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Welfare Impacts of Soaring Food Prices on Iranian Urban Households: Evidence from survey data

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Abstract:

On December 2010, the government of Iran ended the decades-long subsidy program for bread and energy products and launched the Targeted Subsidy Reform program that considerably raised prices of food products. The objective of the study was to measure welfare impacts of food price changes on Iranian urban households between two survey data of 2009/10 and 2011/12 which were taken from Iranian household survey (HEIS) raw data. Food consumption behaviour in Iran is analyzed by estimating a complete food demand system using Quadratic Almost Ideal Demand System (QUAIDS). The elasticity coefficients derived from QUAIDS are used to evaluate impacts of the relative food price changes in terms of Compensated Variations (CV). Based on our estimates, the food groups of meat, edible oils, fruits and dried fruits and Sugary products are luxury goods, with income elasticity above one. Cereals, dairy products, vegetable and pulses, Potables and Spices are necessary goods, as their budget elasticity is positive and below one at the same time. Results showed that all urban households, suffered welfare loses from rise in the food prices during 2009-10 and 2011-12. In addition the high share of cereals in year 2011-12 implies that urban households shift their consumption to cheaper calorie source after implementation of Targeted Subsidy Reform Program. This figure is confirmed with the decline in the share of meat, dairy Products, fruits and dried fruits, vegetables and pulses and potables expenditure.

Keywords: Compensated Variation (CV), Food price change, Iranian Urban households, QUAIDS demand system, Welfare Effects

1- Introduction

Significant food price spikes, coupled with a large increase in food price volatility, may have severe effects on low-income households. Staple food price shocks are particularly concerning, as many households in developing countries are heavily dependent upon staple crops for their

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primary daily caloric intake (Cranfield et al., 2007). High costs of food may curtail household spending for other essential goods and services, such as health care(Hung and Hung, 2009). Thus, it is important to investigate consumer demand for food and evaluate the consumer welfare effects of increased food prices.We focus on one developing country: Iran. Subsidies for energy products and critical food items were first implemented during the Iran-Iraq war of the 1980s as a way to manage consumption during wartime. Over time, cheap energy and bread had become part of life and Iranian consumers had built their lifestyles around them and producers made products with technologies that assumed energy would remain cheap forever. Attempts at reforming subsidies in small steps during the administrations of presidents Rafsanjani and Khatami (1989-2001) were met with tough opposition from populist politicians and therefore did not succeed. Raising energy prices slowly did not work because each round of price increases intensified opposition to the reform, and stopped further increases while inflation wiped out the gains. In the meantime, Iran's energy consumption was increasing at about 3 times as fast as its population and the country steadily became the most energy intensive country in the world.In December 2010 Iran launched an ambitious Targeted Subsidy Reform programthat raised prices of bread and energy products by 2 to 22 times (Salehi Isfahani et al., 2012).The general consumer price index (CPI) of Iran has increased from 233.3In December 2010 to 309.3 in March 2012. This indicates that general price level has increased by more than 32.57% during 15 month. The situation is even worst in case of food inflation, as it has shown an increase of more than 41.24% during the same period (Central Bank of Iran, 2012).

The empirical analysis of price changes on consumption patterns has always been of great concern to development economics. To our knowledge, this study is the first examination of welfare impacts of soaring food prices on households using demand analysis after the Targeted Subsidy Reform program in the context of Iran but there exists enough international literature on the exploring the welfare effects of price changes. In this regard, this study presents review of the studies estimating welfare effects through compensation variation. Ackah and Appleton (2005) examined the welfare effects of trade and agricultural policy reforms for Ghanaian households during year 1991-92 and 1998-99. The welfare effects of price changes are calculated for cereal, tubers, fish, meat, alcohol and all other food in terms of compensating variations. The

results suggest that household consumption did respond to relative prices and real income change resulted from policy reforms. It was found that all household groups suffered and welfare losses arising from the food price increases during the 1990s.Wood and et al. (2009) focused on quantifying the welfare losses for Mexican households due to the world food price increases from 2006 to 2009. The authors measured the welfare effects of tortilla price increase, differentiating by household status (poor and non-poor) and by region (border, north, central and south). The study focuses on the main staple foods to accurately represent the Mexican diet. An appropriate welfare analysis based on compensating and equivalent variation for the representative commodities, differentiated by geographic region and household status, observes small welfare losses for non-poor large differences for poor and non-poor households. Adding tortilla income loss to compensating variation it is found that non-poor households lose 9 percent of their food budget, on average, and poor households lose about 18 percent of their food budget, on average. These results provide evidence that poor Mexican households are the ones who experience significant welfare losses from significant food price increase.Alem (2011) investigate how urban households in Ethiopia coped with the food price shock between 2004 and 2008. Regression results indicate that households with low asset levels, and casual workers, were particularly adversely affected by high food prices.

The remainder of the paper is structured as follows. Section 2 discusses the methodology, while section 3 presents the data and descriptive statistics. The results are presented in section 4and section 5 concludes.

2. Materials and Methods

2.1 Demand System Models in Empirical Studies

Estimating welfare impact of rising food prices requires reliable price and income elasticities that could be commonly derived from utility-based demand models. The AIDS model has been the most commonly used specification in applied demand analysis for more than two decades as it satisfies a number of desirable demand properties.Moreover, it allows a linear approximation at estimation stage and has budget shares as dependent variables and logarithm of prices and real expenditure/income as regressors. Banks et al. (1997), however, observed the existence of nonlinearity in the budget shares for some, if not all commodities and subsequently introduced an extension to permit non-linear Engle Curves.

They proposed a generalized Quadratic Almost Ideal Demand System (QUAIDS) model which has budget shares that are quadratic in log total expenditure. Moreover, the QUAIDS retains the desirable properties of the popular AIDS model nested within it and allows for flexibility of a rank three specification in the Engel curves. Therefore, QUAIDS has been chosen as the demand model for empirical strategy of estimation.

2.2 Empirical Model: Quadratic Almost Ideal Demand System

The complete demand system employed in this study is Quadratic Almost Ideal Demand System. As mentioned above, QUAIDS is an extension from Almost Ideal Demand System. QUAIDS includes higher order of expenditure term to capture the non-linearity of Engel Curve. QUAIDS (Banks, et al., 1997) assumes that household's preferences follow quadratic logarithmic of household expenditure functions as the following:

$$\ln c(u,p) = \ln a(p) + \frac{ub(p)}{1-\lambda(p)b(p)u} \qquad (1)$$

Where u is utility, p is a set of prices, a(p) is a function that is homogenous of degree one in prices, b(p) and λ(p) are functions that are homogenous of degree zero in prices. The household cost function in QUAIDS is similar to AIDS if λ set to zero. The indirect utility function accordingly is as follows:

$$\ln V = \left\{\left[\frac{\ln m - \ln a(p)}{b(p)}\right]^{-1} + \lambda(p)\right\}^{-1} \qquad (2)$$

where m is the total expenditure, ln a(p) and b (p) are the translog and Cobb-Douglas functions of prices as in AIDS formulation:

$$\ln a(p) = \alpha_0 + \sum_{i=1}^{k} \alpha_i \ln p_i + \frac{1}{2}\sum_{i=1}^{k}\sum_{j=1}^{k} \gamma_{ij} \ln p_i \ln p_j \qquad (3)$$

$$b(p) = \prod_{i=1}^{n} p_i^{\beta_i} \qquad (4)$$

The λ(p) in QUAIDS is defined as:

$$\lambda(p) = \sum_{i=1}^{K} \lambda_i \ln p_i \quad , \text{where} \sum_{i=1}^{K} \lambda_i = 0 \qquad (5)$$

The subscript i =1, …, K in the model denote the number of goods in the demand systems. Applying Shephard's lemma to the cost function (1) or Roy's identity to the indirect utility function (2), the QUAIDS expenditure shares is given as the following:

$$W_i = \alpha_i + \sum_{j=1}^{K} \gamma_{ij} \ln p_j + \beta_i \ln\left\{\frac{m}{P(p)}\right\} + \frac{\lambda_i}{b(p)}\left[\ln\left\{\frac{m}{P(p)}\right\}\right]^2 \qquad (6)$$

where, w_i is food budget share of food groups and α, γ, β, and λ are parameters. When λ is equal to zero, the equation (6) represents AIDS model.

From the QUAIDS model provided in equation (6), expenditure $(\mu_i)$and price elasticities (μ_j) can be derived by differentiating equation (6) with respect to $\ln m$ and $\ln p_j$,respectively. The derivation results are:

$$\mu_i \equiv \frac{\partial w_i}{\partial \ln m} = \beta_i + \frac{2\lambda_i}{b(p)}\left\{\ln\left[\frac{m}{\alpha(p)}\right]\right\} \qquad (7)$$

$$\mu_j \equiv \frac{\partial w_i}{\partial \ln P_j} = \gamma_{ij} - \mu_i\left(\alpha_j + \sum_K \gamma_{jK} \ln P_i\right) - \frac{\lambda_i \beta_i}{b(P)}\left\{\ln\left[\frac{x}{a(P)}\right]\right\}^2 \qquad (8)$$

The parameter α_i in equation (6) is the share of an item in the budget of a subsistence household, while $\beta_i + 2(\lambda_i/b(P))[\ln(x/a(p))]^2$ measures the effect of one per cent increase of real expenditure on budget share of good i. The expenditure elasticities can be calculated by:

$$e_i = \mu_i/w_i + 1 \qquad (9)$$

From μ_{ij}, Marshallian uncompensated price elasticities can be calculated as:

$$o_{ij}^u - \frac{\mu_{ij}}{w_i} - \delta_{ij} \qquad (10)$$

whereδ_{ij} is equal to one if i=j and equal to zero if $i \neq j$. From slutsky equation, Hicksian or compensated price elasticities are calculated as follows:

$$e_{ij}^c = e_{ij}^u + w_j e_i \qquad (11)$$

The system is estimated using Brain P Poi (2008) "demand-system estimation: update, Non-Linear Seemingly Unrelated regression (nlsur) model", written in STATA.

2.3 Compensated Variation

The welfare impact of food price changes on households can be measured in monetary terms by using the money metric indirect utility function. Using a set of reference prices, we can compute how well - or worse off households were, moving from their initial utility level to the new or post-reform utility level in response to the changes in food prices. Following

the usual practice in this literature (Minot and Goletti, 2000; Friedman and Levinsohn, 2002;Niimi, 2005 ;Vu and Glewwe, 2010), we characterize the welfareeffects of food price changes as the compensating variation (CV).
Suppose c(u, p) denotes the expenditure function which defines the minimumexpenditure required to achieve a specific utility level, u , at a given price vector p facing the household (see Deaton and Muellbauer, 1980). Assume that prices change from $P_0$to P_1as a result of the Targeted Subsidy Reform. The money measure of the resultant welfare effect is the difference between the minimum expenditure required to achieve the original utility level, at the new prices, and the initial total expenditure. In other words, CV is the amount of money the household would need to be given at the new set of (higher) prices in order to attain the pre-reform initial level of utility. Subscripts refer to before (0) and after (1) prices, in this study2009/10 and 2011/12 respectively.Hence, in terms of the expenditure (cost) function:

$$CV = c(P_1, u_0) - c(P_0, u_0) \qquad (12)$$

The CV can be approximated using first order Taylor expansion of the minimumexpenditure function as(Friedman and Levinsohn, 2002):

$$\ln C^h \approx \sum_{i=1}^{n} w_i^h \, \Delta \ln P_i^h \qquad (13)$$

Where i subscripts refers to the commodity group in the commodity system and h refers the household. $w_i^h$is the budget share devoted to good i in household h 's budget, which is obtained by dividing the pre-reform expenditure on the good by households total expenditure on all goods.The costs of attaining pre-inflation utility levels will increase less rapidly than indicated by (13), as the household has ability to switch away from commodities whose relative prices have disproportionately increased. Thus this measure of compensating variation provides only a maximum bound of the impact of the inflation, ignoring the behavioral responses, the substitution effects towards goods whose prices are relatively lower. Hence, in calculating the household welfare effect, we use the second order Taylor series expansion approximation that utilizes own and cross price elasticities to capture household's behavioral responses.This will be expressed as(Friedman and Levinsohn, 2002):

$$\Delta \ln C^h \approx \sum_{i=1}^{n} w_i^h \, \Delta \ln P_i^h + \frac{1}{2} \sum_{i=1}^{n} \sum_{j=1}^{n} w_i^h \, \varepsilon_{ij} \, \Delta \ln P_i^h \, \Delta \ln P_j^h \qquad (14)$$

where ε_{ij} is Hicks (1939) compensated price elasticity of commodity group i with respect to price change of group j.

Equation (14) indicates that the welfare effect depends on the size of price changes as well as the importance of a particular commodity in the household consumption basket. The two compensating variation specifications given in (13) and (14) are used to identify the consumption effects of price changes to households in Iran between 2010 and 2012.

3. Data Sources and Descriptive Statistics

We use the 2009/10 (1388) and 2011/12 (1390) rounds of the Household Expenditure and Income Survey (HEIS) collected by the Statistical Center of Iran (SCI). The HEIS is the principal annual household survey collected in Iran. It relies on a multi-stage stratified sampling method and has been collected without pause for the past fifty years. The surveys record everything that the interviewed households declare as consumed for one month. Respondents were asked to provide information on how much they spent on each item and on the quantity consumed. A total of 18607 urban households for the 2009/10 sample; and 18,696 urban households for 2011/12 sample were covered in these surveys. The published form of HEIS data gives the information in groups form, such as expenditure made by entire group on the consumption of a particular commodity group, but for our analysis we need grass root level information of each household. Therefore instead of relying on published we have used raw data of HEIS. For the both surveys a total of 230 food items were covered. In order to maintain reasonable parameters, the all food items were reclassified into nine food groups: Cereals, Meat, Dairy Products, Edible Oils, Fruits and dried fruits, Vegetables and Pulses, Sugary, Spices and Condiments, and Potables. Table1 lists the groupings and food items in each group. The food items are aggregated based on Classification of Individual Consumption by Purpose (COICOP).These aggregated commodities make almost 100% of the food consumption basket for the urban households in Iran. Budget shares of the aggregate foods are calculated by dividing the expenditure on each sub-group by the overall food expenditure. One of the major challenges for commodity groupings is on how to compute prices for aggregated food bundles. For our analysis, price indices for the aggregated foodbundles were computedusing the geometric mean with expenditure shares as

weights.Each group price is a weighted average of prices on specific items faced by the household.

Table 1: Classifications of food groups

	Food Groups	Details
Group 1	Cereals	Rice and Rice flour, Wheat and Wheat flour, Bread, Biscuits, Pastry, Confections and Other Cereal Products.
Group 2	Meat	Mutton, Beef, Chicken, Fish and other meat products.
Group 3	Dairy Products	Eggs, Milk and Dairy products except butter.
Group 4	Edible Oils	Edible Oils, Fats and Butter.
Group 5	Fruits and dried fruits	Nuts, Treed fruits and other fresh fruits.
Group 6	Vegetables and Pulses	Fresh vegetables, Dried vegetables, Chickpea, Bean, Split pea, Soybean and other Pulses.
Group 7	Sugary	Hard Sugar, Sugar, Honey, Molasses, and other Sugary Products
Group 8	Potables	Tea, Coffee, Cocoa and Non-alcoholic drinks.
Group 9	Spices and Condiments	Salt, Tomato paste, Ketchup, Lemon juice, Sourness, Pickled Cucumbers and other Spices.

Table 2 gives an overview of the consumption data by reportingbudget shares for aggregated food bundles.Cereals are the major group in the Iranian diet and account for the lion's share of urban household food budget (on average, about 26 percent). The high share of cereals implies that households might shift their consumption to cheaper calorie source in this period. This figure is confirmed with the decline in the share of meat, dairy Products, fruits and dried fruits,vegetables and pulses andpotables expenditure. Alongside the budget shares, Table 2 also reports the average price increase for each aggregated food bundle. This is accomplished by calculating the price increase of the aggregated foods using expenditure shares to weight the price increases of each constituent individual food. By any measure, the inflationary impacts of the Targeted Subsidy Reform program were large.The all-importantcereals price increased by an average of almost 82%, and the prices for many foodstuffsincreasedby more than 40%.

Table 2. Urban households food budget shares and Proportionate price changes (in %)

Food Groups	Survey 2009/10	Survey 2011/12		Mean price increase %
Cereals	0.21	0.26		0.82
Meat	0.25	0.24		0.43
Dairy Products	0.12	0.11		0.52
Edible Oils	0.05	0.05		0.60
Fruits & dried fruits	0.12	0.11		0.32
Vegetables & Pulses	0.13	0.11		0.45
Sugary	0.04	0.05		0.73
Potables	0.04	0.03		0.16
Spices	0.04	0.04		0.21
Source: Author's computation from HEIS raw data				

4. Results and Discussion

4.1 Demand Elasticities

Firstly we discus results obtained from estimating the system of demand equations that provides income, own and cross price elasticities. This is done in stages using the overall sample. Both Marshallian (uncompensated) and Hicksian (compensated) price elasticities for 2009/10 and 2011/12 evaluated at the sample means are reported in Tables 3 and 4 respectively, which include the cross-priceelasticity estimates. The systems of equations in QUAIDS are estimated through imposing theoretical restrictions and applying Non-Linear Seemingly Unrelated regression (nlsur). In all estimation the standard errors reported are robust to heteroskedasticity.

As shown in Tables 3 and 4, all the estimated own-priceelasticities are negative. Consistent with consumer demand theory, there are exists aninverse relationship between changes in own-price indexes and quantities demanded.In most cases the absolute value of the own-price elasticity is less than unity, meaningthat they are not price elastic.The compensated price elasticities provide a more accurate picture of cross-price substitution between food groups, since they are a measure of substitution effects net of income. In the matrix of the compensated price elasticities (in tables 3 and 4), it can be observed that own price effects are relatively large and negative. They are, in absolute terms, smaller than the uncompensated elasticities.Even after the income-compensation, Potables and Spices (in tables 3 and 4) remain the only commodities with own-price elasticity exceeding unity. For the remainder of the food groups, the absolute values of the own-price elasticities are smaller than unity, meaning that they are not price elastic.The fact that the signs of some compensated elasticities are different from those of the uncompensated elasticities suggests that expenditure effects are significant in affecting consumer demand decisions.All of the cross-priceelasticities are positive, indicating that the relevant food groups are substitutes, as would be expected.Table 5 present expenditure elasticities, for both 2009/10and 2011/12 all food groups had positive consumption expenditureelasticities, implying that no food group was classified as“inferior”; all were “normalgoods”. In 2009/10, cereals, dairy products, vegetable and pulses, Potables and Spices werenecessities while meat, edible oils, fruits and dried fruitsand finally sugaryproducts were found to be luxury. This could be a reflection that most urban households are not yet consuming the

desired quantities and hence suggest that as their income increases they will spend proportionately more on consumption of those food groups under consideration. In 2011/12,expenditureelasticitieshold in the same patterns as with2009/10 results.

4.2 Welfare impacts of high prices

Making use of the household budget share, observed proportionate price changeand the estimated consumer responses, we assess the welfare effects of food price changes in Iran.

The measurement of the 'dynamic' household welfare effect, one that jointly considers (static) first order effects in consumption as well as consumption responses, is the object of this sub-section. For comparison purposes, we also present estimates from a first-order approximation to the food price changes, whichholding constant consumers behavioural responses and assuminghouseholds are not able to substitutes.To do that we utilize the estimated Hicksian elasticities for 2009/10 to measure the welfare impact of food price change observed between 2009/10 and 2011/12. The CV measure how much money we would have to give theconsumers after the price change to make them as well of as they were before the pricechange, that is, as in 2009/10 for the period between 2009/10 and 2011/12.Table 6 presentswelfare effects.The first column presents the first-order effects computed using equation(13) whileColumns 2 and 3 thus measure dynamic effects, which jointly consider the first order and consumer responses effects in consumption as a share ofhousehold food expenditure and total household expenditure in 2009/10, respectively.

Table 3: Marshallian and Hicksian Demand Elasticity Matrix, 2009/10

	Cereals	Meat	Dairy Products	Edible Oils	Fruits &dried fruits	Vegetable & Pulses	Sugary	Potable	Spices
Uncompensated									
Cereals	**-0.65 (0.01)****	-0.14 (0.007)**	-0.03 (0.003)**	-0.01 (0.002)**	-0.03 (0.003)**	-0.06 (0.004)**	-0.01 (0.002)**	0.01 (0.001)**	-0.002 (0.001)**
Meat	-0.17 (0.006)**	**-0.77 (0.008)****	-0.01 (0.003)**	-0.055 (0.003)**	-0.02 (0.003)**	-0.133 (0.005)**	-0.01 (0.002)**	-0.0008 (0.001)	-0.004 (0.001)**
Dairy Products	-0.02 (0.006)**	0.077 (0.008)**	**-0.96 (0.006)****	0.041 (0.003)**	-0.03 (0.004)**	0.057 (0.005)**	0.015 (0.002)**	0.012 (0.001)**	0.032 (0.002)**
Edible Oils	-0.09 (0.011)**	-0.25 (0.015)**	0.059 (0.007)**	**-0.68 (0.015)****	-0.03 (0.007)**	-0.12 (0.013)**	-0.01 (0.005)+	0.023 (0.002)**	0.006 (0.003)+
Fruits & dried fruits	-0.08 (0.003)**	-0.0008 (0.003)	-0.06 (0.005)**	-0.01 (0.004)**	**-0.82 (0.002)****	-0.04 (0.001)**	0.002 (0.002)	-0.01 (0.006)**	0.0007 (0.009)**
Vegetables & Pulses	-0.1 (0.006)**	-0.19 (0.009)**	0.033 (0.004)**	-0.04 (0.005)**	-0.03 (0.004)**	**-0.62 (0.011)****	-0.02 (0.002)**	0.009 (0.001)**	0.02 (0.002)**
Sugary	-0.1 (0.01)**	-0.07 (0.013)**	.0007 (0.006)	-0.01 (0.006)*	-0.01 (0.006)	-0.08 (0.008)**	**-0.83 (0.006)****	-0.005 (0.002)*	-0.03 (0.003)**
Potables	0.081 (0.008)**	0.084 (0.014)**	0.032 (0.006)**	0.04 (0.004)**	-0.01 (0.007)	0.043 (0.007)**	0.009 (0.003)**	**-1.08 (0.003)****	-0.01 (0.002)**
Spices	-0.01 (0.009)+	0.025 (0.01)**	0.076 (0.005)**	0.014 (0.004)**	0.009 (0.005)+	0.063 (0.006)**	-0.02 (0.003)**	-0.01 (0.002)**	**-1.09 (0.004)****
Compensated									
Cereals	**-0.45 (0.009)****	0.09 (0.006)**	0.07 (0.002)**	0.03 (0.002)**	0.08 (0.002)**	0.05 (0.003)**	0.02 (0.001)**	0.05 (0.001)**	0.03 (0.001)**
Meat	0.08 (0.005)**	**-0.48 (0.007)****	0.12 (0.003)**	0.002 (0.002)	0.12 (0.002)**	0.02 (0.004)**	0.03 (0.001)**	0.05 (0.001)**	0.04 (0.001)**
Dairy Products	0.14 (0.005)**	0.26 (0.006)**	**-0.86 (0.005)****	0.07 (0.003)**	0.06 (0.003)**	0.15 (0.004)**	0.04 (0.002)**	0.04 (0.001)**	0.06 (0.001)**
Edible Oils	0.147 (0.010)**	0.016 (0.014)	0.185 (0.007)**	**-0.63 (0.015)****	0.10 (0.006)**	0.01 (0.012)	0.03 (0.004)**	0.07 (0.002)**	0.04 (0.003)**
Fruits & dried fruits	0.14 (0.004)**	0.24 (0.005)**	0.05 (0.003)**	0.04 (0.002)**	**-0.69 (0.004)****	0.08 (0.003)**	0.04 (0.001)**	0.03 (0.001)**	0.04 (0.001)**
Vegetables & Pulses	0.095 (0.005)**	0.04 (0.008)**	0.14 (0.003)**	0.007 (0.004)+	0.08 (0.003)**	**-0.49 (0.011)****	0.02 (0.002)**	0.05 (0.001)**	0.05 (0.001)**
Sugary	0.13 (0.008)**	0.20 (0.011)**	0.13 (0.005)**	0.04 (0.005)**	0.12 (0.005)**	0.07 (0.007)**	**-0.78 (0.006)****	0.04 (0.002)**	0.01 (0.003)**
Potables	0.25 (0.006)**	0.28 (0.007)**	0.12 (0.003)**	0.07 (0.002)**	0.09 (0.004)**	0.14 (0.004)**	0.04 (0.002)**	**-1.04 (0.003)****	0.024 (0.001)**
Spices	0.18 (0.007)**	0.26 (0.009)**	0.18 (0.004)**	0.06 (0.004)**	0.12 (0.004)**	0.18 (0.005)**	0.01 (0.003)**	0.02 (0.002)**	**-1.05** (0.004)**

p*<0.1; p**<0.05; p***<0.01; Note: Robust standard errors in brackets

Source: Research findings

Table 4: Marshallian and Hicksian Demand Elasticity Matrix, 2011/12

		Meat	Dairy Products	Edible Oils	Fruits &dried fruits	Vegetable & Pulses	Sugary	Potable	Spices
Uncompensated									
Cereals	**-0.75 (0.009)****	-0.17 (0.007)**	0.008 (0.002)**	0.0036 (0.002)	-0.03 (0.002)**	-0.04 (0.003)**	-0.006 (0.001)**	0.016 (0.0009)**	0.007 (0.001)**
Meat	-0.23 (0.008)**	**-0.71 (0.009)****	-0.01 (0.002)**	-0.03 (0.002)**	-0.004 (0.002)	-0.10 (0.003)**	-0.014 (0.002)**	-0.003 (0.001)**	-0.008 (0.001)**
Dairy Products	0.059 (0.006)**	0.04 (0.006)**	**-1.01 (0.004)****	0.05 (0.003)**	-0.03 (0.003)**	0.01 (0.004)**	0.02 (0.002)**	0.01 (0.001)**	0.02 (0.001)**
Edible Oils	0.003 (0.012)	-0.14 (0.013)**	0.08 (0.007)**	**-0.91 (0.02)****	-0.03 (0.005)**	-0.04 (0.012)**	-0.0002 (0.004)	0.018 (0.001)**	0.017 (0.002)**
Fruits & dried fruits	-0.08 (0.006)**	0.01 (0.006)**	-0.05 (0.002)**	-0.01 (0.002)**	**-0.81 (0.004)****	-0.04 (0.003)**	-0.01 (0.002)**	-0.01 (0.001)**	-0.005 (0.001)**
Vegetables & Pulses	-0.09 (0.007)**	-0.17 (0.007)**	0.008 (0.004)*	-0.01 (0.005)*	-0.03 (0.003)**	**-0.59 (0.010)****	-0.02 (0.002)**	0.001 (0.001)	0.01 (0.001)**
Sugary	-0.08 (0.010)**	-0.07 (0.011)**	0.013 (0.005)*	-0.006 (0.005)	-0.03 (0.004)**	-0.079 (0.006)**	**-0.85 (0.006)****	-0.01 (0.001)**	-0.01 (0.002)**
Potables	0.12 (0.007)**	0.03 (0.007)**	0.02 (0.003)**	0.02 (0.002)**	-0.008 (0.003)*	0.009 (0.003)**	0.00007 (0.002)	**-1.08 (0.002)****	-0.006 (0.001)**
Spices	0.03 (0.009)**	-0.05 (0.01)**	0.07 (0.004)**	0.02 (0.004)**	-0.02 (0.004)**	0.02 (0.005)**	-0.015 (0.003)**	-0.01 (0.001)**	**-1.116 (0.003)****
Compensated									
Cereals	**-0.49 (0.009)****	0.06 (0.007)**	0.10 (0.002)**	0.05 (0.002)**	0.07 (0.002)**	0.06 (0.003)**	0.03 (0.001)**	0.05 (0.001)**	0.03 (0.001)**
Meat	0.06 (0.007)**	**-0.44 (0.008)****	0.1 (0.002)**	0.01 (0.002)**	0.12 (0.002)**	0.01 (0.003)**	0.03 (0.002)**	0.04 (0.001)**	0.02 (0.001)**
Dairy Products	0.27 (0.005)**	0.23 (0.006)**	**-0.92 (0.004)****	0.09 (0.003)**	0.06 (0.003)**	0.10 (0.004)**	0.05 (0.002)**	0.04 (0.001)**	0.05 (0.001)**
Edible Oils	0.27 (0.011)**	0.09 (0.013)**	0.19 (0.007)**	**-0.86 (0.020)****	0.08 (0.005)**	0.06 (0.012)**	0.04 (0.004)**	0.06 (0.002)**	0.04 (0.002)**
Fruits & dried fruits	0.18 (0.005)**	0.26 (0.001)**	0.05 (0.002)**	0.03 (0.002)**	**-0.69 (0.004)****	0.06 (0.002)**	0.03 (0.001)**	0.03 (0.001)**	0.02 (0.001)**
Vegetables & Pulses	0.14 (0.007)**	0.03 (0.007)**	0.10 (0.004)**	0.03 (0.005)**	0.06 (0.003)**	**-0.48 (0.010)****	0.01 (0.002)**	0.04 (0.001)**	0.04 (0.001)**
Sugary	0.21 (0.009)**	0.19 (0.010)**	0.13 (0.005)**	0.05 (0.005)**	0.09 (0.004)**	0.04 (0.006)**	**-0.79 (0.006)****	0.03 (0.002)**	0.02 (0.002)**
Potables	0.35 (0.005)**	0.24 (0.006)**	0.12 (0.003)**	0.07 (0.002)**	0.09 (0.003)**	0.10 (0.003)**	0.040 (0.002)**	**-1.04 (0.002)****	0.02 (0.001)**
Spices	0.31 (0.008)**	0.19 (0.009)**	0.18 (0.004)**	0.07 (0.004)**	0.09 (0.004)**	0.14 (0.005)**	0.03 (0.003)**	0.03 (0.002)**	**-1.082 (0.003)***

p*<0.1; p*<0.05; p**<0.01; Note: Robust standard errors in brackets

Source: Research findings.

Table 5: Expenditure Elasticity Estimates From QUAIDS Model For 2009/10 and 2011/12 Surveys

Surveys	Cereals	Meat	Dairy Products	Edible Oils	Fruits &dried fruits	Vegetable & Pulses	Sugary	Potable	Spices
2009/10	0.94 (0.011)**	1.18 (0.008)**	0.77 (0.011)**	1.10 (0.015)**	1.01 (0.008)**	0.93 (0.010)**	1.12 (0.015)**	0.80 (0.037)**	0.95 (0.011)**
2011/12	0.96 (0.006)**	1.13 (0.008)**	0.81 (0.007)**	1.02 (0.011)**	1.02 (0.008)**	0.90 (0.006)**	1.14 (0.012)**	0.87 (0.012)**	0.99 (0.011)**

p*<0.1; p*<0.05; p**<0.01; Note: Robust standard errors in brackets
Source: Research findings.

Table 6:Compensating variation

House holds	First Order Effectsas a proportion of 2009/10 household food expenditure	Second Order Effectsas a proportion of 2009/10 household food expenditure	Second OrderEffects as a proportion of 2009/10total household expenditure
All UrbanHouseholds	51.37	49.93	11.92

Source: Research findings.

Results show that on average, Iranian households need to be reimbursed around 11.92% of their 2009/10 total household expenditures due to food prices changes in 2009/10 in order to make them in 2011/12 as well off as they were in 2009/10 (the initial situation).As is readily apparent, the first order effect as expected does overstate the welfare losses, even if marginally.

Conclusion

The paper analyses welfare impact of rising food prices for urban households in Iran based on Quadratic Almost Ideal Demand System (QUAIDS), followed by estimation of compensation variation (CV). For the first time we make use of the Iran Household Survey (HEIS) raw data collected before and after the sharp increase in food prices between 2009/10 and 2011/12. The QUAIDS model was estimated for nine food groups; Cereals, Meat, Dairy Products, Edible Oils, Fruits and dried fruits, Vegetables and Pulses, Sugary, Spices and Condiments, and Potables. The estimated price and expenditure elasticities areplausible and consistent with economic theory: all own-price elasticities were negative and statistically significant. Similarly,estimated expenditure elasticities were

positive andstatistically significant for all food groups as is expected.Based on our estimatescereals, dairy products, vegetable and pulses, Potables and Spices werenecessities while meat, edible oils, fruits and dried fruitsand Sugaryproducts were found to be luxury.The estimated compensated price elasticities are used to compute compensating variation for the observed proportionate price change. Results suggest that all Iranian urban households, suffered welfareloses from rise in the food prices during 2009/10 and 2011/12.Also the high share of cereals in year 2011/12 implies that urban households shift their consumption to cheaper calorie source after implementation of Targeted Subsidy Reform Program. This figure is confirmed with the decline in the share of meat, dairy Products, fruits and dried fruits,vegetables and pulses andpotables expenditure.

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