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Welfare Impact of the Global Financial Crisis of 2008-2009 on Turkish Households

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Abstract

This paper looks at how the macro-shock from the 2008 financial crisis has translated into income and welfare shocks in the form of reduced earnings and consumption at the household level in Turkey. Using a specialized household level Welfare Monitoring Survey implemented in May-June 2009 in seven Turkish provinces, the paper first establishes a link between the province-level shock and the changes in earnings at the household level. Secondly, using an instrumental-variables strategy, it establishes the link between the earnings reduction and changes in consumption. The main findings in the paper are that informally employed workers, and those with lower levels of education, were most likely to be hurt by the crisis. In terms of human-development investments at the household level, the paper finds that food expenditures acted as the main adjustment mechanism in the face of the income shock, while education and health expenditures remained relatively stable. The probability of reducing food consumption (and the amount of food provided to children) was highest among the poor that initially had low levels of household assets.

JEL Codes: D10, D12, D31, I30

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1. Introduction

While the center of the global financial crisis of 2008-09 was the developed world, many developing countries have also been impacted by the aftershock of the crisis. At the macro level, the impact of the crisis can be measured by increases in the unemployment numbers and reductions in GDP growth. But how has the macro-shock translated into income shocks at the household level and then consequently to changes in welfare in terms of food and non-food consumption as well as investments in human development, such as education and health expenditures, in different parts of the developing world? This is a critical question to answer for economists in order to fully understand how households in the developing world have ultimately been impacted by this large-scale aggregate blow.

Several papers have been written, based on data from previous crises, focusing on household coping mechanisms and consumption responses to income shocks. One study by McKenzie (2003) uses Mexican household surveys to examine the micro-impact of the 1995 peso crisis. Using data from four years of household surveys between 1992 and 1998, the paper examines the impact of the crisis across various strata. The author makes non-parametric comparisons (Welch tests) of the equality of means for mean weekly labor hours, household structure, and fertility levels, as well as school attendance of children across the years, and finds that consumption fell dramatically in this period, due to households' inability to fully smooth the shocks to their income. At the same time, household structure did not change dramatically over the crisis period, nor was the coping strategy of adding more household members to the labor force widely used. The author links this to weak labor demand through the crisis period and finds that the reduction in labor-market opportunities also reduces the opportunity cost of schooling: attendance rates actually *rose* among 15- to 18- year-olds during the period.

A number of other studies also look at the relationship between aggregate income shocks and investments in education and conclude that there is no negative impact of these phenomena on educational enrollment for children. For example, Escobal (2005) studies the effect of sudden economic downturns on household human-capital investments using a sample of children aged six to 14 from the Young Lives Survey in Peru. This study finds evidence that such downturns have an impact on the quality rather than the quantity of education. The authors observe that a negative income shock does not produce a change in the time spent on education, and that it only reduces the effective accumulation of human capital through cuts in public spending on education. However, another study, by Duryea and Lam (2007), uncovers a negative

impact of the crisis in Brazil on school attendance and enrollment: Brazilian youth adjust their school and labor-force participation behavior in response to an unexpected transitory shock to the household by increasing their labor-force activity. The authors compare households in which the male household head becomes unemployed during a four-month period with households in which the head is continuously employed. *Probit* regressions indicate that an abrupt fall into unemployment significantly ups the probability that a child will enter the labor force, drop out of school, or fail to advance in school. The results suggest that some households are not able to absorb short-run economic shocks, with negative consequences for the children.

This paper looks at how the macro-shock from the 2008-09 financial crisis translated into falls in income and welfare in the form of reduced earnings and expenditures (particularly on food, education, and health consumption) at the household level in Turkey. Using a specialized household-level survey and an instrumental-variables technique, the paper estimates the causal impact of the income shock on household welfare and consumption. Instrumenting for the income shock at the household level, the paper establishes the link between the income shock and changes in expenditure patterns. It finds that while education and health expenditures and utilization were largely protected throughout the crisis in Turkey, most households have reduced their consumption of those food products that have traditionally taken up a large portion of the initial expenditure basket for Turkish households.

The main questions this study attempts to answer are: (i) Who was more likely to be impacted by the macro-shock? What types of workers and households were likely to report reductions in earnings? (ii) How did the macro-shock affect the income and expenditures of households? Which expenditure items were most likely to be cut back in the face of the income fall-off?

The outline of the paper is as follows: Section 1.1 continues with a description of the financial crisis of 2008-09 in Turkey. Section 2 provides the conceptual framework for how we envision households' consumption was impacted, given an income shock. In this section, the empirical strategy for estimating the welfare impact of the income shock is also put forward. Section 3 provides information on the data sources used for this study and explains the construction of key variables in the analysis. Section 4 gives the empirical results for the *probit* and IV estimations, and Section 5 concludes with the main findings.

1.1 The Context of the Financial Crisis in Turkey

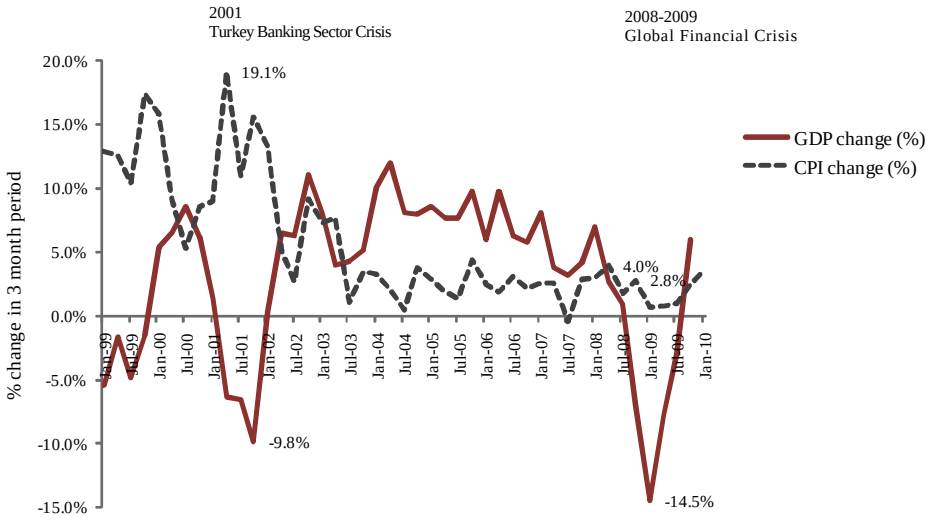
In the wake of the worldwide economic slowdown in 2008, Turkey's GDP contracted by 7% in the last quarter of 2008 compared to the third quarter of that year. In the first quarter of 2009, GDP fell by a further 14.5% and continued to shrink throughout the year (see Figure 1), decreasing an overall 4.7%. Unemployment levels, particularly among the youth, soared in the first quarter of 2009. Having remained stable at levels below 10% for several years, the unemployment rate in Turkey peaked at 16.1%—reaching 28.6% among the 15-24 age bracket—in the first quarter of 2009, and job creation slowed throughout the year (see Figure 2).

The three main channels via which a macro-crisis could hurt households are: (i) the reduction in labor income; (ii) changes in the price level; and (iii) a drop in public expenditures that may adversely affect households. In Turkey, the price level during the 2008-09 financial crisis remained relatively stable, with year-on-year inflation at 5.3% between June 2008 and June 2009. Commodity price index (CPI) stability is also demonstrated in Figure 1. As public expenditures in this period were on the rise, no downward shift in public spending that would hurt households was expected. The non-interest spending of the central government rose from 204 billion TL in 2007 to 227 billion TL in 2008 and to 268 billion TL in 2009. The increases were 13.6% in 2008 and 21.9% in 2009, and in both years exceeded the rate of inflation in Turkey; hence, one can speak of a real increase in public spending through the period of the crisis. Likewise, the share of government spending in GDP jumped in this time period, from 18.4% in 2007 to 22.6% in 2009[1]. Given this macro-background of price levels and fiscal spending, the main transmission mechanism via which the financial crisis influenced households was through reduced labor earnings.

Turkey had previously experienced a major crisis in its banking sector that led to an economic slump in 2001. Back then, the major transmission mechanism of the crisis to the household level was through changes in the overall price level (households had lower purchasing power, arising from the climb in the price level). In the first quarter of 2001, the consumer price index was up by 19.1% over the previous three-month period, following the devaluation of the Turkish lira. In the same time period, GDP had declined by 10%. Compared to the 2001 banking crisis, there was a *sharper* reduction in GDP levels in the 2008-09 economic recession, though the price level stayed relatively stable, with a quarterly inflation level of less than 5%. Given this background, it is fair to say that unlike the earlier economic crisis in the country, the global

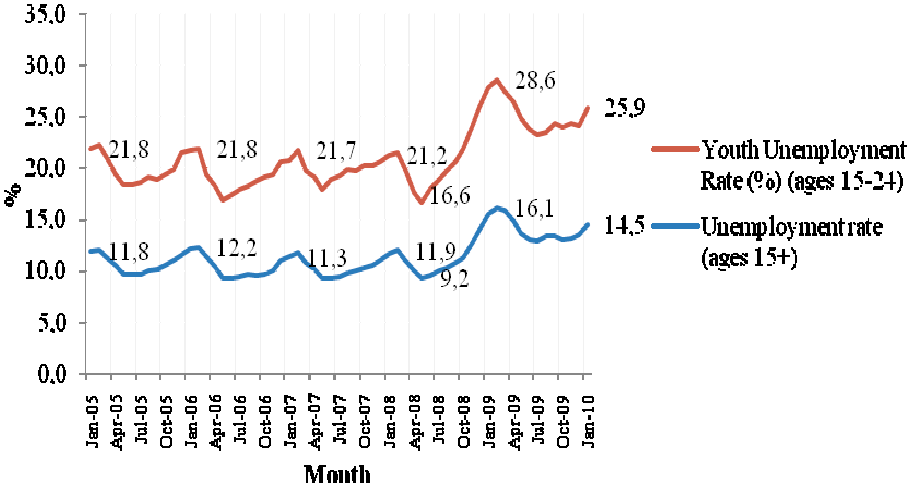
[1] Source: Ministry of Finance, Turkey.

Figure 1. Severity of the Macro-Shock: Changes in GDP and CPI (% change in three-month period)



Source: TURKSTAT

Figure 2. Unemployment and Youth Unemployment Rates in Turkey (Jan. 2005 – Jan. 2010)



Source: TURKSTAT

financial crisis of 2008-09 caused pain in Turkish households mainly through changes in household income via reduced employment and earnings. The rest of this paper focuses primarily on this transmission mechanism in measuring changes to household welfare.

2. Conceptual Framework

2.1 The Model

To analyze changes in consumption behavior at the household level, this paper uses a conceptual model with "hierarchical preferences" in the household's utility function (for the sake of its expositional simplicity). In this model, the utility function is defined in a way whereby individuals require a minimum level of good x (in this case, food), and they also consume other goods, y. Preferences are hierarchical such that a minimum amount of food x_0 needs to be purchased before individuals can obtain utility from food and other goods. The utility function is of the form:

$$U(x, y) = (x - x_0)^{\alpha} y^{\beta} \tag{1}$$

Subject to the food-satiation constraint:

$$X \leq X_{\max}$$

The part of the budget constraint that can be allocated by the household is expressed as the total income minus the amount of expenditure necessary to purchase x_0:

$$I^{*} = I - p_x x_0 \tag{2}$$

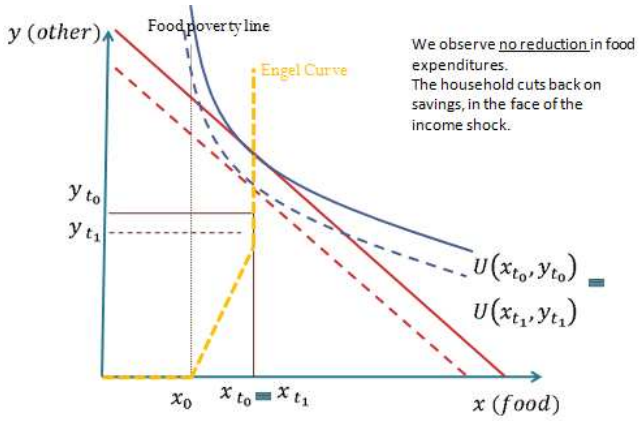
In the face of an income shock, households with different initial income conditions respond to the new circumstances in different ways because of the hierarchical-preferences assumption. We consider here the hypothetical cases of a high-income, middle-income, and low-income household operating under this utility function. Figure 3 provides the utility function and the changes in consumption of good x and good y in the face of an income shock on the three household types. The red curve in the figure represents the budget constraint, which shifts back with the income shock experienced in the household. The Engel Curve outlined in yellow starts on the x-axis and continues along the x-axis until the point consumption of x reaches x_0. At that satiation point, the household begins to consume goods other than food. The simplified model with hierarchical preferences makes sure that a household consumes only food until

it reaches a satiation point of x_0 in food consumption. The satiation point for food comes at some point, and then the Engel curve becomes vertical, with the household consuming only *y* with any extra income beyond this satiation point.

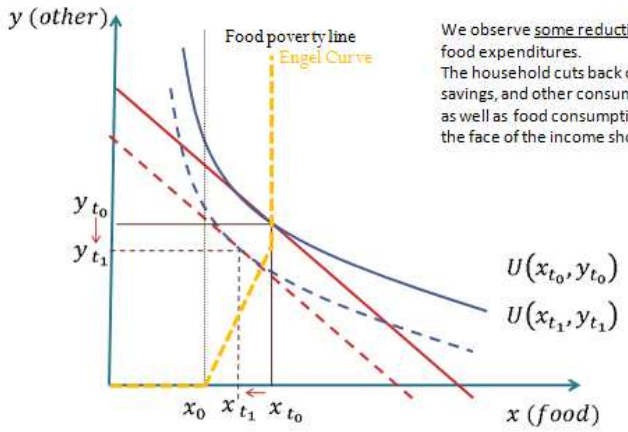
According to the permanent-income hypothesis, consumption patterns are determined by a change in permanent income rather than changes in transitory income. Temporary changes in income should have little effect on the consumer's spending behavior (Friedman, 1957). If this hypothesis holds, and if households are able to smooth consumption, we should state that consumption changes occur because the household interprets a certain portion of the transitory shock to be permanent, or that the transitory shock is large enough to cause the permanent income of the household to come down. However, if households are not able to smooth consumption, we should see consumption coming down with the transitory income shock, even if the impact on permanent income is small. When looking at the ways in which households coped with the crisis, we found that households that were able to smooth consumption by accessing formal and informal safety nets, or through borrowing, were less likely to reduce consumption. Thus, in the absence of a mechanism to smooth consumption, households respond to transitory income shocks by cutting back on consumption.

Figure 3. Income Shock and the Consumption Response

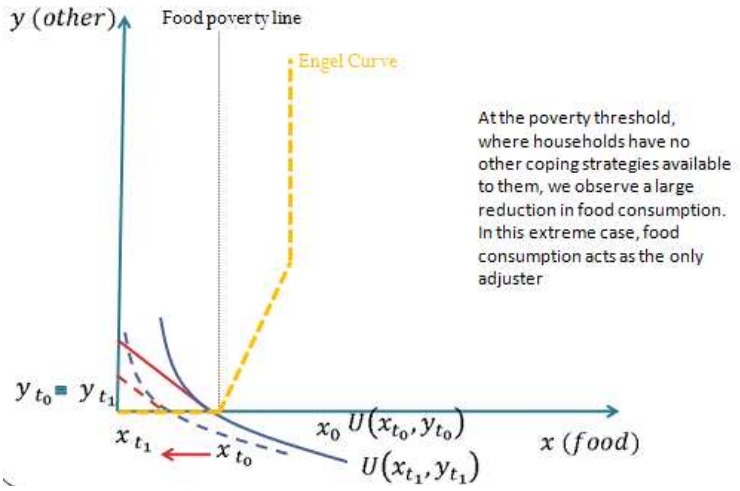
Panel A: Income shock experienced by a high-income household



Panel B: Income shock experienced by a middle-income household



Panel C: Income shock experienced by a low-income household



For the high-income household described in Figure 3, Panel A, the shift in the budget constraint does not change the level of food consumption, since the household is already beyond satiation point, and any reduction in income gets reflected in the reduction in the consumption of *y*, other goods. The middle-income household in Panel B is initially below the food-satiation point; hence, a reduction in income reduces the consumption of both the food and non-food

goods in the consumption basket. In Panel C, the situation of a low-income household is depicted; for this household, $x < x_0$ in the initial conditions, so the income shock gets disproportionately reflected in household food consumption. We can expect the pattern of changes in consumption to follow the model outlined here, with poorer households having less fungible resources to allocate away from food expenditures, thus having a higher likelihood of having to reduce food expenditures within the overall household budget.

Table 1 provides the levels of food and non-food expenditures in household budgets in Turkey as of 2008 (prior to the crisis). Here Engel's Law can be observed for Turkish households, with households in the poorest decile allocating up to 43% of their total household expenditures to food. Housing constitutes the second-largest expenditure item in the household consumption bundle for Turkish households in the poorest decile. Since housing expenditures, mostly in the form of rent, are discrete and more difficult to substitute away from, they are regarded as *not* being part of "fungible" income in this model. A household would not be able to substitute away from or reduce rent expenditures in the very short term; therefore, food expenditures are most likely to bear the brunt of consumption belt-tightening in the aftermath of an income shock for a poor household, as predicted in this model.

2.2 Empirical Strategy

The hypothesis put forward in the above model relates to the changes in the consumption patterns of households following an income shock—namely, that they reduce food consumption in the short term, particularly if they are in the poorer quintiles.

First, the paper looks at the probability of reporting reduction in earnings through the first eight months of the global financial crisis, between October 2008 and May 2009, in order to establish what types of workers and households were most likely to be constrained in terms of their income in this period. In the model, October 2008 and May 2009 are referred to as t_1 and t_2, respectively.

The predicted probability of lower earnings by the household head is estimated using a *probit* regression of the form:

$$\Pr(\Delta Y_i)=\alpha_1 \Delta X_p + \alpha_2 A_{i(t1)} + u_i \quad (3)$$

$$\Pr(\Delta Y_i)=\alpha_1 \Delta X_p + \alpha_2 A_{i(t1)} + \alpha_3 \Delta X_p A_{i(t1)} u_i \quad (4)$$

Table 1. Household Expenditures by Decile (2008)

Deciles of Per capita Expenditure	Total Spending	Food	Alcohl	Clothing	Housing	Furniture	Health	Transport	Communication	Entertainment	Education	Restaurants	Various
Poorest decile	100.0%	**43.5%**	9.8%	7.5%	25.2%	5.5%	**3.1%**	8.1%	5.7%	1.7%	**4.7%**	4.0%	3.5%
2	100.0%	**37.1%**	10.0%	7.2%	28.0%	5.7%	**2.7%**	8.6%	5.0%	2.4%	**4.7%**	4.7%	3.5%
3	100.0%	**32.7%**	9.4%	6.6%	29.9%	5.2%	**2.8%**	9.0%	4.9%	2.0%	**5.0%**	5.1%	3.6%
4	100.0%	**29.8%**	8.7%	6.4%	30.6%	5.7%	**3.0%**	9.7%	4.9%	2.8%	**4.6%**	5.3%	3.2%
5	100.0%	**27.6%**	7.5%	6.7%	31.9%	6.1%	**2.7%**	10.0%	4.7%	3.1%	**4.8%**	5.0%	3.6%
6	100.0%	**26.5%**	7.6%	7.0%	30.4%	6.2%	**2.6%**	10.6%	5.3%	3.2%	**4.5%**	5.4%	3.8%
7	100.0%	**24.7%**	7.2%	7.3%	31.7%	6.0%	**2.5%**	11.4%	5.0%	3.1%	**5.1%**	5.0%	3.6%
8	100.0%	**23.8%**	6.8%	6.9%	30.3%	6.4%	**3.5%**	12.7%	5.2%	3.0%	**5.5%**	5.0%	4.0%
9	100.0%	**21.8%**	6.0%	6.8%	29.2%	6.4%	**3.3%**	14.8%	5.1%	3.4%	**5.9%**	5.2%	4.4%
Richest decile	100.0%	**15.1%**	3.7%	6.9%	23.4%	6.7%	**3.7%**	26.2%	3.8%	4.4%	**9.4%**	4.8%	5.6%
Total	100.0%	**23.5%**	6.4%	7.2%	28.2%	6.3%	**3.3%**	16.5%	4.9%	3.7%	**7.0%**	5.3%	4.4%

Data Source: Household Budget Survey 2008

The dependent variable Pr (ΔY_i) in Equation 3 is the probability of reporting lower earnings in current job in time period 2 (t_2) compared to time period 1 (t_1). The workers who report being "employed" in t_1 and subsequently lose their job by t_2 are also recorded as having reduced earnings. Hence, the dummy variable for the dependent variable takes a value of 1 for those who actually receive lower earnings and for those who have lost a job. The explanatory variables in the first-stage regressions include the province-level macro-shock variable (ΔX_p), which is defined as the rate of change in non-cash credit from banks in the province. In these regressions, ΔX_p can be interpreted as a proxy variable for the intensity of the "credit crunch" experienced at the province level (see Section 3.2). $A_{i(t1)}$ denotes the characteristics of the worker as of t_1, and includes the labor status and the educational attainment of the household head. Each worker characteristic is provided as deviations from the mean in the regressions.

In the second specification provided in Equation 4, the worker characteristics are interacted with the province-level crisis proxy to see if the macro-shock from the crisis had a heterogeneous impact on workers of different characteristics. The specifications in Equations 3 and 4 are run for two different sub-samples: (i) all workers that held a job in t_1 and (ii) workers who are also household heads and held a job in t_1. In order to get robust standard errors for these regressions, the standard errors are clustered at the province level, since at least one explanatory variable (namely, ΔX_p) varies only at the province level and takes on only seven values.

Second, a *probit* estimation is run to establish the positive correlation between the income shocks experienced at the household level and any associated reduction in welfare as measured by the consumption of the household on food, education, health, or other expenditures. The marginal effects of the following *probit* regressions are reported:

$$\Pr(\Delta C_j) = \beta_1 \Delta Y_j + \beta_2 A_{j(t1)} + u_j \quad (5)$$

$$\Pr(\Delta C_j) = \beta_1 \Delta Y_j + \beta_2 A_{j(t1)} + \beta_3 A_{j(t1)} \Delta Y_j + \beta_4 H_j + u_j \quad (6)$$

Here, the dependent variable ΔC_j is the dummy variable for reporting lower expenditures or a change in behavior in consumption patterns between t_1 and t_2. ΔY_j is the dummy variable for the household head reporting a reduction in earnings between t_1 and t_2. Only the sample of household heads who were working in t_1 is included in these regressions. The characteristics denoted by A_j are provided at the household level. These include urban/rural location,

educational attainment of the household head, and the household-asset index, and are demeaned in the regressions. The interaction term between household-head initial characteristics and the dummy variable for reporting the earnings shock is added to the specification in Equation 6, where H_j includes household-composition variables (number of children and adults in the household), and u_j represents the error term in the equation.

The possible labor-supply responses to the income shock are (i) the added worker effect (where household members who were not active in the labor market begin to look for jobs, or take jobs), and (ii) taking secondary jobs for those who are already employed. The variable in the regressions defining the income shock is whether the household head has lost his or her main job in October 2008, and whether he/she reports a reduction in earnings from the main job. If either of the above conditions occurs, the actual income shock to the household would be smaller than described in the data. In this sense, the impact of the income shock (the coefficient on the income shock β_1, in the consumption regressions in Equations 5 and 6) would be a lower-bound estimate of the actual impact of the labor-income shock on expenditures and consumption.

The specifications in Equations 5 and 6 assume the income shock at the household level as an exogenous variable and looks at its effect on consumption behavior. These *probit* regressions are run separately for food, education, and health expenditures. The coefficient on β_1 gives the relationship between the earnings shock and changes in consumption, controlling for household-head characteristics. In the specification with the interaction terms, the coefficient on β_3 gives the heterogeneous response of the households associated with an earnings shock.

The maximum-likelihood *probit* model estimates of the coefficients of the earnings shock may be inconsistent and/or biased if (i) there is a correlation between the responses to the changes in income and the responses to the changes in expenditures and consumption questions (in which case the earnings-shock variable would become endogenous in the model), and if (ii) there is a measurement error in the earnings-shock variable, which would result in attenuation bias on the coefficient β_1 of the earnings shock at the household level. We can suspect that both of these problems may exist in the survey data used in this paper.

There is a risk for the potential endogeneity of the earnings shock. The income shock and consumption changes are both subjectively reported in the rapid survey data and may be correlated with each other as a result of the respondent's desire to reduce "*dissonance*" in the responses. Cognitive disso-

nance can be defined as a discomfort caused by holding conflicting ideas simultaneously[2].

1. Given that the data are based on "perceptions" of consumption, we may worry that people have erroneously reported lower levels of food consumption if they had already reported lower levels of earnings in the data set. In that case, the income shock would not be exogenous to the probability of reporting a change in consumption. For instance, a household head who reports a reduction in his earnings may be more likely to also say that the household has reduced food consumption. This problem would result in an *overestimation* of the size of the β_1 coefficient in Equation 5.

2. Measurement error on the earnings shock: the data on earnings are based on recall data and are a categorical variable that asks the worker to assess whether his earnings in the current job (in t_2) are higher, lower, or at the same level as his earnings at the onset of the crisis in t_1. Any measurement error that results from recall data would generate an attenuation bias in the estimation of β_1 whereby the estimated plim(β_1) is always closer to zero than β_1. This measurement problem would result in an *underestimation* of the size of the β_1 coefficient in the maximum-likelihood *probit* model in Equation 5.

To find consistent and unbiased estimates for the coefficient of the earnings shock in the model in Equation 5, this paper next implements an instrumental-variables approach. A 2SLS strategy is chosen to establish the causal link between the idiosyncratic income shock at the household level and the changes in different types of consumption.

The excluded instruments in the model have to satisfy the relevance and validity conditions. The instruments have to be strongly correlated with the earnings shock at the household level (X) and uncorrelated with the unobservable error, u. The instrumental-variable matrix, z, should have the property that changes in z are associated with changes in the earnings variable at the household level but do not lead to changes in expenditures/consumption (except indirectly through earnings). In this paper, two variables are used to instrument for the earnings shock at the household level: the severity of the crisis at the province level (as proxied by the rate of change in non-cash credit available from banks in the province[3]), and the formal/informal sector employment of the household head.

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[2] The theory of cognitive dissonance proposes that people have a motivational drive to reduce dissonance and that they do this by changing their attitudes, beliefs, and actions (Festinger, 1957).

[3] The definition of the crisis-proxy variable is described in detail in Section 3.2.

The inspiration for the instrument in the 2SLS estimation comes from the earnings *probit* provided earlier in Equation 3 and later in Table 6. The paper has already established a strong linkage in these results between the province-level macro-shock and the probability of an earnings shock at the household level. The formal/informal sector employment of the household head was also strongly associated with the probability of receiving a shock to the earnings of the household head. In this section, the paper instruments for the potentially endogenous earnings-shock variable using the province-level macro-shock variable and the (formal/informal) sector of employment of the household head. Both of these instruments are strongly correlated with the probability of the household head receiving an earnings shock in the crisis period (as will later be shown in first-stage regressions of the 2SLS estimation), and we expect them to be *uncorrelated* with consumption decisions at the household level.

To instrument for the household-level earnings-shock variable, which may potentially be endogenous or mismeasured, this paper uses two instruments that are closely linked to the predicted probability of receiving an income shock at the household level: (i) the intensity of the macro-shock in the province where the household is located, and (ii) the formal/informal labor status of the household head prior to the onset of the crisis in t_1.

The 2SLS specification can be formally stated as follows:

$$\Pr(\Delta C_j) = \varphi_1 \Delta \hat{Y}_j + \varphi_2 A_{j(t1)} + u_j \tag{7}$$

Here, $\Delta \hat{Y}_j$, the predicted level of the probability of receiving the income shock, is used to instrument for ΔY_j, the probability of experiencing an earnings shock in the household, which is potentially endogenous to the reported change in consumption. A_j represents household-head characteristics and, once again, in these regressions, the variables are defined as deviations from the mean. The primary goal of the 2SLS estimation in Equation 7 is to find *consistent estimates* for the impact of the earnings shock at the household level on household expenditures and consumption. The heterogeneous impact of the income shock on different types of households becomes more difficult to measure using 2SLS methodology, since each of the interaction terms need to also be instrumented for in turn in order to get consistent results of this estimation. Hence, the *probit* specification in Equation 6 with the interaction terms is not repeated using the 2SLS estimation.

3. Data

3.1 Data Sources

The main data set used for this paper is the Turkey Welfare Monitoring Survey (TWMS) baseline survey. This is a household-level survey that was designed as a rapid monitoring tool that would give immediate feedback to policymakers on the changes in the income and welfare levels of households during the financial crisis in Turkey. The survey was fielded twice in the same households: in May 2009 (baseline) and in December 2009 (panel). The World Bank and UNICEF provided the funding for the survey, and data collection was carried out by BAREM, a local research firm. We designed this survey with specialized modules that relate to coping strategies and access and utilization of safety nets. In this paper, only the baseline data from this survey are drawn on. However, the baseline survey already had *retrospective* questions that asked households to compare their levels of income, earnings, labor status, consumption, and utilization of education and health services in May 2009 (t_2) with those levels in October 2008 (t_1). In the survey questionnaire, October 2008 was selected as the reference period for most of these comparison questions, since it could be considered the beginning/onset of the crisis in Turkey as far as the macro-figures are concerned.

The sample in TWMS included a total of 2,402 households in seven provinces in Turkey. Five of these provinces encompassed urban city centers (Istanbul, Kocaeli, Izmir, Ankara, Adana), and a sample of 2,102 households was selected using stratified sampling. According to this, 100 PSUs were selected at the city-center level (pooled), with oversampling of poor neighborhoods and random sampling of households within each PSU. The data-sampling process was carried out in collaboration with the Turkish Statistical Institute (TURKSTAT). The weighted estimates of population averages in the urban sample, such as average education-attainment rates, labor-force participation rates, and employment composition by sector, compare closely with estimates provided by TURKSTAT in the official Labor Force (LFS) and the Household Budget Surveys (HBS) for Turkey. The two eastern rural provinces of Erzurum and Gaziantep in the sample covered 300 households. This rural sample was not meant to be representative of a specific area. For the purposes of this paper, the data from rural and urban samples were pooled, and weighting was not used in the regressions, although weights are used for urban observation when representing averages in summary statistics.

The second source of data used in the paper is financial administrative data on “non-cash credit available from banks” in Turkey by province, collected

and compiled by the Turkey Banking Sector Regulatory Agency (BDDK) and made available publicly on its website (www.bddk.org.tr). These data were used to construct the province-level "crisis proxy" variable in the earnings equations as well as the instrument in the 2SLS regressions. Further information on the construction of the crisis-proxy variable is available in the next section.

3.2 Description of Variables

The variables used in the Turkey Welfare Monitoring Survey are described in this section. The variable indicating the income shock at the household level comes from the labor module of the baseline survey (collected in May 2009), and asks the person to compare his or her earnings in the current job with October 2008. (*"Are your earnings in your current job higher, lower, or the same as you were earning in May 2009?")* The dummy variable for the earnings shock takes the value of "1" if (i) the person who was working back in October 2008 answers this question saying his or her earnings are lower in the current job, or (ii) if he reports he was employed as of October 2008 and became unemployed as of May 2009.

The previous labor status of the worker takes only two values in the survey: formal or informal sector employment. Formal-sector employment is defined by social-security coverage in the previous job (Question L11 in survey: *"Did the person have social-security coverage in the previous job?"*). The educational-attainment variables are defined in four categories of educational attainment (and are defined using Questions T12 in the survey *"What is the last diploma the person attained?"*). The four categories of attainment are defined as (i) illiterate or no diploma, (ii) primary-school diploma, (iii) junior- or high-school diploma, and (iv) higher education.

The change-in-consumption (welfare) variable is constructed using the expenditure and coping-strategy modules of the survey. The expenditure module asks whether the household's "expenditure" in each category of spending (food, education, and health) increased, remained the same, or decreased in the first five months of 2009 compared to the same time period in 2008. The coping-mechanisms module includes questions on the household's adaptation in behavior. The responses in this module are binary responses to questions such as *"Since October 2008, have you had to reduce the amount of food consumption in the household?", "Have you had to reduce the amount of food provided to the children?", "Have you had to reduce the utilization of health services?", "Have you had to withdraw a child from school or postpone enrollment?"*. Each of these coping questions was asked with the same time frame (for the period between October 2008 and May 2009), and they provide

binary information on whether the household resorted to this kind of adaptation in consumption behavior during the crisis period. These questions are used in the analysis as robustness checks on the main expenditures-dependent variables for food, education, and health.

The asset-index variable is constructed using household characteristics and assets in the housing module of the survey. The index is based on the Filmer-Pritchett methodology, whereby a principal-components analysis (PCA) is used to differentiate households according to the assets they own (Filmer and Pritchett, 2001). Each of the variables used in the asset index is first checked to see if it correlates positively with the income variable of the household[4]. Factor analysis is run on these household assets and housing characteristics as listed in Table 2, and households are eventually split into five equally-sized groups to create the quintiles separated by the asset index.

The TWMS is a useful and unique data set for quickly measuring the responses of Turkish households to the aggregate macro-shock during the period of the global financial crisis. The main limitation of the data set is that since the survey was designed as a rapid-response monitoring survey, both the income and consumption questions in the survey are based on perceptions of the respondent rather than on detailed income or consumption modules. These questions do not provide an indication of the "levels" of increase or decrease in income and consumption and merely provide dummy variables to be constructed for the shock. One would expect a larger income shock to have a different impact on consumption than a small income shock, though this kind of binary data allows us only to work with probabilities (discrete changes) and not continuous variables of income and consumption levels.

The second main data source used in this paper is the financial-sector data at the province level. The main financial-sector variable used in the construction of the instrument that predicts the severity of the financial crisis experienced at the household level is the rate of change in the amount of non-cash credit available from all banks in the province. Non-cash credit from banks includes (i) letters of credit and (ii) letters of guarantee, particularly necessary for exporting companies to be able to continue their business. This variable was chosen for the construction of the instrument as it is a viable province-level predictor of the probability of receiving an earnings shock at the household level, while not being related to changes in consumption at the household level except through its impact on local companies in the province and the labor income/earnings of workers in the province. Since non-cash credit is

[4] Only variables that are positively correlated with income should be included in the estimation of the asset index.

Table 2. Variables Used in the Construction of the Asset-Index Variable

Housing Characteristics:	**Household Assets:**	
	· Fridge	Cable TV
· Type of housing: (1 "Town House/other" 2 "Basement/tenement" 3 "Single house"	· Electric oven	· Camera
4 "Apartment")	· Microwave	· CD Player
· Number of rooms	· Dishwasher	· Telephone
· Size of housing	· Blender	· Cell Phone
· Source of Water (1 "truck/spring/other" 2 "well" 3 "pipe")	· DVD Player	· PC
· Type of Toilet (1 "pit/other" 2 "sewage")	· Washing machine	· Internet
· Type of Floor (1 "Cement" 2 "Earth" 3 "Marley" 4 "Karo/rudim. wood/other"	· Video Camera	· Private Car
5 "carpet/mosaic" 6 "polished wood")	· Air conditioner	· Taxi Minibus
	· Satellite cable	· Tractor
	· Vacuum cleaner	· Motorcycle
	· TV	· Bicycle
	· Video	· Number of TVs
	·	· Number of Cell Phones
		· Number of Private Cars

provided only to companies and not to households, and does not translate into an increased monetary "liquidity" in the province, this variable is not related directly to the changes in consumption for households. The crisis-proxy variable (X_p) in Equations 3 and 4 that feeds into the definition of predicted probability of receiving the earnings shock is constructed as a "*deceleration*" in the availability of non-cash credit (NCC) from banks in the following way:

$$X_p = \text{Rate of reduction in NCC from banks} \quad (8)$$

$$= (\%\Delta NCC_{p(t0)}) - (\%\Delta NCC_{p(t1)})$$

Here, NCC_p indicates non-cash credit available from banks in the province; t_0 stands for the nine-month period from December 2007 to September 2008; and t_1 stands for the nine-month period from September 2008 through June 2009. A data summary of the changes in the variable of non-cash credit from banks and the calculation of the crisis-proxy variable by province appears in Table 3.

It is important to understand the reason for using "rate of change" in non-cash credit (a *deceleration* variable) rather than a "percentage change" or "level" variable for this indicator. The seven provinces in the data set are different from one another in terms of economic development and financial penetration in the initial conditions; hence, *levels* of non-cash credit cannot be used as a comparison variable for the change in economic conditions. Nor can the "percentage change" in non-cash credit available in these two time periods be used as an indicator variable, since three of the seven provinces still display a positive increase in non-cash credit from banks even in the period September 2008 to June 2009, although the expansion of non-cash credit has slowed as a result of the crisis. As such, using the positive-percentage-change indicator does not sufficiently describe the deceleration in growth taking place in these provinces. It was essential, therefore, to *de-trend* the growth trajectory in this variable and look at the *rate of change* in non-cash credit, comparing the growth in this variable in t_1 with growth in t_0.

4. Empirical Results

4.1 Summary Statistics

A large percentage of households in the TWMS sample report a reduction in household income in the first eight months of the crisis. Of the total sample of 2,402 households, 16.6% of them report that the head of household had lower earnings in his or her main job (or had lost a job) between October 2008

Table 3. Administrative Data on Non-cash Credit from Banks, by Province in Turkey

				A	B	B-A
	December-07	September-08	June-09	(% change in noncash credit from banks in province Dec 2007- Sep 2008.)	(% change in non-cash credit from banks between Sep 2008 and June 2009)	Xp = Rate of reduction in non-cash credit available from banks
ADANA	1,468,413	1,883,069	1,719,041	-8.71%	28.24%	36.95%
ANKARA	19,481,350	24,677,791	31,753,881	28.67%	26.67%	-2.00%
ERZURUM	165,603	195,135	183,117	-6.16%	17.83%	23.99%
GAZİANTEP	1,450,283	1,845,386	2,055,470	11.38%	27.24%	15.86%
İSTANBUL	50,478,581	62,978,770	66,351,274	5.35%	24.76%	19.41%
İZMİR	4,317,569	5,522,260	5,128,869	-7.12%	27.90%	35.03%
KOCAELİ	2,356,751	2,696,476	2,252,427	-16.47%	14.41%	30.88%
TURKEY (TOTAL)	**94,469,968**	**117,128,527**	**126,756,979**	8.22%	23.98%	15.76%

Note: X_p= (% change in non-cash credit from banks between Sep 2008 and June 2009) - (% change in noncash credit from banks in province in Dec)

Data source Turkey Banking Sector Regulation Agency (BDDK)

Table 4. Summary Statistics for Changes in Household Income (Oct 2008-May 2009)

			Observations	Mean	Std. Err	Binomial Dist. [95% Conf. Interval]	
TOTAL in SAMPLE	**TOTAL**	Lower earnings for HHhead in May 2009 when compared to Oct 2008	2,402	16.6%	0.0076	15.1%	18.1%
		Reduced wage income (at HH level)	2,402	13.3%	0.0069	11.9%	14.7%
		Reduced Self-employment income (at HH level)	2,402	7.3%	0.0053	6.3%	8.4%
		Reduced income from Pensions (at HH level)	2,402	2.8%	0.0034	2.2%	3.6%
		Reduced income from Private Transfers and Remittances (at HH level)	2,402	1.5%	0.0025	1.1%	2.1%
By Employment Status of Household Head (as of October 2008)	**Employed formally**	Lower earnings for HHhead in May 2009 when compared to Oct 2008	963	27.2%	0.0143	24.4%	30.1%
		Reduced wage income (at HH level)	963	15.0%	0.0115	12.8%	17.4%
		Reduced Self-employment income (at HH level)	963	10.1%	0.0097	8.2%	12.1%
		Reduced income from Pensions (at HH level)	963	0.7%	0.0027	0.3%	1.5%
		Reduced income from Private Transfers and Remittances (at HH level)	963	0.5%	0.0023	0.2%	1.2%
	Employed informally	Lower earnings for HHhead in May 2009 when compared to Oct 2008	323	42.1%	0.0275	36.7%	47.7%
		Reduced wage income (at HH level)	323	22.3%	0.0232	17.9%	27.2%
		Reduced Self-employment income (at HH level)	323	14.6%	0.0196	10.9%	18.9%
		Reduced income from Pensions (at HH level)	323	2.2%	0.0081	0.9%	4.4%
		Reduced income from Private Transfers and Remittances (at HH level)	323	1.5%	0.0069	0.5%	3.6%
	Not working	Lower earnings for HHhead in May 2009 when compared to Oct 2008	-	-	-	-	-
		Reduced wage income (at HH level)	1,116	9.2%	0.0087	7.6%	11.1%
		Reduced Self-employment income (at HH level)	1,116	2.8%	0.0049	1.9%	3.9%
		Reduced income from Pensions (at HH level)	1,116	4.8%	0.0064	3.7%	6.3%
		Reduced income from Private Transfers and Remittances (at HH level)	1,116	2.4%	0.0046	1.6%	3.5%

Data source: Turkey Welfare Monitoring Survey (May 2009)

and May 2009. Among households where the household head is employed informally, the percentage reporting at least one person with lower earnings is much higher, at 42.1%. Table 4 provides summary statistics on reduced reported earnings at the household level by sector of employment (as of October 2008) of the household head.

In the rapid-monitoring survey sample, Turkish households most frequently report decreases in food expenditures and consumption, while expenditures on education and health services in the face of the crisis remain more stable (or increase). In the expenditures module of the survey, households are asked if they have had to reduce expenditures on certain items. Roughly 43.5% of households in the sample respond that they have cut down on their spending for food items during the October 2008-May 2009 period. In comparison, only 8.9% of households claim to have spent less on education, and 14.4% say the same about their health expenditures (see Table 5).

In the coping-strategies module of the survey, households are then questioned about whether they have had to change certain forms of behavior since the onset of the crisis, and again we see significant adjustments in food-consumption behavior: 70.9% of the households mention having "substituted into cheaper food items," 56.8% say they "have reduced the amount of food consumed," and a worrying 24% admit having had to "reduce the amount of food provided to children" in the household. Health-care utilization falls for about one-fifth of the sample of households: 20.5% report less use of health-care services, and 18.7% state they have turned to preventive-care services less since the onset of the crisis. Educational enrollments are for the most part protected through this time period: less than 3% of households report "withdrawing children from school/postponing admission to school," or "transferring children to a cheaper public or private school" (see summary statistics in Table 5).

Reductions in food consumption and expenditures are more likely for the poorest households in the sample, as predicted by the model presented in the conceptual framework. The overall changes in food, education, and health expenditures are depicted in non-parametric form in Figure 4. In these figures, the y-axis varies between -1 and 1, and the dependent variable takes three values: 1 if expenditures in this category have increased, 0 if they have remained the same, and -1 if they have decreased in the first months of 2009 when compared to the first five months of 2008. As reported in the top left-hand panel of Figure 4, most households in the sample report reductions in food expenditures in this time period, and the likelihood of such reporting increases with lower levels of the asset index. In other words, as predicted by the model, poorer households are more likely to report reductions in their food

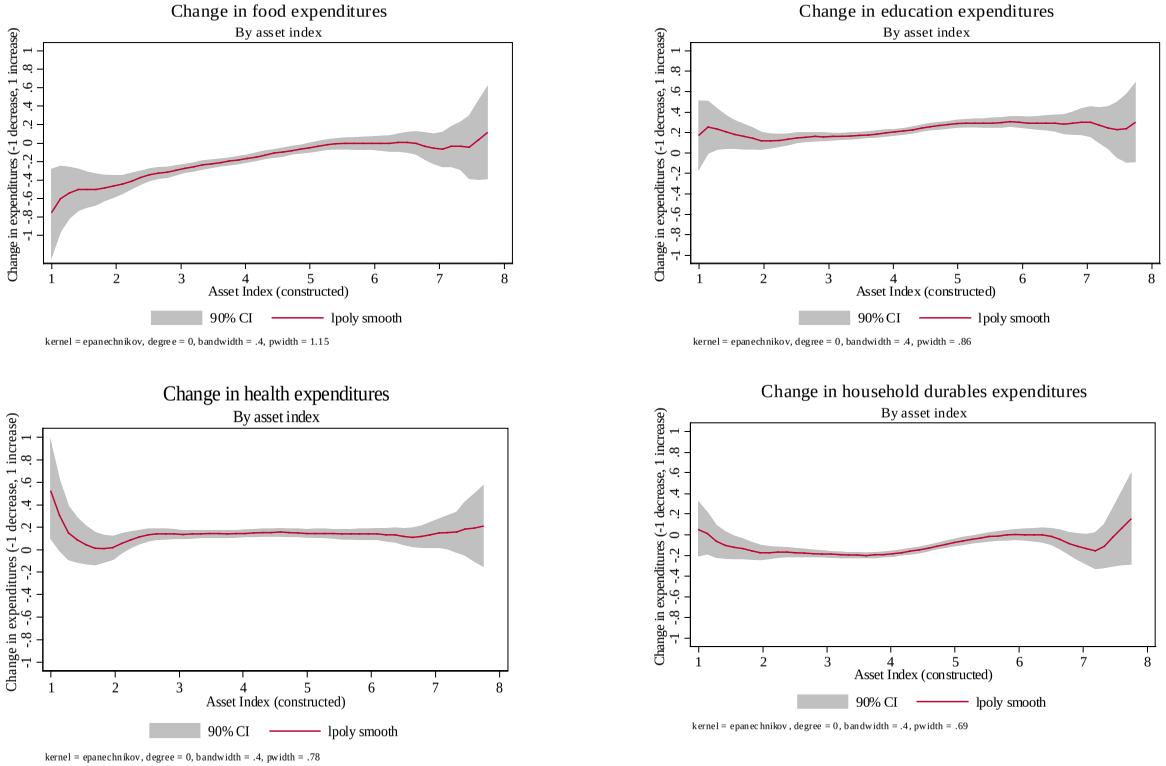
Table 5. Summary Statistics for Changes in Household Consumption and Welfare through the crisis

	Observations	Mean	Std. Err	Binomial Dist. [95% Conf. Interval]	
Changes in Expenditures (compare Jan-May 2009 to Jan-May 2008):					
Reduced expenditures on food	2,402	43.5%	1.01%	41.5%	45.5%
Reduced expenditures on education	2,402	8.9%	0.58%	7.8%	10.1%
Reduced expenditures on health	2,402	14.4%	0.72%	13.1%	15.9%
Reduced expenditures on household durables	2,402	22.1%	0.85%	20.5%	23.8%
Changes in Consumption and Welfare (Oct 2008-May 2009)					
Food related:					
Decreased amount of food consumption	2,402	56.8%	1.01%	54.8%	58.8%
Substituted into cheaper food items	2,402	70.9%	0.93%	69.0%	72.7%
Were short of money and had to "stretch" food consumption	2,402	51.0%	1.02%	49.0%	53.1%
Had to reduce the amount of food for your children?	2,402	24.0%	0.87%	22.3%	25.8%
Education related:					
Withdrew/postponed admission to school, private high school, or kindergarten.	2,402	2.7%	0.33%	2.1%	3.4%
Transferred children to cheaper public or private school	2,402	1.0%	0.21%	0.7%	1.5%
Health related:					
Reduced the use of health services	2,402	20.5%	0.82%	18.9%	22.2%
Reduced visits to the doctor for preventive medical checkups	2,402	18.7%	0.79%	17.1%	20.3%

Data source: Turkey Welfare Monitoring Survey (May 2009)

Figure 4. Changes in Expenditures, by Category

The y-axis indicates a decrease in expenditures (-1) , no change in expenditures (0), or an increase in expenditures (+1) as a categorical variable. The time frame for the changes in expenditures is January-May 2009; expenditure levels on these items compared to January-May 2008.



Data source: Turkey Welfare Monitoring Survey (May 2009)

expenditures. Changes in expenditures on education, health care, and household durables are also provided in the other panels of this figure. For the lowest values of the constructed-asset index, the mean of the categorical variable indicating changes in food expenditures is about -0.8 (on a range of -1 to 1). By contrast, in the same time period, education expenditures are likely to *increase* for the poorest as well as the richest households in the sample. The mean of the categorical variable on change in expenditures is around 0.2 for education expenditures. The change in health expenditures is also on average *positive* for the poorest asset households, and we observe little change in expenditures on household durables, where the mean level of change hovers around zero for all wealth levels.

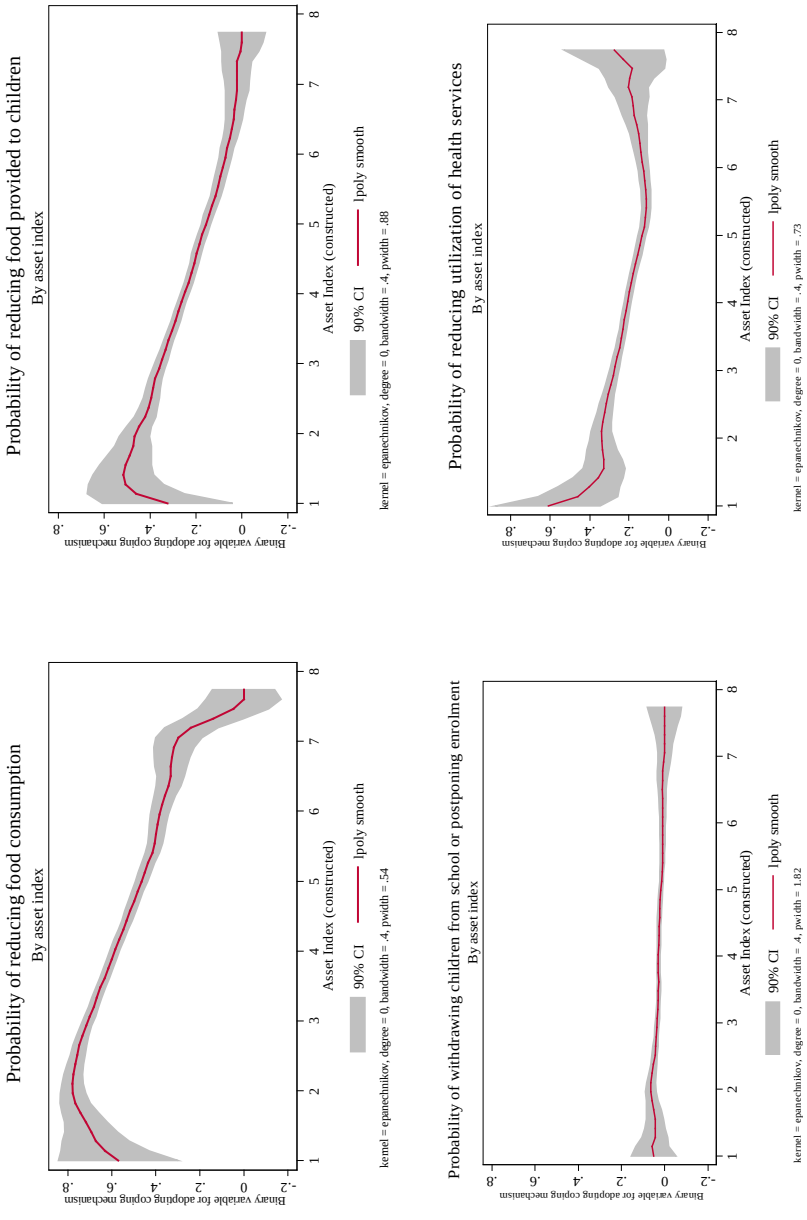
The insights we gain from Figure 4 are also confirmed by responses to other consumption-related questions in the coping-strategies module of the survey; these relate to food consumption and utilization of education and health services throughout the crisis period. Specifically, the respondents are asked whether they have had to change or adapt their behavior in certain respects in the October 2008-May 2009 period. Their responses are coded as dummy variables and plotted against the asset index in Figure 5. The y-axis in this figure varies between 0 and 1 and provides the predicted probability of adopting a certain change in behavior through the crisis period by levels of the asset index. In the top panels of the figure, we observe that the probability of reducing food consumption is highest for the poorest asset holders in the sample, with the predicted probability varying between 60% and 80% for the lowest levels of the asset index. The probability of reducing the amount of food provided to children is also around 40-50% for the poorest in the sample. In fact, only the very top levels of the asset index report no changes in food consumption and no need to reduce the amount of food provided to children, where the predicted probability of reducing food consumption hits zero (see Figure 5 top two panels).

4.2 Main Results

4.2.1 Changes in household-level earnings given the macro-shock

The probability of reporting reduced earnings for all workers (and for workers that are also household heads) is linked closely to the macro-level shock at the province level. The results of the earnings regressions that show the heterogeneous impact of the macro-shock on workers by sector of employment and educational attainment—as stated in Equations 3 and 4—are provided in Table 6. In the specification in Equation 3, where only the level effects of worker characteristics are considered, a 100% increase in the mac-

Figure 5. Probability of Adopting Certain Coping Strategies, by Household Asset Index



Data source: Turkey Welfare Monitoring Survey (TWMS)

Table 6. Link between the Macro-Shock and Household-Level Income Shock: probability of getting shock to earnings given province level macro-shock and worker characteristics- Reporting marginal effects from the Probit Regressions. (Refer to equations (3) and (4) in empirical specifications)

Dependent variable:	Earnings are lower in May 2009 compared to Oct 2008[16]			
	All workers in sample		Workers in sample who are also household heads	
	(1)	(2)	(3)	(4)
Crisis proxy at province level	0.294***	0.303***	0.377**	0.381**
	(0.0937)	(0.106)	(0.150)	(0.161)
Educ: Illiterate or no schooling	0.141**	0.271**	0.138**	0.380
	(0.0649)	(0.125)	(0.0657)	(0.248)
Educ:Primary School	0.166***	0.170***	0.186***	0.154**
	(0.0366)	(0.0620)	(0.0415)	(0.0648)
Educ: Junior or Senior High School	0.0649*	0.0305	0.0937*	0.0352
	(0.0341)	(0.0353)	(0.0492)	(0.0494)
Labor status of worker: Informal	0.126***	0.0581*	0.160***	0.0847
	(0.0210)	(0.0301)	(0.0396)	(0.0843)
Crisis proxy X Illiterate or no schooling		-0.588		-0.936
		(0.424)		(0.878)
Crisis proxy X Primary School		-0.0133		0.168
		(0.246)		(0.243)
Crisis proxy X Junior or Senior High School		0.163		0.292*
		(0.128)		(0.159)
Crisis proxy X Informal Status		0.321**		0.357
		(0.143)		(0.321)
Observations	1,889	1,889	1,163	1,163

Robust standard errors in parentheses (clustered at the province level) *** p<0.01, ** p<0.05, * p<0.1

[16] Definition of lower earnings includes those workers who were employed in October 2008 and subsequently lost their jobs and were unemployed by May 2009.

ro-shock variable at the province level is associated with a 29.4-percentage-point increase in the probability of reporting reduced earnings for workers who are employed formally and have a higher-education degree (p value < 0.01) (Table 6, Column 1). For the sub-sample of workers who are also household heads, the association between the macro-shock and the probability of reduction in earnings is even stronger, with a coefficient of 37.7 percentage points (p value < 0.05) (Table 6, Column 3) for formally employed workers with degrees in higher education. Workers employed in the informal sector as of October 2008 and those with lower levels of education are more likely to have received a shock to their earnings. Being an informal worker is associated with an *increase* in the probability of reduction in earnings by 12.6 percentage points. Having no formal education is associated with an increase in the probability of reduced earnings by 14.1 percentage points in the sample of all workers (and 13.8 percentage points in the sample of household-head workers) when compared to those with higher-education degrees. Those with only primary-school diplomas are 16.6 percentage points (18.6 percentage points in the sample of household heads) more likely to report reductions in earnings in this time period. Thus, a worker who has a primary-school degree and is informally employed as of October 2008 in the sample is 29.2 percentage points more likely to report reductions in income during this time period, compared to someone who is formally employed and holds a higher-education degree.

The interaction terms in the specification (Table 6, Columns 2 and 4) show the heterogeneous impact of the crisis on different types of workers: workers employed informally are 32.1 percentage points more likely to experience lower earnings, with a 100% increase in the crisis proxy at the province level (rate of reduction in non-cash credit available from banks). Therefore, it is possible to observe the heterogeneous impact of the crisis: for workers who are informally employed, there is a level effect as well as a slope effect associated with the crisis whereby the province-level macro-shock causes a higher probability of reduced earnings for such workers (see Table 6, Column 2). In the sample of workers who are also household heads, having a middle-school diploma in the presence of the macro-shock (or with increased intensity of the macro-shock) is associated with lower earnings as well when compared to university graduates, though the coefficient here is only significant at the 90% confidence level (see Table 6, Column 4).

In the change-in-earnings regressions in Table 6, we observe that of all workers in the sample, the crisis has more of an impact on informal workers. The interaction term between the crisis (macro-shock) proxy variable and the dummy variable for being an informal worker takes on a positive and signifi-

cant value. This is likely because, for workers with formal-sector jobs, the severance pay is high, and there is no mechanism for the renegotiation of salaries[5]. Throughout the crisis, therefore, informal workers are more likely to both lose jobs and to get lower pay for the same amount of work, as they are less protected in their jobs[6].

4.2.2 Changes in household expenditures, given the earnings shock at the household level

The probability of a household reducing its food expenditures can in turn be linked closely to the earnings shock at the household level. This is demonstrated in the results, first in the form of a maximum likelihood *probit* regression.

Probit results

The results of the empirical specification provided in Equations 5 and 6 are given in Table 7 for the three categories of expenditures (i) food, (ii) education, and (iii) health expenditures. The dependent variables in these *probit* regressions are the dummy variables for reducing expenditures on these items in the first five months of 2009, compared to the first five months of 2008[7]. The first two columns of the table provide findings for the dependent variable on reducing food expenditures. In these regressions, the coefficient on the dummy variable for the reduction in earnings for the household head, denoted by β_1 in Equation 5, takes the value of 0.152 ($p < 0.01$) when controlling for the urban/rural location of the household, household-head educational status, and household-asset index. In other words, a household where the household head experiences an earnings shock (between October 2008 and May 2009) is 15.2 percentage points more likely to reduce its expenditures on food in the first five months of 2009, compared to the same period a year earlier, and in

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5 Note that Turkey has one of the most generous severance-pay mechanisms in the world, as ranked by Holzmann et al. (2011).

6 Also note that informality is more common among women in Turkey: only 9% of women employed were formally employed in 2010, while about 37% of men were in formal employment (Source: Turkey Labor Force Survey 2010, for workers ages 15+). When we limit the sample to household heads who are workers, rather than all workers, we get more of the male workers in the sample, as household heads are predominantly men. Consequently, it becomes more difficult to observe in the data the heterogeneous impact of the crisis on informal workers when we look at household-head workers only.

7 Turkey experienced positive inflation through the time period analyzed. Hence, the households that reported no change in "expenditures" on a certain item should actually be experiencing a "reduction" in consumption (in terms of the quantity of the good consumed). In this sense, the estimates reported are an "underestimate" of the impact of the macro-shock on changes in consumption.

Table 7. Changes in Food, Education, Health, and Durables Expenditures -
Reporting marginal effects from Probit Regressions
(Refer to equations (5) and (6) in empirical specifications)

VARIABLES	Reduced food expenditures		Reduced education expenditures		Reduced health expenditures	
	(1)	(2)	(3)	(4)	(5)	(6)
Lower earnings	0.152***	0.143***	0.009	0.016	0.028	0.025
	(0.034)	(0.034)	(0.019)	(0.018)	(0.028)	(0.028)
Urban location	-0.081*	-0.011	0.021	0.041	0.041	0.019
	(0.046)	(0.079)	(0.030)	(0.052)	(0.033)	(0.041)
Educ: Illiterate or no schooling	-0.062	-0.215	0.054	0.071	-0.001	-0.001
	(0.111)	(0.135)	(0.052)	(0.072)	(0.062)	(0.082)
Educ: Primary School	0.124**	0.035	0.066**	0.098***	0.047	0.052
	(0.052)	(0.059)	(0.031)	(0.035)	(0.033)	(0.040)
Educ: Junior or Senior High School	0.091*	0.040	0.042	0.049	0.046	0.037
	(0.052)	(0.056)	(0.029)	(0.034)	(0.031)	(0.037)
Asset Index	-0.061***	-0.095***	-0.010	-0.006	-0.026*	-0.018
	(0.020)	(0.024)	(0.011)	(0.013)	(0.014)	(0.019)
Earnings shock X Urban		-0.031		-0.006		0.059
		(0.106)		(0.073)		(0.075)
Earnings shock X Illiterate or no schooling		0.165		-0.150		-0.028
		(0.190)		(0.107)		(0.128)
Earnings shock X Primary School		0.114		-0.161***		-0.019
		(0.124)		(0.057)		(0.072)
Earnings shock X Junior or Senior High School		0.069		-0.054		0.034
		(0.119)		(0.057)		(0.075)
Earnings shock X Asset index		0.059		-0.025		-0.031
		(0.036)		(0.019)		(0.027)
Number of children in HH younger than age 15 (age <=14)		0.031*		0.009		0.004
		(0.016)		(0.008)		(0.010)
Number of adults in HH (age >14) (non-children)		0.046***		0.021***		0.008
		(0.014)		(0.007)		(0.011)
Observations	1,163	1,163	1,163	1,163	1,163	1,163

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

comparison to households with similar characteristics but where the household head does not get an earnings shock[8].

As the level of the asset index increases (and the household becomes wealthier), the probability of lowering expenditures on food declines (Column 1). Households where the household head only holds a primary- school degree or middle- or high-school degree are more likely to report drops in food expenditures in this time period, compared to household heads with a higher-education degree.

In the second column of results in Table 7, the same specification is run including the interaction terms between household characteristics and the earnings shock, thus including slope effects following Equation 6 in the specification. The coefficient β_1 is 0.143 when controlling for interaction terms[9].

The household-composition variables—number of adults and children in the household—are also positively associated with the probability of lower food expenditures at the household level. The coefficients on interaction terms would indicate the heterogeneous way in which households respond to an income shock at the household level. The coefficients on these variables (β_3) are generally not significant, although the level effects associated with the asset index and low levels of education remain significant. This suggests that the poor are more likely to lessen their food consumption overall in this time period. However, the existence of the income shock at the household level does not necessarily bring about different probabilities of reducing food expenditures for different types of households. On the other hand, the earnings shock is not associated in these *probit* regressions with reduced levels of expenditures on health and education (represented in Table 7, Columns 3-6). In

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[8] The definition of the earnings shock at the household level included both lower earnings in the current job, as well as a shock to earnings as a result of a job loss. In order to see how a job loss may be differently associated with the changes in food expenditures, separate regressions with different earnings-shock variables were also run. When the earnings shock is defined only in terms of a job loss, this impacts only 2.4% of household-head workers in the sample, while a reduction in earnings in the current job impacts 32.7% of household-head workers. The sample for which we observe a job loss is very small, and this variable does not take on a significant coefficient in the regressions. On the other hand, the coefficient on the earnings shock resulting from lower earnings in the current job (14.1 with p-value < .01) is very similar to the original coefficient on the earnings-shock variable (which was 14.3 with p-value < 0.01 in Table 7).

[9] The model here may contain a number of equations, and the error terms across the equations may be correlated, since spending decisions are jointly decided. As a robustness check, a seemingly unrelated regression (SUR) system with food, education, health, and durables expenditures is set up whereby decisions on these expenditures are made concurrently. The results are robust to this estimation: the coefficient on the earnings shock changes from 14.3 (p-value < 0.01) to 13.7 (p-value < 0.01).

households where the household head only holds a primary- or middle- or high-school degree, compared to a higher-education (university) degree, there is a higher likelihood of reducing education expenditures through this time period. However, in the wake of an income shock, these groups are less likely to reduce education expenditures in comparison to households where the household head holds a university degree.

2SLS and IVprobit estimation results

Next, the paper implements a 2SLS instrumental-variables estimation (as described in Equation 7 of the empirical specification) in order to get more consistent results for the coefficient for the earnings-shock impact on changes in expenditures on food and other items. As described in the empirical-strategy section, one may suspect two types of problems leading to inconsistency in the results: first, in the *probit* results, the responses to the reduction-in-expenditures questions and the income/earnings questions in the survey may be correlated as a result of people's *aversion to cognitive dissonance* and their desire to be consistent in their responses to the survey. Second, given that changes in earnings are not objectively measured and that they are subjective-recall questions asking the household to evaluate changes to their expenditures, there may be significant errors in the measurement of the earnings shock, leading to "attenuation bias" in the coefficient β_1 in Equation 5.

The 2SLS specification given in Equation 7 is provided in Table 8. The coefficient on the predicted probability of having reduced earnings at the household level (φ_1) is significant in the regressions, where only intercept effects are controlled for (as in Equation 7). The 2SLS results where the dependent variable is the dummy variable for reducing food expenditures are reported in Column 1 of Table 8 with robust standard errors. The coefficient on the predicted probability of lower earnings in the household is 0.333 (p value < 0.1), meaning that an earnings shock in the household increases the probability of reducing food expenditures by 33.3 percentage points. In Column 2 of Table 8, the same specification is run using an IV*probit* estimator, which is a more suitable functional form, given that the dependent variable in the regressions (reduction in various expenditures categories) is defined as binary. The marginal-effects coefficient for (φ_1) in the IVprobit estimation is 0.33 (p value < 0.1) with robust standard errors.

The asset index in these instrumental-variables estimations again takes on a large and highly significant coefficient, indicating that the initial wealth level of the household is important in determining the probability of reduction in food expenditures. The size of the coefficient for the earnings shock at the household level using the 2SLS and IVprobit estimations (φ_1) is higher than

Table 8. Changes in Food, Education, and Health Expenditures (IV Regressions - Marginal Effects)

(Refer to equation (7) in empirical specification)

	Reduced food expenditures			Reduced education expenditures			Reduced health expenditures		
	(1) 2SLS	(2) IV *Probit* mfx	(3) First stage results	(4) 2SLS	(5) IV *Probit* mfx	(6) First stage results	(7) 2SLS	(8) IV *Probit* mfx	(9) First stage results
Lower earnings	0.333*	0.330*		0.005	-0.001		-0.071	-0.070	
	(0.193)	(0.170)		(0.114)	(0.136)		(0.124)	(0.114)	
Urban location	-0.032	-0.028	-0.232***	0.021	0.018	-0.233***	0.015	0.012	-0.234***
	(0.081)	(0.081)	(0.058)	(0.046)	(0.050)	(0.058)	(0.050)	(0.051)	(0.058)
Educ: Illiterate or no schooling	-0.120	-0.113	0.175*	0.044	0.057	0.175*	0.017	0.029	0.175*
	(0.103)	(0.105)	(0.095)	(0.064)	(0.066)	(0.095)	(0.066)	(0.075)	(0.095)
Educ: Primary School	0.068	0.076	0.207***	0.058*	0.069	0.207***	0.064	0.073	0.207***
	(0.065)	(0.070)	(0.043)	(0.035)	(0.044)	(0.043)	(0.042)	(0.048)	(0.043)
Educ: Junior or Senior High School	0.056	0.066	0.115***	0.030	0.043	0.115***	0.050*	0.059	0.115***
	(0.048)	(0.055)	(0.040)	(0.025)	(0.034)	(0.040)	(0.030)	(0.037)	(0.040)
Asset Index	-	-0.069***	0.053***	-0.010	-0.010	0.053***	-0.021	-0.021	0.052***
	(0.020)	(0.019)	(0.017)	(0.011)	(0.012)	(0.017)	(0.013)	(0.014)	(0.017)
Crisis proxy at province level			0.298***			0.310***			0.319***
			(0.100)			(0.117)			(0.098)
Labor status of worker: Informal			0.156***			0.153***			0.151***
			(0.035)			(0.041)			(0.038)
Constant	0.276***		0.285***	0.088*		0.283***	0.148**		0.281***
	(0.067)		(0.022)	(0.040)		(0.025)	(0.044)		(0.022)
Observations	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163	1,163
R-squared	0.029			0.008					

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

the size of the coefficient in the *probit* estimations β_1. This suggests that the attenuation bias resulting from measurement error dominated the direction of the bias in the maximum-likelihood *probit* results presented in Table 7. The same specification as in Equation 7 is run for education and health expenditures in Columns (4-9) of Table 8, and 2SLS and IVprobit results are presented with the first-stage regressions. None of the earnings-shock variables are significant in these regressions, once again establishing that the income shock did not lead to a reduction in education or health-care expenditure for the households.

Tests of exclusion restrictions

Several tests are reported here documenting the performance of the instrumental variables used in the analysis:

Testing for the relevance of the instruments: In order to test the relevance of instruments, we need to establish that the instrumental-variables matrix is correlated with the earnings shock at the household level, formally $E(Z'Y) \neq 0$. The first-stage results (reported in Table 7, Column 3) suggest that both of the instruments are highly correlated with the earnings-shock variable at the household level. The partial correlation coefficient of the crisis proxy is 0.298 (with p-value < 0.01), and the partial correlation coefficient on the informal labor status of the household head is 0.156 (with p-value < 0.01) in the first-stage regressions (with robust standard errors). The F test of excluded instruments has the value 16.14 in the 2SLS regression, which is above the rule-of-thumb value of 10 and allows us to reject the hypothesis of weak instruments.

Testing for the validity of the instruments: To establish the validity of the instruments, we need to show that the instrumental-variables matrix is uncorrelated with the error term, $E(Z'u)$. In other words, the only way the instruments can influence the outcome variable (changes in expenditures) is through their impact on change in earnings. The exclusion restriction can be tested, since there are more excluded instruments than endogenous regressors in this overidentified model. The Sargan statistic (implemented under the assumption of i.i.d. errors) fails to reject the validity of the excluded instruments: the Sargan statistic has a value of 0.396 and has a Chi2 (1) distribution with a p-value of 0.5292 in the 2SLS results[10]. Alternatively, to drop the i.i.d. assumption, we

[10] The Sargan test statistic is computed using the estat overid command after the 2SLS estimation using ivregress in STATA. The test of overidentifying restrictions regresses the residuals from the 2SLS regression on all instruments in Z. Under the null hypothesis that all instruments are uncorrelated with u, the test has a large-sample Chi2(r) distribution, where r is the number of overidentifying restrictions, in this case 1.

run the Hansen's test (following a GMM estimation of the same model)[11]. The Hansen's J test statistic here is chi2 (1) = 0.387839 (p-value = 0.5334), once again *failing to reject* the null hypothesis that the instruments are valid. The rejection of the null hypothesis in the Hansen-Sargan test could be interpreted as at least one of the instruments being invalid.

Testing for endogeneity: Next, we implement a test of the endogeneity of the earnings-shock variable in the *probit* regressions of Equation 5. Under the null hypothesis that the earnings-shock variable is exogenous, the robust Durbin-Wu-Hausman test[12] is implemented and gives a p value of 0.307. The test fails to reject the null hypothesis that the earnings-shock variable in the regular OLS regressions is exogenous. While the endogeneity of the earnings shock in the model is now less of a concern, there is still a strong concern related to the measurement error in the earnings-shock explanatory variable in Equation 5; for that reason, using the 2SLS estimation to get consistent estimates of the coefficient on the earnings shock is still a suitable strategy.

Testing for underidentification: This test is essentially the test of the rank of a matrix. Under the null hypothesis that the equation is underidentified, the Anderson canon. corr. LM statistic has a value of 31.6. Under the null, the statistic is distributed as Chi2 (2), and we can reject the null hypothesis indicating that the model is identified with p-value equal to zero. The rejection of the null indicates that the matrix is full-column rank and that the model is identified.

4.3 Robustness Checks

The results on changes in food-expenditure patterns are also robust to different dependent variables that describe food-consumption behavior. Robustness checks for the same empirical specification as in Equation 7 are run using four different dependent variables in this section of the analysis, still revealing a strong link between the income shock at the household level and the changes in food-consumption levels[13].

The results of the 2SLS and IVprobit regressions with food-consumption-dependent variables are provided in Table 8. The results (following specifica-

[11] Hansen's test is implemented with the post-estimation estat overid command following the ivregress gmm command for an overidentified model.

[12] The Durbin-Wu-Hausman test is implemented using the post-estimation command estat endogenous following the 2SLS estimation using ivregress.
Durbin-Wu-Hausman F(1,1155) = 1.04429 (p = 0.3070)\par.

[13] The dependent variables in this section of the analysis are based on the coping-mechanisms module of the survey, where households are asked if they have had to change certain behavioral patterns between October 2008 and May 2009 to cope with the crisis.

tion in Equation 7) show that households that face an earnings shock in this time period also have a higher likelihood of "reducing food consumption," "substituting into cheaper food items," and "reducing the amount of food provided to children." A shock to the earnings of the household head is associated with a 79.8-percentage-point (p value < 0.01) increase in the probability of "reducing food consumption" and a 45.2-percentage-point (p value < 0.05) increase in the probability of "reducing the food amount provided to children" in the 2SLS estimation when controlling for household characteristics such as urban/rural location, educational attainment of the household head, and the asset index. Urban households and households with a lower asset index have a higher likelihood of changing food consumption behavior in these regressions. These households also report substituting into cheaper food items with a 55.1-percentage-point higher probability (p value < 0.01). The asset index takes on a highly significant and large partial correlation coefficient in these 2SLS regressions, with a one-unit increase in the asset index being associated with a 14.2-percentage-point rise in the likelihood of reducing food consumption, and a 14.9-percentage-point uptick in the likelihood of reducing the amount of food provided to children (both with a p-value < 0.01)[14]. The IVprobit marginal-effects results are provided in the same table for comparison with 2SLS results.

Finally, the 2SLS and IVprobit estimations using Equation 7 are provided for these education and health utilization variables. The 2SLS results show no apparent link between the earnings shock and changes in education enrollments, while there is a strong association between the earnings shock and reduced health-care utilization of curative care at the household level[15].

These regressions show that an earnings shock at the household level is associated with no change in educational enrollments or use of preventive health-care services (though there is some reduction in the utilization of curative health-care services after an income shock). In general, though, when dealing with an income shock, households are less likely to change their consumption of education and preventive health-care services than they are to adjust their consumption of food. The reduction in demand for these mostly publicly-provided services (that already made up a small share of the house-

[14] Note that the asset index takes on values between 1 and 7.73 in the sample. Hence, between the poorest and richest households in terms of assets, there is a 6.73-unit difference in the measurement of the asset index.

[15] The results are robust to an IVProbit estimation using Newey's minimum chi-squared estimator with the two-step option. In fact, the income shock gets an even higher coefficient (0.878 with p-value < 0.10) in the two-step IVProbit regression (not reporting marginal effects) compared to 0.861 (with p-value < 0.10) in the regular IVProbit estimation.

hold budgets in the baseline, Table 1) was smaller than the reduction in demand for food throughout this time period.

Further robustness checks were run using different definitions for the income-shock variable, such as (i) the proportion of breadwinners in the household as the income-shock variable at the household level, and (ii) a dummy variable that takes the value of 1 if anyone in the household has received an earnings shock (rather than just the household head). The findings with regard to changes in food consumption are robust to these different specifications of the income-shock variable. When the earnings shock is defined as at least one individual in the household experiencing lower earnings since October 2008, this variable is associated with an 8.9-percentage-point jump in the likelihood of reduction of food expenditures. When the variable is defined as "the proportion of breadwinners in the household reporting lower incomes," then a 100% increase in this variable is associated with a 10.6-percentage-point run-up in the probability of decreasing food expenditures. Both of these coefficients are statistically significant (with p-values < 0.01); however, the size of the coefficients under these definitions is lower than when the earnings shock is defined as the household head worker receiving a shock to his earnings.

5. Conclusion

Food expenditures, which as of 2008 made up 44% of the household budget for the poorest expenditure decile, acted as the main adjustment mechanism for those reeling from the income shock in Turkey, while education and health expenditures remained relatively stable. Households managed to cut down on their spending on food either by substituting into cheaper food products or, directly, by reducing their consumption of food. About 71% of the households in the sample reported substituting consumption into cheaper food items, and 57% reported directly decreasing the amount of food consumption. In parallel, 24% of the households reported reducing the amount of food provided to children in the survey period. The income shock at the household level was associated with a decline in food consumption and expenditures, while education and health-care utilization were more protected, even with the backdrop of an economic crisis.

In the maximum-likelihood *probit* regressions, the dummy for the income shock to household earnings is associated with a 16.2-percentage-point increase in the probability of reporting reduced expenditures on food between October 2008 and May 2009. Due to measurement error in the earnings-shock explanatory variable in these regressions, though, there is likely to be attenuation bias in the maximum-likelihood *probit* results. This bias is corrected with

a 2SLS and IVprobit strategy, which consistently estimates the probability of reduction in food consumption. In the aftermath of an income shock, the probability of reducing food expenditures goes up by 33.3 percentage points, and the probability of reducing food consumption soars 79.8 percentage points in the 2SLS model. The probability of "reducing the amount of food provided to children" is raised by 45.2 percentage points after a shock to the earnings of the household head. Through the period analyzed in the survey, the probability of reducing food consumption is highest among those poor that initially had low levels of household assets. While food expenditures and consumption provide the main buffer for households affected by the crisis, there is little or no change in the education and health expenditures of households, and the educational enrollment of children or the utilization of preventive health-care services after having sustained an income shock at the household level remains stable.

Given that food consumption was the main buffer for these households between them and the trauma of the income shock and, as a result, we see the amount of food provided to children being reduced, it may be possible to consider in times of such crises to expand in-kind distribution of food to children through school feeding programs for a limited time period. Such programs could be an effective social safety net, reducing the medium- to long-term negative effect of the crisis on children's nutrition and physical/cognitive development, while also having a beneficial impact on school analysis rates (Bundy and Grosh, 2009). However, such programs can also be highly costly and administratively burdensome, so it is important to ensure they are designed in a cost-effective and sustainable way, perhaps with a time limit, i.e., the duration of the macro-shock.

The analysis in the paper can be expanded in several ways in order to better analyze policy options. First of all, one could look at whether there have been changes to household assets over time as a result of the income shock. While consumption may serve as a buffer against the earnings shock in the short term, households may only begin to run down their assets in the medium term if the earnings shock persists (Fafchamps et al., 1998). The second round of the Turkey Welfare Monitoring Survey was collected as a panel survey in December 2009 (with retrospective questions going back to May 2009), and these data (following the same households over time) would enable us to answer questions regarding the changes in assets where the income shock persists for several months. The household-assets module, as well as the module on household savings and debt in this survey questionnaire, would be invaluable inputs for researching the medium-term impact of the crisis on household assets.

A second way in which the analysis in this paper might be expanded would be to work with the safety-nets module in the data set. Such further analysis would be quite descriptive in nature, though interesting nonetheless, considering all the detailed information available on the household's access to safety nets through public and private means. For instance, each household reports whether during difficult times they would be able to borrow from friends and relatives, and whether they have utilized this informal safety net in the past.

A preliminary analysis of this module shows that informal safety nets (involving friends and family networks) are quite strong in the Turkish context, with 20.6% of households in the sample reporting they increasingly borrowed from friends and relatives and 7.4% saying they increasingly received help from friends and relatives during the crisis.

In contrast, the Turkish public safety net is quite weak, with only 1% of households in the sample accessing social-protection funds provided by the government and municipalities in the same time period. This preliminary analysis of the safety-nets module also suggests that households that had access to informal safety nets had a lower probability of reducing (food) consumption during the crisis, even with the presence of an income shock. This finding indicates that the informal safety net in Turkey may have been effective in *delinking* the income shock at the household level from changes in consumption and welfare. Thus, in a separate paper, it would be worthwhile to further analyze these data on the use of informal safety nets in Turkey during the crisis and the effectiveness of such networks for reducing the welfare impact of the crisis on households.

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