the per capita expenditure line (i.e. it is more important for the poor than the non-poor). The overall share of *teff* in total cereal consumption is much higher in urban areas.[13]

---

[13] A summary of estimates of income elasticities of demand is given in Annex Table 2. The overall picture of price responsiveness emerging from the panel data is that the three cereals tend to be price elastic in many specifications, with evidence of wheat being a close substitute for teff, especially in cereal areas.

**Figure 20: Concentration curve for cereals: urban areas 1994-2004**

*Source***:** Shimeles and Delegn (2007).

88.   The panel data analysis commissioned for this study suggests that urban consumption patterns exhibit significant non-linearities in a large group of commodities, especially for higher consumption quintiles. In general, in addition to cereals, such items as sugar, kerosene, electricity, pulses, coffee and tea, fall under the category of "necessities" – so that an increase in the relative price of any of these commodities will have larger adverse effects for the poor (see Annex Table 4).

89.   A complementary approach is to evaluate by how much overall inequality changes due only to changes in relative prices holding each household income constant. For this particular purpose we use the urban HICES 1999/2000 (described above), since it has a wider coverage and is nationally representative. Econometric analysis commissioned for this study suggests that the Gini coefficient would have worsened by about 2 percentage points between 2000 and 2006 due only to inflationary processes. If the trend of rising income inequality reported by Bigsten and Shimeles (2007) for the decade 1994-2004 has continued, this regressive inflationary impact would have exacerbated this disequalising trend.

90.   Finally, but not least household panel data enables investigation of price responses of consumption, as in Dercon (2004). Figure 21 depicts the relationship between relative prices and consumption growth in rural areas for the period 1994-2004. The positive relationship depicts the fact that the higher relative prices of agricultural goods, for net sellers, mean both income and consumption gain. Interestingly, even for net buyers, this pattern suggests that higher relative prices would mean higher incomes, which is consistent with Dercon (2004). While they lose due to the negative direct effect on consumption, the size of this effect depends on the elasticity of price as well as income and expenditure shares of the purchased goods on total consumption. Indirect effects could include diversification toward high monetary value crops, wage effects, and so on. Quantitative results suggest that changes in relative prices of agricultural goods are responsible for as much as 20 percent of the variation of consumption expenditure in rural areas.

Figure 21: Non-parametric estimates of effect of relative prices on rural consumption, 1994-2004
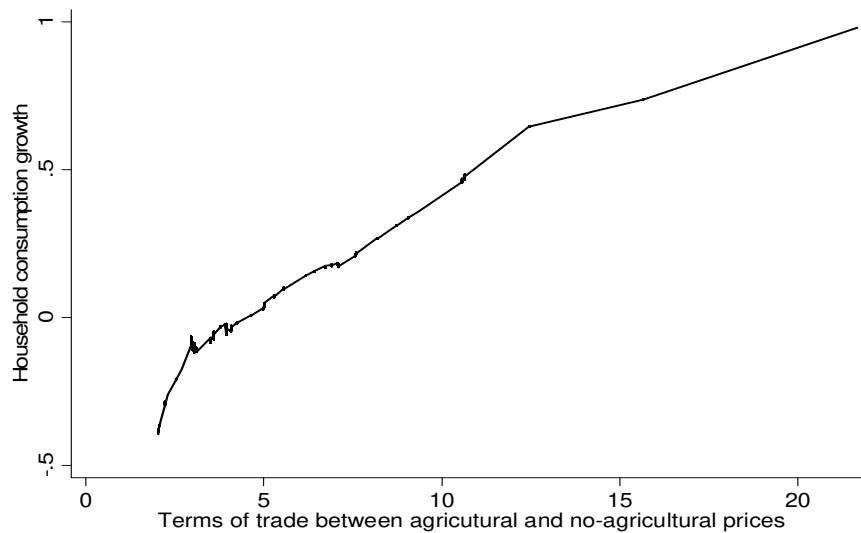
Source: Shimeles and Delegn (2007).

Summary

91.   In sum, measuring the welfare impact of inflation for rural households is challenging given the simultaneous production and consumption decisions inherent in their livelihood systems (a complexity from which we have abstracted in this analysis), and the responsiveness of consumption decisions to price and incomes. Nevertheless, the micro analysis suggests several important findings.

- Overall, rises in the relative price of food tends to benefit rural households, though the exact magnitude needs to be investigated further.
- Changes in the prices of *teff*, wheat and maize tend to affect more the people at the higher income quintile in rural areas, while in urban areas they tend to affect those at the lower income quintiles.
- The recent hike in relative prices has increased the urban cost of living by 8-12 percent in urban areas.
- Inflation could worsen urban income inequality significantly.
- Demand for *teff*, maize and wheat tends to be elastic, with evidence of substitutability, especially between *teff* and wheat. In urban areas, all three types of cereals tended to be necessities, with inelastic price responses.