

# Household-Level Consumption in Urban Ethiopia: The Impact of Food Price Inflation and Idiosyncratic Shocks\*

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## Abstract

We use survey data to investigate how urban households in Ethiopia coped with the food price shock in 2008 and idiosyncratic shocks. Qualitative data indicate that the high food price inflation was by far the most adverse economic shock between 2004 and 2008, and that a significant proportion of households had to adjust food consumption in response. Difference-in-differences estimates of the effects on consumption indicate that assets improved households' ability to cope with the shock, and that casual workers were particularly adversely affected by high food prices. Similar results are obtained from econometric analysis of self-reported data on the food price effects. In contrast, we find that household demographics and education matter little for the impact of the shock. Our analysis of idiosyncratic shocks further indicates that losing one's job is a serious, uninsurable shock. We interpret the results as pointing to the importance of growth in the formal sector so as to generate more well-paid and stable jobs. We also note that our results imply that aid programs responding to food price shocks can be made more efficient by targeting low-asset households with members on the fringe of the labor market.

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## **1. Introduction**

In 2008 food prices in Ethiopia soared to unprecedented levels. In July 2008 food prices were on average 92 percent higher than a year earlier. In the last quarter of 2008 food prices fell, and during the first six months of 2009 the food price index settled at a level about 15% lower than at its peak (Central Statistics Agency, 2008, 2009). These dramatic changes in food prices are illustrated in Figure 1.

In this paper we use panel data on urban households in Ethiopia for 2008, 2004 and 2000 to investigate the effects of the food price shock of 2008. There are several reasons the welfare effects may have been very negative.<sup>1</sup> The share of household expenditure spent on food is high, suggesting welfare is sensitive to food price changes. Little food production takes place in urban areas, thus higher food prices do not raise urban incomes. Urban households are not in a good position to produce for own consumption, another notable difference compared to rural households. There is no formal insurance mechanism, and poor households may be unable to self-insure by accumulating enough financial assets. Indeed, there are good reasons to suppose that the welfare effects of higher food prices vary considerably across households. Standard intertemporal models of consumption predict a small effect of a transitory price shock on utility if households are able to smooth consumption over time, e.g. by borrowing or by tapping into financial assets accumulated in the past. Since not all households in urban Ethiopia are in a position to smooth consumption along these lines, some will be more vulnerable than others. Glewwe and Hall (1998) provide a useful conceptual framework for thinking about the heterogeneous effects of macroeconomic shocks on households, identifying location, household size and demographics, assets, credit access, employment status, and human capital as potentially important factors. Drawing on this framework, the main goal of the paper is to establish what types of households were most adversely affected by the 2008

food price shock. We also consider the effects of idiosyncratic shocks such as the death or illness of a family member, the loss of assets, or unemployment.

Because the food price shock was common across households, identification of its effects is not straightforward. Glewwe and Hall (1998) faced a similar problem in their analysis of the effects of the macroeconomic decline in Peru in the late 1980s on household welfare. These authors adopted a before-after analysis, modeling the change in log consumption over the shock period as a function of a set of household variables, and attributing the results to the macroeconomic shock. We use a similar method as our starting point, linking changes in consumption between 2004 and 2008 to household observables. However, even though 2004-2008 was a period characterized by rapidly rising food prices, a potential concern is that the consumption changes observed in the data may not have been caused exclusively by the food price shocks.<sup>2</sup> To infer causality we need the counterfactual – how consumption would have developed in ‘normal’ circumstances. Since food prices rose throughout Ethiopia during this period, no control group is available in the cross-section. We propose two ways of dealing with this problem. First, we adopt a difference-in-differences (DiD) strategy, comparing consumption growth rates in the shock period (2004-2008) and in a baseline period, which in our case is 2000-2004. The basic idea is that if some observable characteristic is correlated with consumption growth in the shock period but not in the baseline period, then this is indicative that the impact of the food price shock varied with that characteristic. One attractive feature of using data from 2000-2004 to form a baseline is that price inflation over this period was low. However, confounding factors may still play a role. For example, the economy grew faster in the second period, and energy price inflation was also significantly higher. Our second empirical method is based on data obtained from questions in the most recent survey, fielded in late 2008 and early 2009, in which household respondents were asked to self-assess

the effects of the food price shock on food consumption.<sup>3</sup> Hence the households themselves implicitly assess how consumption under ‘treatment’ (the food price shock) will have differed from the counterfactual.

Overall, we find that the DiD analysis and the analysis of self-reported effects yield results that are qualitatively similar, with slightly better statistical significance for those based on the self-reported data. We find that households with low levels of assets have been particularly adversely affected by the food price inflation. We also find that households headed by a casual worker have coped comparatively badly with the food price shock. In contrast, the results suggest that education has played at most a small role for the ability of households to cope with food price inflation. Similarly, household demographics appear to play a limited role in this context, suggesting that labor supply constraints are not first order important.

Several implications for policy follow from our results. We find that workers whose skills are in low or volatile demand are very exposed. For policy makers, this points to the importance of facilitating for the creation of more relatively well-paid and stable jobs in urban Ethiopia. Our research also has implications for how to design effective policies in periods of high food prices. During the food price crisis in 2008, the Ethiopian government undertook to help urban households by providing low cost wheat. Since no explicit targeting of households was adopted, the allocation of the resources devoted to the support program may have been inefficient. For example, poor households had no better access to cheap wheat than relatively well-off households and therefore received less support than might have been possible with a well targeted program. With knowledge about which groups are least able to cope with shocks, better and more effective policies can be formulated.

The remainder of the paper is organized as follows. Section 2 provides background information on the performance of the Ethiopian economy and the inflation during 2004-2008. Section 3 presents the conceptual framework forming the basis for our empirical analysis. Section 4 describes the data source and contains descriptive statistics. Section 5 contains the results from our econometric analysis. Section 6 provides conclusions.

## **2. Context: Inflation in Ethiopia**

Ethiopia is one of the poorest countries in the world. The economy is agrarian and in the year 2009 for instance, about 43 % of the GDP, 60% of exports, and 85% of total employment was generated from this sector (CIA, 2009). Poverty is a serious development problem for the country and in the year 2005 about 38 percent of the population lived below the official poverty line. It is however expected that a larger proportion of the population experiences extended periods of poverty due to prevalence of shocks (Bigsten and Shimeles, 2008). In view of this, beginning 2002, the Ethiopian government has adopted a development strategy called “Sustainable Development and Poverty Reduction Program (SDPRP)” centered on the principal goal of reducing poverty in the country.

Official statistics indicate that Ethiopia’s economy has grown rapidly during the last five years. Table A.1 in the Appendix shows some macroeconomic indicators. According to Table 1, real GDP on average grew by about 11 percent during the years 2004 to 2008. During the same period, however, the country exhibited the highest rate of inflation in its history and the highest in the world next to Zimbabwe in 2008 (CIA, 2009). The country has not suffered from high inflation prior to 2004 and annual average inflation was only 5.2 percent 1980/81-2003/04. The major hikes in the general price level occurred during war and drought times. The highest inflation episodes of 18.2, 21.1 and 15.5, respectively, occurred in 1984/85 due to

severe drought, in 1991/92 at the peak of war, and in 2003 following drought (Loening et al. 2009).

Since 2005, global food prices have also been increasing. International food prices in April 2008 were 60 percent higher than 12 months earlier. There is some evidence indicating that world food prices have been driven by higher grain prices. For instance the international price of wheat more than tripled between 2002 and March 2008. The price has since then come down, but as of August 2008 it remained 70 percent higher than the average price in 2006. Similar trends have been exhibited for other cereals and food items (Ahmed, 2008; Ivanic and Martin, 2008).

Following trends in international food prices, inflation continued to increase after 2005 in Ethiopia as well, despite good weather and an agricultural production boom which according to official figures exhibited about 13 percent growth rate over the period 2004-2008. Inflation in general was mainly driven by food price inflation, which rose from 18 percent in June 2007 to a peak of 92 percent in July 2008. Overall inflation rose from 15 percent in June 2007 to 55 in June 2008 (Loening et al. 2009).<sup>4</sup>

Several factors have been mentioned as causes of the recent global food price inflation, for example: rising population; rapid economic growth in emerging economies which resulted in increased food demand; high energy and fertilizer prices; increased use of food crops for bio-fuels; depreciation of the US dollar; and declining global stocks of food grains due to changes to buffer stock policies in the US and European Union (Ahmed, 2008). FAO (2008a) however rejects the claim that emerging economies such as China and India have been the culprits behind the food price explosion, since domestic production in these countries has been

growing in parallel during the same period. Rather, the use of agricultural products, in particular maize, wheat and vegetable oil, as feedstock for biofuel production has been the most important factor behind the rise of global food prices during 2005-2008. More recently, Gilbert (2009) argued that the world food price hikes in 2006-2008 are mainly explained by depreciation of dollar and future market investments.

In summary, there appears to be little consensus on why Ethiopia experienced such a rapid rate of inflation. World Bank (2007) and IMF (2008) argue that excess aggregate demand generated by expansionary monetary policy were key driving factors, calling for forceful policy tightening. EDRI (2007) and FAO (2008b) however point out that domestic and external factors account for the recent inflation, among them (i) increase in international commodity prices including oil; (ii) structural change and continued good economic performance; (iii) increasing supply of money and injection of cash into the rural economy; (v) changes in farmers' behavior to supply products more uniformly over the year (improvements in access to micro-credit, storage facilities, marketing information, etc; and (vi) increased local purchases by governmental food security institutions, agricultural cooperatives, and relief agencies. More recently, Loening et al (2009) have argued that in the short to medium run, agricultural supply shocks and inflation inertia strongly affect domestic inflation in Ethiopia, causing large deviations from long-run price trends. In the long-run however, domestic food and non-food prices are determined by the exchange rate and international food and goods prices which means that the exchange rate and international prices explain a large fraction of Ethiopia's inflation. Whatever the causes were however, there has been unprecedented high rate of inflation in Ethiopia during 2005-2008 mainly driven by food price inflation and it is important to see its effect on household welfare using detailed household level data, which is the main objective of this study.

### **3. Conceptual Framework: Shocks and Vulnerability**

The impact of shocks or adverse events, and the threat of such events, on individual and household welfare in developing countries is a research area which has attracted a lot of interest both from academics and policy makers.<sup>5</sup> Much of the empirical literature on the effects of shocks takes as a starting point the theoretical result that the impact of temporary shocks on consumption will be small for households with access to perfect insurance and credit markets.<sup>6</sup> Recognizing that credit and insurance markets in poor countries normally feature significant imperfections, the development literature considers other, sometimes informal, mechanisms for managing risk and smoothing consumption. For example, in the absence of credit and insurance markets, households may undertake their own precautionary measures to reduce the impact of shocks on welfare.<sup>7</sup> Rosenzweig and Wolpin (1993) for instance document that bullock stocks have been used for consumption smoothing in rural India.<sup>8</sup> Nevertheless, the empirical literature for developing countries, which primarily is concerned with rural households, typically documents evidence that shocks tend to affect welfare suggesting limited ability of in particular poor households to smooth consumption over time (e.g. Townsend, 1994; Glewe and Hall, 1998; Dercon, 2004; Skoufias and Quisumbing, 2005).

Our main aim in this paper is to document the impact of the food price inflation that peaked in 2008 on the welfare of urban households in Ethiopia. We specifically try to determine if and how the causal effect of the food price shock varied with household characteristics, which amounts to asking whether certain types of households are relatively vulnerable to food price shocks.<sup>9</sup> Following a large number of authors we initially focus on consumption per adult equivalent as our main proxy for well-being.<sup>10</sup> We distinguish between effects on food consumption and general (including food) consumption, both expressed on a per adult

equivalent basis. The quantity of interest is the causal effect of the food price shock, which we define as

$$(1) \quad \Omega \equiv E(\ln C_{it} | \mathbf{X}_i, \delta_i, t, S_t = 1) - E(\ln C_{it} | \mathbf{X}_i, \delta_i, t, S_t = 0)$$

where  $C_{it}$  refers to consumption per adult equivalent in household  $i$  at time  $t$ ,  $\mathbf{X}_i$  is a vector of observable household characteristics,  $\delta_i$  is an unobserved household fixed effect capturing time invariant heterogeneity across households (e.g. with respect to the rate of time preference and risk aversion), and  $S_t$  is a dummy variable equal to 1 in the period of the food price shock and zero in all other periods. We parameterize our model of consumption as

$$(2) \quad E(\ln C_{it} | \mathbf{X}_i, \delta_i, t, S_t) = \alpha_0 + \beta_0 t + \gamma_0 S_t + \mathbf{X}_i \boldsymbol{\beta} + (\mathbf{X}_i \cdot t) \boldsymbol{\alpha} + (\mathbf{X}_i \cdot S_t) \boldsymbol{\gamma} + \delta_i$$

where  $\alpha_0$ ,  $\beta_0$ ,  $\gamma_0$  are scalars, and  $\boldsymbol{\beta}$ ,  $\boldsymbol{\alpha}$ ,  $\boldsymbol{\gamma}$  are parameter vectors. This implies that the causal effect of the food price shock is equal to

$$(3) \quad \Omega = \gamma_0 + \mathbf{X}_i \boldsymbol{\gamma}.$$

Thus  $\gamma_0$  and  $\boldsymbol{\gamma}$  are our main parameters of interest. If the ability to cope with the food price inflation varies across households, this will be reflected by some or all elements of the vector  $\boldsymbol{\gamma}$  being different from zero. This relates to vulnerability: for example, if the first element of  $\boldsymbol{\gamma}$  is negative, this is interpretable as indicating that households with high values of the associated  $X$ -variable are relatively vulnerable to food price shocks. Drawing on the discussion in Glewwe and Hall (1998), we hypothesize that the ability to cope with the 2008 food price inflation will have varied with socioeconomic characteristics, such as household assets, source of livelihood, education and household demographics. In the empirical analysis below we specifically include the following variables in the vector  $\mathbf{X}$ : household size and its square; the dependency ratio in the household, defined as the ratio of children below the age of 15 and elderly above 65 to adult members; household assets; the age, education, occupation

and sex of the household head; and location of the household. Time varying variables are measured in the beginning of the period, to mitigate endogeneity bias.

How can the causal effect of the food price shock,  $\Omega$ , be identified? Suppose we have data for  $t = 0, 1, 2$  with the shock occurring at  $t = 2$ . Taking first differences of (2) in order to eliminate unobserved time invariant heterogeneity, we can obtain the following regression model:

$$(4) \quad \Delta \ln C_{i2} = \beta_0 + \gamma_0 + \mathbf{X}_i(\boldsymbol{\beta} + \boldsymbol{\gamma}) + u_{i2}$$

where  $u_{i2}$  is a mean zero residual assumed uncorrelated with the explanatory variables.

Consider taking the before-after equation (4) to the data. We would define the dependent variable as the change in consumption between 2004 and 2008 and regress this on the explanatory variables in  $\mathbf{X}$ . The resulting parameter estimates would be interpretable as descriptive statistics, informative about patterns of consumption changes between the two time periods. But they are not interpretable as causal effects unless we insist that  $\beta_0 = 0$ ,  $\boldsymbol{\beta} = 0$ .

This would amount to saying that in non-shock periods expected consumption growth is equal to zero and independent of household characteristics. Thanks to the availability of the baseline data, we can identify  $\Omega$  under less unrealistic assumptions. Differencing the consumption equation over the two non-shock periods, we obtain

$$(5) \quad \Delta \ln C_{i1} = \beta_0 + \mathbf{X}_i\boldsymbol{\beta} + u_{i1}$$

where  $u_{i2}$  is a residual with the same properties as  $u_{i1}$ . Combining (4) and (5) we can obtain the following expression:

$$(6) \quad \Delta \ln C_{it} = \beta_0 + \gamma_0 S_t + \mathbf{X}_i\boldsymbol{\beta} + (\mathbf{X}_i \cdot S_t)\boldsymbol{\gamma} + u_{it}$$

Estimating (6) using OLS we can thus identify  $\gamma_0$  and  $\gamma$  (and hence  $\Omega$ ), from the time dummy and the coefficients on the interaction terms  $(\mathbf{X}_i \cdot S_i)$ , subject to the assumptions we have made above. We refer to this as our difference-in-differences estimator.

The above exposition draws heavily on the treatment effects literature. The causal effect of the food price shock (the ‘treatment’) is defined as the outcome under treatment minus the outcome under no treatment, the latter being the counterfactual. In the literature, the most common way of constructing counterfactuals for treated individuals is to use data on similar individuals not exposed to the treatment. Since in our application the food price shock is common to all households at one point in time, no control group exists in the cross-section. Instead we thus exploit the panel dimension of the data, and construct the control group as consisting of households observed prior to the shock period, in our case 2000-2004. The average inflation rate over the 2000-2004 period was lower than 4 percent on average, which stands in sharp contrast to the situation during 2004-2008.

While likely an improvement over the before-after approach, our DiD method is of course not guaranteed to work perfectly. It could well be that differences in the consumption growth rates across the two intervals arise for other reasons than the food price inflation. For example, the economy grew faster in 2004-2008 than in 2000-2004, and energy price inflation was also significantly higher. While the food price inflation by all accounts appears to have been the major economic event in 2008, we can thus not rule out the possibility that differences in outcomes across the two periods are influenced by other events. When planning the most recent survey underlying this research we anticipated these potential weaknesses. We therefore asked households as part of the survey to assess the effects of the food price shocks. We specifically asked how the food price shock affected food consumption of the household

(distinguishing *very negatively*, *negatively* or *not at all* as possible answers) and whether the household cut back on the quantity of food consumed as a result of the food price shock. Hence the households implicitly got to assess the qualitative difference in consumption under treatment (the food price shock) compared to the counterfactual. We model the responses to these questions using the same set of explanatory variables as in the consumption DiD analysis. The main advantage of this approach is that the underlying question refers specifically to the shock that we are interested in. Confounding factors such as energy price inflation or economic growth should therefore be less important. Potential weaknesses are that answers are subjective (e.g. comparing across households, we cannot be certain that ‘very negatively’ always reflects an objectively more adverse outcome than ‘negatively’, since different households may have different reference points) and, because only a small number of outcomes are distinguished, potentially not very informative.

#### **4. Data and Descriptive Statistics**

Our empirical analysis is based on survey panel data for 2008, 2004 and 2000. The most recent survey, fielded by us in late 2008 and early 2009, covered 709 households located in Addis Ababa, Awassa, Dessie and Mekelle. One of the key objectives was to generate data suitable for analysis of the effects of the food price inflation. We therefore included in the survey instrument several questions referring to the perceived effects of the food price inflation. We also ensured the data could be linked with data for 2004 and 2000, enabling us to analyze consumption growth. The two earlier waves of data derive from the Ethiopian Urban Socio-economic Survey (EUSS), organized by the Department of Economics at Addis Ababa University in collaboration with the University of Gothenburg in Sweden.<sup>11</sup> Out of the 709 households surveyed in 2008/09, 120 are new households included in the sample randomly. We surveyed these new households in order to investigate if the panel households –

some of which were initially selected in 1994, see footnote 11 - have become atypical and not very well representative of the Ethiopian urban population. To form our estimation sample, we dropped 22 of the 589 panel households because information on these households was missing in the 2004 round. Our final sample based on the 2008/09 survey contains 567 households; 346 from Addis, 73 from Awassa, 71 from Dessie and 77 from Mekelle. Our dataset contains information on household living-conditions including income, expenditures, demographics, health, educational status, occupation, production-activities, asset ownership and other variables. In addition, new modules on shocks and coping mechanisms were included in the 2008/09 survey instrument.

We first consider descriptive statistics for variables measuring shocks and coping mechanisms. Table 1 provides information on the incidence of shocks in urban Ethiopia during 2004-2008 based on self-reported data obtained in the most recent survey. By far the most common shocks refer to food price inflation (94 percent) and rising energy costs (74 percent).<sup>12</sup> Looking at idiosyncratic shocks, the most commonly cited one is death of a household member (non-spouse) (9 percent), followed by serious illness of wife (6 percent). When asked to indicate the most influential shock (idiosyncratic or covariate) during 2004-2008, 89 percent of the households considered food price inflation as the main shock, which completely dwarves the other types of shocks. A follow-up question on households' expectation of the re-occurrence of the most influential shock was also asked and 74 percent of the households responded that they thought the risk of such a shock happening again had increased, compared to what it was before the shock.

There has been a lot of evidence documented in the literature on shocks and coping mechanisms that households faced by uninsured risk and shocks adopt their own coping

mechanisms to protect themselves against a serious decline in welfare. In view of this, the households interviewed in the 2008/09 survey were asked about the coping strategies they adopted in response to the food price shock. Table 2 presents these data. The four leading coping mechanisms are as follows: 38 percent of the households reported that they cut back on the quantities served per meal; 21 percent received assistance from relatives and friends both from domestic and foreign sources; 17 percent coped by shifting resources from other consumption items to food; and 10 percent of the households earned extra income from activities such as increased labor force participation or renting out residential houses.

The data thus suggest the food price inflation has been a major adverse economic event in urban Ethiopia, affecting the consumption and welfare of a significant number of households. In the next section we discuss our econometric results on the effects of the food price inflation. Table 3 shows summary statistics for the key variables in the regression analysis, across the three years considered. Since households that were sampled for the first time in 2008/09 cannot be included in consumption growth equations, these are excluded from our estimation sample. All financial variables are expressed in real terms using 2008 as the base year. For general consumption, as well as food consumption per adult equivalent, we observe a modest increase in the sample average over time. This does not necessarily generalize for the population, because of the panel dimension in the data (e.g. it could be because average age increases with time across the samples). In 2008 the sample average of 4.78 corresponds to 119 birr per month. The share of food expenditure in total expenditure is around 0.8, suggesting a high sensitivity of welfare to food price changes. Related to this, sixty percent of the households interviewed in 2008/09 say that food consumption has been very negatively affected by the food price inflation; a further 29 percent say that the effect has been negative, leaving 11 percent stating that there had been no effect. Thirty-one percent of the households

in the estimation sample state that they have cut back on the quantity of food served in response to the food price shock.<sup>13</sup> About half of the household heads are female, and average age of the head is 55 in the last wave of the data. In 2008 the sample average of household size is 5.07 and the average dependency ratio is 0.39. Both numbers are much lower than in 2000, reflecting a natural process by which children and elderly exit from the household as they become older. Education is low on average, and around 40 percent of the household heads have no education. Slightly less than half of the households own their own house, and the average log real value of household assets ranges between 6.95 in 2000 (which corresponds to 1,043 Birr) and 7.38 in 2008 (1,598 Birr).<sup>14</sup> The most common type of occupation for household heads that are in the labor force is to be self-employed (own account), followed by civil servant. However, between 37 and 48 percent of the heads are out of the labor force, a category that includes housewives, retired individuals and other individuals not actively seeking work.

## **5. Econometric Analysis**

### **5.1 Consumption Levels**

We begin by reporting results from regressions in which log consumption per adult equivalent in 2008 is the dependent variable, distinguishing food consumption and general (all types of) consumption. By definition, since the dependent variable is in levels and not differences, these results are not informative about vulnerability to food price shocks. The results are of interest for two reasons. First, estimating consumption levels regressions constitutes a useful ‘quality control’ of the consumption data. For example, were we to find no positive association between education and consumption, one might be concerned that our consumption data is not very accurate. Moreover, we consider results with and without the new households included,

so as to check if the panel households have systematically different consumption levels compared to a random sample drawn from the 2008 population. Second, documenting the correlates of consumption is of interest in and of itself. The analysis sheds some light on, for example, the differences in consumption across households of differing size, a question that has interested economists for a long time (see e.g. Deaton and Paxson, 1998) and the correlation between consumption and education. In all regressions reported below, standard errors are robust to heteroskedasticity.

The results, shown in Table 4, can be summarized as follows: consumption is somewhat lower in households in which the head is female; there is no evidence that consumption varies with the age of the household head or with the dependency ratio; consumption falls with household size until there are around 10 household members; consumption rises with education and household assets; consumption is lower amongst households in which the head is a casual worker than in households in which the head has a different occupation (including being out of the labor force, which is the reference category in these regressions); and there are no systematic differences across locations, conditional on other explanatory factors. The signs of these partial correlations appear reasonable. Furthermore, the explanatory variables explain around 50 percent of the variation in consumption, which is a fairly good fit. We conclude that the consumption data appears to be of sufficiently high quality for it to be possible to learn about vulnerability from consumption growth regressions. Finally, we observe that the dummy variable for new households is small and completely insignificant, suggesting that there are no systematic differences in consumption across new households and panel households.<sup>15</sup>

## 5.2 Changes in Food Consumption

We now analyze how consumption growth rates differ across households depending on observable characteristics. We begin by modeling food consumption growth rates during 2004-2008 as a function of household characteristics. A similar before-after approach has been used by Glewwe and Hall (1998). Results are shown in Table 4, column 1. We find evidence that consumption growth over this period varies with household composition and household size. The dependency ratio has a negative and significant coefficient, suggesting lower growth rates in households with a large share of dependants. There is an inverse-U relationship between household size and consumption growth. The point estimates suggest that for households with less than eight members, there is a positive relationship between size and growth. We find no evidence of systematic growth differences depending on assets; in fact the estimated coefficients on the dummy for house ownership and log of household assets are both negative but insignificant. Age has a convex effect on food consumption growth, suggesting that moderately old households have experienced the lowest consumption growth rates over the 2004-2008 period. The coefficients on primary, secondary and tertiary education are negative, suggesting, somewhat surprisingly, that households headed by individuals with some education have experienced lower consumption growth rates than households in which the head has no education. Consumption growth varies across occupations of the household heads. In all the regressions shown in this section, the reference category (omitted dummy) consists of individuals out of the labor force. Casual workers stand out as being the job category for which consumption developed least favorably during 2004-2008, recording an average growth rate of consumption about 42 percent lower than the reference category.<sup>16</sup>

As discussed in Section 3 we cannot infer from these results how the causal effect of the food price inflation varies with households characteristics, since we do not know how consumption

would have developed in the absence of the shock (the counterfactual). The macro nature of the shock implies it is not possible to find a counterfactual in the cross-section, which is why we exploit the panel dimension in the data. The period 2000-2004 was characterized by low average inflation, presenting us with a potentially useful comparison period. We show results for the 2000-2004 period in Table 5, column 2. We are primarily interested in how these results differ from those for 2004-2008. To assess whether these differences are significantly different across the two periods, we pool the data, interact a dummy variable for the shock period with all explanatory variables, and regress the change in log consumption on all explanatory variables and the interaction terms (see eq. [6] above for the exact specification). The estimated coefficients on the interaction terms, and the associated standard errors (which are robust to heteroskedasticity and serial correlation) are shown in Table 5, column 3.<sup>17</sup> Note that, by construction, these coefficients are equal to the difference in the coefficients between 2004-08 and 2000-04. We find that the coefficient on log household assets is higher in the shock period than in the baseline period, and that the difference is significant at the 5 percent level. In the baseline period, the coefficient on assets is negative and significant, possibly reflecting a convergence process by which households that have low assets initially tend to record higher subsequent growth rates. In contrast, in the shock period, the asset coefficient is close to zero. The results for the baseline period thus suggest that the ‘normal’ relationship between initial assets and subsequent growth is negative. Taking this to be the counterfactual relationship, we hence obtain a positive DiD estimate of the asset effect. This suggests that assets helped households sustain food consumption during the shock period.

We also find that several of the coefficients on the occupation dummies are significantly different in the two periods, suggesting that labor market status matters for the effect of the food price shock. Recall that the omitted occupation dummy is ‘out of the labour force’.

Hence, in the baseline period, participating in the labor market tends to lead to higher rates of consumption growth than if you are out of the labor force. In the shock period, however, this pattern is reversed. To the extent that the baseline period is a valid counterfactual, this is interpretable as saying that the food price inflation had adverse effects on those in the labour market. The results in column 3 suggest civil servants, public sector employees and casual workers were the types of occupations most adversely affected by the food price shock. Different mechanisms clearly operate here. Civil servants and public sector employees have slowly changing nominal wages that will be eroded by high inflation. Casual workers, on the other hand, tend to have very uncertain and volatile earnings. The large growth shortfall recorded by this group thus suggests that high income variability in itself is associated with limited ability to smooth consumption, perhaps because of limited access to basic financial services such as overdrafts or savings accounts.

Some of the effects that were found to be statistically significant in the before-after analysis (column (1)) are not significant in the DiD analysis. There is no strong evidence that the impact of the food price shock depends on household demographics. The coefficients on household size are fairly similar for the two periods and not significantly different. The difference in the dependency ratio effect is also not significant at conventional levels. It can be noted, however, that the DiD estimate of dependency ratio effect (column 3) is actually somewhat larger than the before-after estimate in (1). The implied t-value for the DiD estimate is 1.58, so this effect is fairly close to being significant at the 10 percent level. The coefficients on the age of the household head are not significantly different across the two periods. This is also true for education, which can be interpreted as saying that education has not provided effective insurance against the food price shock.<sup>18</sup> The coefficient on female household head is negative and significant at the 10 percent level.

As discussed in Section 3, we have data on the perceived impact of the food price shock on food consumption. Households could choose between very negatively, negatively and not at all. Assigning higher values to less negative outcomes we model this variable using ordered probit.<sup>19</sup> Column (4) in Table 5 shows the results. Most of the findings are similar to those obtained by means of the DiD estimator. The coefficient on log household assets is positive and highly significant, supporting the notion that household assets helped households sustain food consumption during the shock period. We also obtain a positive and significant (at the 10 percent level) coefficient on the dummy for house ownership, further supporting the idea that assets are important insurance instruments. Similar to the results for consumption growth we find a negative and significant effect of being a casual worker, suggesting that volatile incomes accentuate vulnerability. We also find statistically insignificant effects of household size and dependency ratio, although we note that the latter effect is negative and not too far from being significant at the 10 percent level. Unlike the results for consumption growth we find that tertiary education is associated with less adverse outcomes. We also find that age has a convex effect on the perceived severity of the effects of the food price inflation, suggesting that young household heads were less adversely affected than moderately old heads. The coefficients on age and age squared are jointly significant at the 10 percent level.

The final model that we consider in this part of the empirical analysis is a probit regression in which the dependent variable is equal to one if the household cut back on the quantity of food served in response to the food price shock, and zero otherwise. Unlike the other models shown in this table, a positive coefficient implies that an increase in the associated variable affects welfare negatively, and vice versa; i.e. the signs of the coefficients are expected to be the opposite of those for the previous regressions. Results are shown in Table 5, column 5. Again,

we find strong evidence that household assets and house ownership mitigate the effect of the food price shock, and that casual employment of the household head is associated with stronger sensitivity of food consumption to food price inflation. Taken together with the other results in Table 5, we thus have strong evidence that households with little assets and uncertain labor market outcomes are particularly vulnerable. The coefficients on age and age squared imply a concave relationship between age and the likelihood of consuming less food, suggesting that young households cope better with the food price shock than moderately old ones. However the coefficients on age and age squared are not quite jointly significant ( $p$ -value = 0.15), hence we do not reject the hypothesis that the impact of the food price shock is independent of the age of the household head. The household demographics variables have wholly insignificant effects, as is the case for education.

### **5.3 Changes in General Consumption**

We now consider a broader definition of the outcome variable, modeling general consumption growth rather than just food consumption growth. Results are shown in Table 6. Focusing on the DiD estimates in column (3), it is clear that the results are very similar to those for food consumption in Table 5. Arguably, this is not very surprising given that the average food share in the data is as high as 0.8. We find a positive and significant (at the 5 percent level) DiD estimate of household assets, and negative and significant effects of being a civil servant, a public sector employee or a casual worker. Possible reasons for these results have already been discussed above. All other effects are statistically insignificant. Moreover, most of the coefficients in the present regression are less significant than those in the food consumption models. This is not surprising: after all, one would expect the effects of higher food prices to matter more for food consumption than for the consumption of other products.

#### **5.4 Idiosyncratic shocks**

While the main focus of this paper is on the effects of the food price inflation, we also consider the effects of idiosyncratic shocks. Since there is cross-section variation in the incidence of idiosyncratic shocks, we can estimate the impact on consumption levels and growth and shed some light on whether idiosyncratic shocks are insured in urban Ethiopia.<sup>20</sup> Based on the 2008/09 survey data, we construct five idiosyncratic shock variables: death of a family member; illness of a family member; job loss of a family member; asset loss; and other idiosyncratic shocks, and add these to the set of explanatory variables in the growth models.<sup>21</sup> Results are shown in Table 7. The variables measuring household demographics, assets, characteristics of the head and location are all included in these regressions, but we omit these results from the table in order to conserve space. Whether we look at food consumption or general consumption, or levels or growth rates, the result is the same: only job loss of a household member has a statistically significant negative effect. Quantitatively the job loss effect is large, reducing food consumption growth by 33 percent and general consumption growth by 37 percent. These results indicate, not very surprisingly, that urban households in Ethiopia cannot insure themselves fully against a job loss shock, and that when one occurs, the effects are very substantial. One way of interpreting the insignificance of the other types of shocks is that these are either easier to cope with, in terms of preserving the level of consumption, or that they simply do not matter at all.

#### **6. Conclusions**

In this study we use panel data on urban Ethiopian households to examine the welfare effects of the dramatic food price inflation in 2008. To this end, we study how changes in food consumption and general consumption relate to household-level variables using a difference-

in-differences approach. We also analyze self-reported data on the effects of the food price inflation on food consumption.

We obtain strong evidence that households with low levels of assets have been particularly adversely affected by the food price inflation. Overall, we assign a more important role to assets for coping with shocks than, for example, do Glewwe and Hall (1998) and Lanjouw and Stern (1993) who, in different settings, find returns to endowments more important. We also find that households headed by a casual worker have been vulnerable to the food price shock. From the point of view of the urban poor, these are troubling results. Lacking the financial resources to self-insure, and being referred to informal employment and volatile earnings because of low skills, the urban poor appear to be highly vulnerable to food price shocks.

Education appears to play a small role for the ability to cope with food price inflation. Only for one empirical specification – the ordered probit modeling the perceived impact of the shock - do we obtain a statistically significant coefficient on higher education. On balance we thus find little evidence supporting Shultz's (1975) hypothesis that education reduces vulnerability. Similarly, household demographics appear to play a limited role for the ability of coping with shocks. This suggests labor supply constraints are not first order important. For example, even though there are households in the sample with high dependency ratios, there is only weak evidence that this has hampered the ability of such households to respond to the shock, relative to other households. Given that food consumption is of primary importance, this is perhaps not very surprising. One possible implication, however, is that the ability of adults to care for the young and the elderly has diminished, but we do not have the data to investigate this formally. Still, this is one example of how the welfare effects may be underestimated with our empirical approach.

The fact that aggregate (covariate) shocks are inherently not insurable limits the range of policy instruments that can be used to mitigate the effects of food price shocks. Findings like those in this paper can be used as a basis for the targeting of aid in response to such shocks. A more serious challenge for policy makers is to reduce the vulnerability of households to high food price inflation ex ante. One implication of our study is that the creation of good, well-paid and secure jobs reduces vulnerability. Recall that, analyzing the effects of idiosyncratic shocks, we found that experiencing a job loss has a large negative effect on consumption growth, suggesting that households are unable to insure themselves against this type of shock. We have also found that being a casual worker makes you vulnerable to food price shocks. Individuals at the fringe of the labor market thus face large welfare fluctuations, especially if food prices are volatile. This does not imply that such individuals are worse off on average than those out of the labor force. Rather, it implies that informal, uncertain employment does not provide individuals with a basis for accumulation of resources or stable levels of welfare. Seen in this light, from a welfare point of view the stagnation of the formal sector and the rapid expansion of the informal sector in Ethiopia during the last decade is arguably cause for concern (Bigsten, Gebreeyesus and Söderbom, 2009). Policies contributing to sustained growth and more jobs in the formal sector would have positive welfare effects through less volatile labor outcomes.

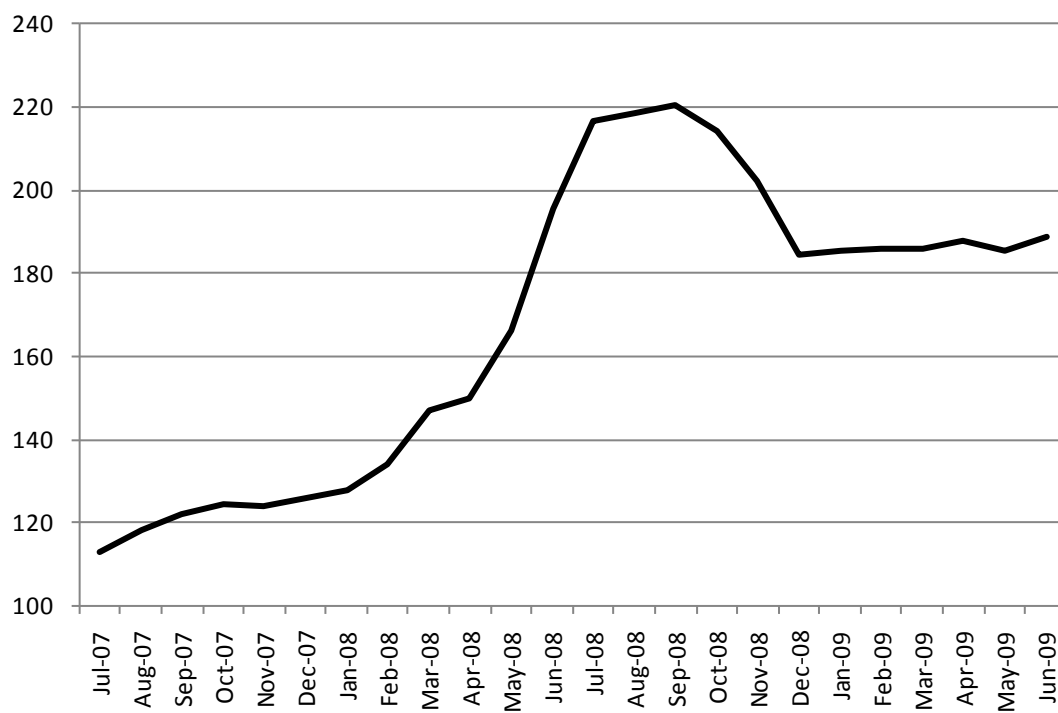
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**Figure 1: Food Price Index in Ethiopia, July 2007 – June 2009**



Note: The graph shows the price index for food for Ethiopia. December 2006 = 100. Source: Central Statistics Agency (2008, 2009)

**Table 1. Incidence of shocks, 2004-2008**

|                                   | Household experienced<br>this type of shock | This was the most<br>influential shock |
|-----------------------------------|---|--|
| Increase in food price            | 0.94  | 0.87                                   |
| Increase in energy price          | 0.74  | 0.01                                   |
| Death of husband                  | 0.05  | 0.02                                   |
| Death of wife                     | 0.02  | 0.004                                  |
| Death of another member           | 0.09  | 0.02                                   |
| Serious illness of husband        | 0.04  | 0.01                                   |
| Serious illness of wife           | 0.06  | 0.01                                   |
| Serious illness of another member | 0.04  | 0.01                                   |
| Divorce/separation/abandonment    | 0.01  | 0.004                                  |
| Loss of job of a household member | 0.04  | 0.01                                   |
| Imprisonment for political reason | 0.004                                       | 0.003                                  |
| Destruction or theft of assets    | 0.04  | 0.01                                   |
| Other shock                       | 0.03  | 0.01                                   |
| No shock                          | 0.04  |  |
| Observations                      | 709   | 684                                    |

Note: The numbers in the first column do not add up to 1.0 since households could indicate more than one shock. Household indicating there was no shock during the period are excluded from the calculations in the second column.

**Table 2. Coping mechanisms to deal with food price inflation**

|  | <b>Sample proportion</b> |
|--|--------------------------|
| Cut back quantities served per meal            | 0.36                     |
| Received assistance from relatives and friends | 0.20                     |
| Shifted resources from other consumption items | 0.16                     |
| Engaged in extra income generating activities  | 0.09                     |
| Reduced quality and quantity of food purchased | 0.06                     |
| Used own saving                                | 0.04                     |
| Received assistance from others                | 0.01                     |
| Borrowed money against household possessions   | 0.02                     |
| Received assistance from NGOs                  | 0.01                     |
| Sold household possessions                     | 0.003                    |
| Other  | 0.01                     |
| Did nothing                                    | 0.04                     |
| Observations                                   | 684                      |

**Table 3. Summary statistics**

|  | (1) Year 2008 |         | (2) Year 2004 |         | (3) Year 2000 |         |
|--|---------------|---------|---------------|---------|---------------|---------|
|  | Mean          | Std Dev | Mean          | Std Dev | Mean          | Std Dev |
| <b>Consumption</b>                             |               |         |               |         |               |         |
| Log consumption per adult equivalent           | 4.78          | 0.63    | 4.76          | 0.70    | 4.70          | 0.78    |
| Log food consumption per adult equivalent      | 4.56          | 0.63    | 4.46          | 0.73    | 4.43          | 0.82    |
| Change in log consumption                      | 0.01          | 0.69    | 0.05          | 0.73    | -             | -       |
| Change in log food consumption                 | 0.10          | 0.74    | -0.02         | 0.81    | -             | -       |
| Share of food in total expenditure             | 0.81          | 0.08    | 0.75          | 0.11    | 0.77          | 0.11    |
| Food consumption very negatively affected      | 0.60          |         |               |         |               |         |
| Food consumption negatively affected           | 0.29          |         |               |         |               |         |
| Consumed less food because of food price shock | 0.31          |         |               |         |               |         |
| <b>Household demographics</b>                  |               |         |               |         |               |         |
| Dependency ratio                               | 0.39          | 0.47    | 0.47          | 0.51    | 0.69          | 0.73    |
| Household size                                 | 5.07          | 2.29    | 5.83          | 2.54    | 6.08          | 2.39    |
| <b>Household assets</b>                        |               |         |               |         |               |         |
| Owens a house                                  | 0.47          |         | 0.47          |         | 0.46          |         |
| log household assets                           | 7.38          | 1.44    | 7.48          | 1.55    | 6.95          | 1.84    |
| <b>Head of the household</b>                   |               |         |               |         |               |         |
| Female   | 0.50          |         | 0.49          |         | 0.43          |         |
| Age  | 54.94         | 13.79   | 51.00         | 13.72   | 50.84         | 13.31   |
| Primary schooling completed                    | 0.39          |         | 0.40          |         | 0.20          |         |
| Secondary schooling completed                  | 0.11          |         | 0.15          |         | 0.28          |         |
| Tertiary schooling completed                   | 0.11          |         | 0.08          |         | 0.07          |         |
| Employer                                       | 0.01          |         | 0.01          |         | 0.01          |         |
| Own-account worker                             | 0.22          |         | 0.23          |         | 0.22          |         |
| Civil servant                                  | 0.13          |         | 0.14          |         | 0.14          |         |
| Public sector employee                         | 0.02          |         | 0.04          |         | 0.03          |         |
| Private sector employee                        | 0.10          |         | 0.06          |         | 0.08          |         |
| Casual worker                                  | 0.05          |         | 0.04          |         | 0.06          |         |
| <b>Location</b>                                |               |         |               |         |               |         |
| Addis Ababa                                    | 0.61          |         | 0.61          |         | 0.71          |         |
| Awassa   | 0.13          |         | 0.13          |         | 0.09          |         |
| Dessie   | 0.13          |         | 0.13          |         | 0.09          |         |
| Mekelle  | 0.14          |         | 0.14          |         | 0.10          |         |
| Observations                                   | 567           |         | 567           |         | 437           |         |

Note: Standard deviations omitted for dummy variables.

**Table 4: Covariates of Consumption 2008**

|   | (1) Food consumption |           | (2) Food consumption |           | (3) General consumption |           | (4) General consumption |           |
|---|----------------------|-----------|----------------------|-----------|-------------------------|-----------|-------------------------|-----------|
|   | Coefficient          | Std error | Coefficient          | Std error | Coefficient             | Std error | Coefficient             | Std error |
| <b><i>Household demographics</i></b>        |                      |           |                      |           |                         |           |                         |           |
| Dependency ratio                            | -0.021               | 0.044     | -0.014               | 0.041     | -0.031                  | 0.041     | -0.025                  | 0.038     |
| Household size                              | -0.324***            | 0.038     | -0.303***            | 0.031     | -0.336***               | 0.036     | -0.314***               | 0.029     |
| Household size squared                      | 0.016***             | 0.003     | 0.015***             | 0.002     | 0.017***                | 0.003     | 0.015***                | 0.002     |
| <b><i>Household assets</i></b>              |                      |           |                      |           |                         |           |                         |           |
| Owns a house                                | 0.092**              | 0.044     | 0.075*               | 0.039     | 0.093**                 | 0.041     | 0.078**                 | 0.036     |
| Log of household assets                     | 0.209***             | 0.017     | 0.219***             | 0.016     | 0.230***                | 0.017     | 0.238***                | 0.015     |
| <b><i>Head of the household</i></b>         |                      |           |                      |           |                         |           |                         |           |
| Female                                      | -0.120**             | 0.050     | -0.108**             | 0.046     | -0.122**                | 0.046     | -0.114**                | 0.042     |
| Age   | -0.007               | 0.014     | -0.012               | 0.011     | -0.010                  | 0.013     | -0.014                  | 0.010     |
| Age squared / 100                           | 0.007                | 0.013     | 0.012                | 0.010     | 0.009                   | 0.012     | 0.014                   | 0.009     |
| Primary schooling completed                 | 0.028                | 0.050     | 0.026                | 0.047     | 0.019                   | 0.047     | 0.021                   | 0.043     |
| Secondary schooling completed               | 0.140*               | 0.075     | 0.118*               | 0.070     | 0.116*                  | 0.067     | 0.095                   | 0.062     |
| Tertiary schooling completed                | 0.330***             | 0.081     | 0.302***             | 0.077     | 0.310***                | 0.076     | 0.278***                | 0.072     |
| Employer                                    | -0.053               | 0.235     | 0.030                | 0.208     | -0.009                  | 0.180     | 0.058                   | 0.162     |
| Own account worker                          | 0.087                | 0.059     | 0.098                | 0.060     | 0.078                   | 0.055     | 0.087                   | 0.056     |
| Civil servant                               | -0.062               | 0.066     | -0.053               | 0.058     | -0.040                  | 0.064     | -0.036                  | 0.055     |
| Public sector employee                      | 0.125                | 0.148     | 0.185                | 0.117     | 0.102                   | 0.137     | 0.149                   | 0.107     |
| Private sector employee                     | 0.017                | 0.081     | 0.041                | 0.071     | 0.001                   | 0.075     | 0.021                   | 0.064     |
| Casual worker                               | -0.154               | 0.101     | -0.166*              | 0.087     | -0.191**                | 0.095     | -0.199**                | 0.081     |
| <b><i>Location and sampling control</i></b> |                      |           |                      |           |                         |           |                         |           |
| Addis Ababa                                 | -0.018               | 0.059     | -0.059               | 0.053     | 0.017                   | 0.054     | -0.016                  | 0.048     |
| Awassa                                      | 0.017                | 0.073     | -0.009               | 0.061     | 0.061                   | 0.067     | 0.052                   | 0.055     |
| Dessie                                      | 0.010                | 0.073     | -0.030               | 0.065     | 0.024                   | 0.066     | 0.001                   | 0.059     |
| New household                               |                      |           | -0.041               | 0.046     |                         |           | -0.028                  | 0.041     |
| Observations                                | 567                  |           | 709                  |           | 567                     |           | 709                     |           |
| R-squared                                   | 0.47                 |           | 0.47                 |           | 0.53                    |           | 0.54                    |           |

*Note:* All models are estimated using OLS with the dependent variable expressed in logarithmic form. Standard errors are robust to heteroskedasticity.. Significance at the 1%, 5%, 10% level is indicated by \*\*\*, \*\*, \*, respectively. An intercept is included in all model specifications.

**Table 5. Changes in Food Consumption**

|                               | (1) Consumption growth<br>2004-08 (OLS) |           | (2) Consumption growth<br>2000-04 (OLS) |           | (3) Difference in<br>Difference (OLS) |           | (4) Perceived effect of<br>food price shock<br>(ordered probit) |           | (5) Cut-back quantity of<br>food (binomial probit) |           |
|-------------------------------|---|-----------|---|-----------|---------------------------------------|-----------|---|-----------|--|-----------|
|                               | Coefficient                             | Std error | Coefficient                             | Std error | Coefficient                           | Std error | Coefficient   | Std error | Coefficient  | Std error |
| <b>Household demographics</b> |   |           |   |           |                                       |           |   |           |  |           |
| Dependency ratio              | -0.098**                                | 0.049     | 0.024                                   | 0.059     | -0.122                                | 0.077     | -0.144  | 0.105     | -0.004   | 0.117     |
| Household size                | 0.207***                                | 0.056     | 0.319***                                | 0.070     | -0.111                                | 0.090     | 0.107   | 0.094     | 0.033  | 0.094     |
| Household size squared        | -0.012***                               | 0.004     | -0.021***                               | 0.005     | 0.008                                 | 0.006     | -0.006  | 0.007     | -0.004   | 0.007     |
| <b>Household assets</b>       |   |           |   |           |                                       |           |   |           |  |           |
| Owns a house                  | -0.061                                  | 0.070     | 0.104                                   | 0.081     | -0.165                                | 0.107     | 0.198*  | 0.119     | -0.314**   | 0.125     |
| Log of household assets       | -0.033                                  | 0.023     | -0.117***                               | 0.024     | 0.084**                               | 0.033     | 0.222***  | 0.043     | -0.091**   | 0.045     |
| <b>Head of the household</b>  |   |           |   |           |                                       |           |   |           |  |           |
| Female                        | -0.010                                  | 0.071     | 0.180**                                 | 0.089     | -0.190*                               | 0.114     | 0.117   | 0.137     | 0.104  | 0.139     |
| Age                           | -0.027**                                | 0.013     | -0.006                                  | 0.019     | -0.021                                | 0.024     | -0.052**  | 0.025     | 0.054*   | 0.028     |
| Age squared / 100             | 0.026**                                 | 0.013     | 0.009                                   | 0.018     | 0.017                                 | 0.022     | 0.049*  | 0.026     | -0.049*  | 0.027     |
| Primary schooling completed   | -0.113                                  | 0.076     | -0.016                                  | 0.119     | -0.097                                | 0.141     | 0.080   | 0.148     | -0.232   | 0.147     |
| Secondary schooling completed | -0.101                                  | 0.119     | -0.094                                  | 0.114     | -0.007                                | 0.164     | 0.068   | 0.205     | -0.147   | 0.220     |
| Tertiary schooling completed  | -0.207                                  | 0.137     | -0.006                                  | 0.161     | -0.201                                | 0.211     | 0.501*  | 0.258     | -0.362   | 0.292     |
| Employer                      | 0.129                                   | 0.230     | 0.044                                   | 0.647     | 0.085                                 | 0.685     | 0.358   | 0.455     | 0.018  | 0.654     |
| Own account worker            | -0.084                                  | 0.079     | 0.079                                   | 0.097     | -0.163                                | 0.125     | 0.110   | 0.148     | 0.163  | 0.152     |
| Civil servant                 | -0.108                                  | 0.105     | 0.371***                                | 0.120     | -0.479***                             | 0.159     | -0.270  | 0.202     | 0.205  | 0.210     |
| Public sector employee        | -0.193                                  | 0.161     | 0.455***                                | 0.148     | -0.648***                             | 0.219     | 0.225   | 0.300     | 0.105  | 0.340     |
| Private sector employee       | 0.005                                   | 0.132     | -0.022                                  | 0.132     | 0.027                                 | 0.187     | -0.133  | 0.211     | 0.272  | 0.267     |
| Casual worker                 | -0.555***                               | 0.196     | 0.119                                   | 0.231     | -0.674**                              | 0.303     | -0.798**  | 0.399     | 0.939***   | 0.305     |
| <b>Location and time</b>      |   |           |   |           |                                       |           |   |           |  |           |
| Addis Ababa                   | 0.023                                   | 0.100     | 0.221*                                  | 0.133     | -0.198                                | 0.166     | 1.321***  | 0.237     | 0.674***   | 0.190     |
| Awassa                        | -0.013                                  | 0.114     | 0.115                                   | 0.155     | -0.129                                | 0.192     | 2.420***  | 0.281     | 0.290  | 0.241     |
| Dessie                        | 0.196*                                  | 0.114     | 0.112                                   | 0.171     | 0.084                                 | 0.205     | 1.053***  | 0.280     | -0.191   | 0.243     |
| 2004-08 Period                |   |           |   |           | 1.100                                 | 0.707     |   |           |  |           |
| Observations                  | 567                                     |           | 437                                     |           | 1001                                  |           | 567   |           | 567  |           |
| R-squared / Pseudo R-squared  | 0.08                                    |           | 0.17                                    |           | 0.13                                  |           | 0.19  |           | 0.10   |           |

Note: Standard errors in (1) and (2) are robust to heteroskedasticity. Standard errors in (3) are robust to heteroskedasticity and autocorrelation. Significance at the 1%, 5%, 10% level is indicated by \*\*\*, \*\*, \*, respectively. An intercept is included in all model specifications. Column (3) shows the estimated coefficients on interaction terms between a dummy for the period 2004/08 and all explanatory variables, in a regression pooling the data underlying (1) and (2). The dependent variable in (4) is coded as follows: 0 – very negatively; 1 – negatively; 2 – not at all. The dependent variable in (5) is a dummy variable equal to 1 if the household cut back on the quantity of food consumed in response to the food price shock.

**Table 6. Changes in General Consumption**

|                                      | (1) Consumption growth<br>2004-08 (OLS) |           | (2) Consumption growth<br>2000-04 (OLS) |           | (3) Difference in<br>Difference (OLS) |           |
|--------------------------------------|---|-----------|---|-----------|---------------------------------------|-----------|
|                                      | Coefficient                             | Std error | Coefficient                             | Std error | Coefficient                           | Std error |
| <b><i>Household demographics</i></b> |   |           |   |           |                                       |           |
| Dependency ratio                     | -0.105**                                | 0.047     | -0.002                                  | 0.057     | -0.103                                | 0.079     |
| Household size                       | 0.196***                                | 0.052     | 0.337***                                | 0.065     | -0.141                                | 0.091     |
| Household size squared               | -0.012***                               | 0.004     | -0.022***                               | 0.005     | 0.010                                 | 0.007     |
| <b><i>Household assets</i></b>       |   |           |   |           |                                       |           |
| Owns a house                         | -0.087                                  | 0.067     | 0.096                                   | 0.071     | -0.182                                | 0.113     |
| Log of household assets              | -0.031                                  | 0.022     | -0.101***                               | 0.021     | 0.071**                               | 0.034     |
| <b><i>Head of the household</i></b>  |   |           |   |           |                                       |           |
| Female                               | 0.013                                   | 0.066     | 0.153**                                 | 0.077     | -0.141                                | 0.114     |
| Age                                  | -0.024*                                 | 0.013     | 0.000                                   | 0.019     | -0.024                                | 0.024     |
| Age squared / 100                    | 0.022*                                  | 0.013     | 0.003                                   | 0.018     | 0.020                                 | 0.023     |
| Primary schooling completed          | -0.113                                  | 0.071     | 0.001                                   | 0.108     | -0.114                                | 0.131     |
| Secondary schooling completed        | -0.096                                  | 0.109     | -0.048                                  | 0.101     | -0.048                                | 0.151     |
| Tertiary schooling completed         | -0.151                                  | 0.128     | -0.045                                  | 0.142     | -0.106                                | 0.204     |
| Employer                             | 0.124                                   | 0.206     | 0.053                                   | 0.595     | 0.071                                 | 0.620     |
| Own account worker                   | -0.041                                  | 0.074     | 0.053                                   | 0.089     | -0.094                                | 0.125     |
| Civil servant                        | -0.079                                  | 0.096     | 0.265**                                 | 0.105     | -0.344**                              | 0.154     |
| Public sector employee               | -0.170                                  | 0.156     | 0.307**                                 | 0.136     | -0.477**                              | 0.220     |
| Private sector employee              | -0.023                                  | 0.126     | -0.073                                  | 0.125     | 0.051                                 | 0.189     |
| Casual worker                        | -0.485**                                | 0.189     | 0.053                                   | 0.197     | -0.539*                               | 0.286     |
| <b><i>Location and time</i></b>      |   |           |   |           |                                       |           |
| Addis Ababa                          | 0.065                                   | 0.094     | 0.135                                   | 0.122     | -0.069                                | 0.185     |
| Awassa                               | 0.019                                   | 0.104     | 0.042                                   | 0.140     | -0.023                                | 0.209     |
| Dessie                               | 0.233**                                 | 0.106     | 0.094                                   | 0.154     | 0.139                                 | 0.220     |
| 2004-08 Period                       |   |           |   |           | 1.023                                 | 0.725     |
| Observations                         | 567                                     |           | 437                                     |           | 1001                                  |           |
| R-squared / Pseudo R-squared         | 0.08                                    |           | 0.17                                    |           | 0.13                                  |           |

Note: Standard errors in (1) and (2) are robust to heteroskedasticity. Standard errors in (3) are robust to heteroskedasticity and autocorrelation. Significance at the 1%, 5%, 10% level is indicated by \*\*\*, \*\*, \*, respectively. An intercept is included in all model specifications. Column (3) shows the estimated coefficients on interaction terms between a dummy for the period 2004/08 and all explanatory variables, in a regression pooling the data underlying (1) and (2).

**Table 7: The Effects of Idiosyncratic shocks**

|                              | (1) Food consumption |           | (2) Change in food consumption |           | (3) General consumption |           | (4) Change in general consumption |           |
|------------------------------|----------------------|-----------|--------------------------------|-----------|-------------------------|-----------|-----------------------------------|-----------|
|                              | Coefficient          | Std error | Coefficient                    | Std error | Coefficient             | Std error | Coefficient                       | Std error |
| Death of family member       | -0.084               | 0.074     | 0.117                          | 0.093     | -0.071                  | 0.069     | 0.099                             | 0.088     |
| Illness of family member     | 0.005                | 0.061     | 0.152                          | 0.107     | 0.018                   | 0.054     | 0.124                             | 0.098     |
| Job loss of household member | -0.227*              | 0.120     | -0.400**                       | 0.158     | -0.244**                | 0.110     | -0.454***                         | 0.159     |
| Asset loss                   | -0.030               | 0.096     | -0.312                         | 0.205     | -0.029                  | 0.095     | -0.273                            | 0.179     |
| Other idiosyncratic shocks   | 0.176                | 0.116     | 0.201                          | 0.159     | 0.160                   | 0.110     | 0.218                             | 0.159     |
| <b>Controls</b>              |                      |           |                                |           |                         |           |                                   |           |
| Household demographics       | Yes                  |           | Yes                            |           | Yes                     |           | Yes                               |           |
| Household assets             | Yes                  |           | Yes                            |           | Yes                     |           | Yes                               |           |
| Characteristics of the head  | Yes                  |           | Yes                            |           | Yes                     |           | Yes                               |           |
| Location                     | Yes                  |           | Yes                            |           | Yes                     |           | Yes                               |           |
| Observations                 | 567                  |           | 567                            |           | 567                     |           | 567                               |           |
| R-squared                    | 0.48                 |           | 0.11                           |           | 0.54                    |           | 0.12                              |           |

Note: Standard errors are robust to heteroskedasticity. Significance at the 1%, 5%, 10% level is indicated by \*\*\*, \*\*, \*, respectively. An intercept and a full set of explanatory variables are included in all model specifications.

## **Appendix**

### **Consumption aggregation and adult equivalences**

We computed aggregate household consumption expenditure by adding up reported household expenditure on food and non-food items. The non-food component of consumption includes expenditures on items such as; clothing, footwear, energy, personal care, utilities, health and education. We excluded expenditure on consumer durables. According to Deaton (2002), from the perspective of welfare analysis, it is the value of services that flows from ownership of these consumer durables that should enter the aggregation of consumption expenditure. This was not possible in our analysis because we didn't have information that is useful to impute depreciation rate of household fixed assets. This is unlikely to distort the values of the aggregated consumption expenditure because the value of expenditure that goes to durables goods in Ethiopia is insignificant (Tadesse, 1996).

Aggregate household consumption expenditure is converted into adult equivalences to adjust for household size and composition using the method proposed by Dercon and Krishnan (1998). Moreover, to allow for temporal and spatial comparisons of consumption among households, we deflated consumption expenditure using the CPI reported in Table A.1 using the year 2000 as the base year. We adjusted for spatial price differences using temporal spatial price information made available by Central Statistics Agency (2009).

**Table A.1 Selected Macroeconomic Indicators of Ethiopia 2000-2008**

| Variable                                 | Units                        | Scale    | 2000    | 2001      | 2002      | 2003   | 2004      | 2005      | 2006      | 2007      | 2008      |
|--|------------------------------|----------|---------|-----------|-----------|--------|-----------|-----------|-----------|-----------|-----------|
| GDP, constant prices                     | National currency            | Billions | 64.40   | 69.36     | 70.22     | 67.76  | 74.40     | 83.80     | 93.47     | 104.20    | 116.30    |
| GDP, constant prices                     | Annual percent change        |          | 5.93    | 7.71      | 1.24      | -3.51  | 9.80      | 12.64     | 11.54     | 11.47     | 11.61     |
| GDP, current prices                      | National currency            | Billions | 64.40   | 65.69     | 63.46     | 68.90  | 86.66     | 106.47    | 131.67    | 170.92    | 239.13    |
| GDP, current prices                      | U.S. dollars                 | Billions | 7.90    | 7.88      | 7.43      | 8.03   | 10.05     | 12.31     | 15.17     | 19.43     | 25.66     |
| GDP, deflator                            | Index                        |          | 100.00  | 94.70     | 90.38     | 101.69 | 116.48    | 127.05    | 140.87    | 164.04    | 205.62    |
| GDP per capita, constant prices          | National currency            | Units    | 1014.14 | 1,060.497 | 1,044.618 | 980.51 | 1,047.300 | 1,147.591 | 1,245.138 | 1,350.171 | 1,468.752 |
| GDP per capita, current prices           | National currency            | Units    | 1014.14 | 1,004.317 | 944.10    | 997.05 | 1,219.941 | 1,458.011 | 1,753.967 | 2,214.790 | 3,020.055 |
| GDP per capita, current prices           | U.S. dollars                 | Units    | 124.40  | 120.47    | 110.51    | 116.20 | 141.53    | 168.52    | 202.05    | 251.79    | 324.05    |
| GDP based on PPP                         | Current international dollar | Billions | 29.59   | 32.63     | 33.61     | 33.12  | 40.76     | 47.24     | 54.39     | 62.26     | 71.00     |
| GDP based on PPP per capita GDP          | Current international dollar | Units    | 465.92  | 498.90    | 500.01    | 479.31 | 573.81    | 646.85    | 724.44    | 806.70    | 896.64    |
| GDP based on PPP share of world total    | Percent                      |          | 0.07    | 0.08      | 0.07      | 0.07   | 0.08      | 0.08      | 0.09      | 0.10      | 0.10      |
| Implied PPP conversion rate              |                              |          | 2.18    | 2.01      | 1.89      | 2.08   | 2.13      | 2.25      | 2.42      | 2.75      | 3.37      |
| Inflation, average consumer prices       | Index, 2000=100              |          | 100.00  | 94.79     | 87.94     | 101.18 | 109.90    | 117.42    | 131.81    | 152.69    | 191.34    |
| Inflation, average consumer prices       | Annual percent change        |          | 6.16    | -5.21     | -7.22     | 15.06  | 8.62      | 6.84      | 12.26     | 15.84     | 25.32     |
| Inflation, end of period consumer prices | Index, 2000=100              |          | 100.00  | 88.57     | 87.67     | 108.28 | 110.17    | 124.48    | 138.88    | 159.88    | 248.24    |
| Inflation, end of period consumer prices | Annual percent change        |          | 0.27    | -11.43    | -1.02     | 23.51  | 1.75      | 12.99     | 11.57     | 15.12     | 55.27     |
| Population                               | Persons                      | Millions | 63.50   | 65.41     | 67.22     | 69.10  | 71.04     | 73.03     | 75.07     | 77.17     | 79.18     |
| Current account balance                  | U.S. dollars                 | Billions | -0.34   | -0.23     | -0.35     | -0.11  | -0.40     | -0.74     | -1.39     | -0.87     | -1.49     |
| Current account balance                  | Percent of GDP               |          | -4.24   | -2.96     | -4.67     | -1.36  | -4.00     | -6.00     | -9.14     | -4.48     | -5.80     |

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<sup>1</sup> Dessus et al. (2008), Ivanic and Martin, (2008), Wood et al. (2009) study the implications of rising world food prices on poor households in developing countries, especially the urban poor, and they argue that the negative welfare effects have been tremendous. The data used in these studies do not cover the period of the dramatic global food price increase in 2007-2008.

<sup>2</sup> A similar point is raised by Dercon (2006a), who argues that observed changes in outcomes over time may not necessarily be the consequence of policy changes, since the effects of the reforms cannot be separated from other factors, such as external shocks or the lagged consequences of past recessions.

<sup>3</sup> It appears the use of self-reported data is becoming more widespread in poverty analysis, a practice recently endorsed by Angus Deaton: “there is something to be said for directly asking people around the world how their lives are going, whether they have enough, or whether they are in financial difficulty” (Deaton, 2010, p.38).

<sup>4</sup> There is evidence that the unprecedented high rate of inflation in Ethiopia in the past few years eroded living standard of the majority of the urban population. Woldemichael (2008) documents that cumulative salary increment in the government sector (which is the major employer of the labour force in urban areas) between July 2001 and 2007 was about 60 percent, while the general and food price inflation rates during the same period were 96 percent 125 percent respectively.

<sup>5</sup> See for example the World Development Report 2000/01 (World Bank, 2001)

<sup>6</sup> In empirical research, formulations based on the permanent income hypothesis of Friedman (1957) have been common. Friedman originally argued that rational households with access to perfect markets in insurance and credit will maximize the sum of expected lifetime discounted utility, constrained only by the sum of initial assets, and value of their future savings; their “permanent income”.

<sup>7</sup> Coate and Ravallion, (1993), Fafchamps, (1999), Fafchamps and Lund (2003) discuss the different informal arrangements that have evolved to cope with market failures in developing countries.

<sup>8</sup> Reardon et al. (2007) on the other hand, discuss the mechanism of engaging in non-farm income generating activities to deal with risk and shocks and more recently, Porter (2008) found some evidence that households and their members divert labour towards relatively higher return activities in order to smooth income in rural Ethiopia during shocks.

<sup>9</sup> Vulnerability is defined by the World Bank (2001) as measuring “...the likelihood that a shock will result in a decline in well-being” (p.139). Note that vulnerability is not synonymous with poverty. For an excellent survey of the micro literature on risk, vulnerability and poverty, see Dercon (2006b).

<sup>10</sup> There has been a longstanding debate about using income or consumption expenditure to measure household welfare. In the context of developing countries, it is strongly recommended to use consumption measures because income is often underreported and in many cases, volatile and difficult to remember. See Deaton (1997), Deaton and Grosh (2000) for further discussion.

<sup>11</sup> The waves for 2000 and 2004 cover approximately 1,500 households in Addis Ababa, Awassa, Bahir Dar, Dessie, Dire Dawa, Jimma and Mekelle. Still earlier waves of data deriving from the EUSS exist for 1994, 1995 and 1997. See Bigsten and Shimeles (2008) for details on these data. Lack of sufficient funding prevented us from covering Bahir Dar, Dire Dawa and Jimma in the 2008/09 survey.

<sup>12</sup> The average share of energy expenditures in total household expenditures is about 6 percent in our sample. Hence, while energy prices have risen rapidly over the sample period, energy expenditures have remained relatively low. Moreover, the data shown in column 2 in Table 1 indicate that few households refer to energy price inflation as big problem. We therefore assume the energy price inflation is a less significant shock for households in urban Ethiopia than the food price inflation.

<sup>13</sup> This figure differs from that reported in Table 2, since new households are excluded here.

<sup>14</sup> This household asset variable includes assets such as TV, refrigerator, motor vehicles etc.

<sup>15</sup> We have also done a pooling test, by interacting the dummy for new households and the explanatory variables and adding these to the baseline specification. The coefficients on the interaction terms are insignificantly different from zero at the 5% level of significance, indicating no systematic difference between new households and panel households.

<sup>16</sup>  $\exp(-0.55)-1=-0.42$ .

<sup>17</sup> The panel dimension of the data implies that the residuals are likely serially correlated, and therefore we ‘cluster’ the standard errors at the household level.

<sup>18</sup> A statement that is valid, of course, only to the extent that the baseline period is an accurate counterfactual.

<sup>19</sup> We have also estimated the model using OLS. Results are available on request.

<sup>20</sup> This type of analysis is not possible for food price shocks, hence our earlier focus on the heterogeneity in the effects of the food price inflation.

<sup>21</sup> Data on idiosyncratic shocks were collected for the first time in the 2008/09 survey, thus no panel data exist for these variables.