# Aggregate Food Demand Analysis For A Transitional Economy: An Application to Chinese Household Expenditure Data

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An analytical framework to assess the effects of changing income and socio-demographic distributions on aggregate food demand functions in transitional economies is presented. Ignoring such distributional effects can lead to biased estimates of aggregate demand elasticities. The proposed method is applied to Chinese urban household expenditure survey data. The results indicate that the drastic distributional changes that have occurred in China have had notable effects on estimated demand elasticities for both food and non-food commodity groups.

The structure of the world economy has undergone dramatic changes during the last 15 years, beginning with the market-oriented economic reforms in China, and followed by the collapse of the Soviet Empire together with changes in the socio-economic system in Eastern Europe. With the former centrally planned economies moving toward free-enterprise economic systems, the world economic system has evolved into one involving, so-called transitional economies. Transitional economies can have a large influence on the world food economy since they represent over 30% of the world population and the diets of consumers in these economies often undergo a transition from subsistence to greater variety, including more income superior and income elastic food commodities.

It is to be expected that during the transitional period significant changes occur in consumer income, income distribution, and socio-demographics in transitional economies. Consider mainland China for example. Since the initiation of economic reforms in 1978, China has experienced double-digit economic growth along with dramatic changes in consumer expenditures, demographics, income and income distribution. Urban household size has decreased significantly from 4.24 in 1981 to 3.31 in 1993 due to China's population control policy. Per capita income has increased five-fold in the urban areas since the economic reform began. At the same time, income has also become more unevenly distributed among consumers, especially across different geographic regions (e.g., coastal vs inland). Given such dramatic changes in consumer income and demographics, a traditional econometrics time series approach to modeling aggregate demand behavior can generate potentially biased estimates of food demand elasticities because distributional effects are ignored. This can have serious consequences for studying world food demand given the size of the population and the large portion of household budgets spent on food in China.

In this paper, an empirically tractable procedure for incorporating distributional effects into aggregate demand functions that is consistent with neoclassical theory at the aggregate level is developed. First, the theoretical framework is presented, followed by an empirical procedure for incorporating distributional effects. A non-nested specification test to examine the data compatibility of the demand functions, with and without distributional effects incorporated, is then presented. Finally, empirical results based on China's urban household expenditure data are presented. The results include elasticity of food demand estimates and an evaluation of the effects of income distribution and household size changes on these estimated elasticities.

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**Theoretical Framework**

The Almost Ideal Demand System (AIDS) proposed by Deaton and Muellbauer (1980) is one of the most popular demand models among empirical analysts due to its desirable theoretical properties and its empirical tractability. A consumer-specific AIDS model can be expressed in the following form,

$$(1)\quad w_{ih} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(x_h/P),\ \forall\ i,h$$

$$\log P = \alpha_o + \sum_i \alpha_i \log(p_i) + 1/2 \sum_i \sum_j \log(p_i) \log(p_j)$$

where

$$\sum_i \alpha_i = 1,\ \sum_j \gamma_{ij} = 0,\ \sum_i \beta_i = 0,\ \gamma_{ij} = \gamma_{ji}\ \forall\ i \neq j$$

$w_{ih}$, $x_h$, $p_j$, and P are, respectively, the expenditure share devoted to commodity $i$ by consumer $h$, total expenditure (income) by consumer $h$, the price of good $j$ and the AIDS price index.

Sociodemographic characteristics can be incorporated into the preceding AIDS model as follows,

$$(2)\quad w_{ih} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(x_h/P) + \sum_f \beta_{if} D_{fh},$$

where $D_{fh}$ is demographic characteristic $f$ for consumer $h$. An assumption underlying the specification of equation (2) is that consumers with the same income and sociodemographic characteristics have the same consumption patterns and thus demand function parameters are constant across consumers. The share of aggregate expenditure allocated to good $i$ can be defined as

$$(3)\quad \overline{w}_i = \sum_h p_i q_{ih} / \sum_h x_h = \sum_h x_h w_{ih} / \sum_h x_h = \sum_h r_h w_{ih}$$

where $q_{ih}$ is the quantity of commodity $i$ consumed by consumer $h$, $p_i$ is the price of commodity $i$, $r_h = x_h / \sum_h x_h$ is the $h^{th}$ consumer's share of total income, with $r_h \in [0,1]$ and $\sum_h r_h = 1$.

The aggregate demand function can be obtained by substituting (2) into (3), obtaining

$$(4)\quad \overline{w}_i = \alpha_i \sum_j \gamma_{ij} \log p_j + \beta_i [\sum_h r_h \log(x_h/P)] + \sum_f \beta_{if} [\sum_h r_h D_{fh}],$$

Note that the terms in brackets in equation (4) are, respectively, the logarithm of the weighted geometric mean of real consumer incomes and the weighted arithmetic means of demographic variables, where $r_h$ are the weights. Letting $x^*$, and $D_j^*$, $\forall j$, denote the weighted geometric mean of income and the weighted arithmetic means of demographic variables, respectively, equation (4) can be rewritten as

$$(5)\quad \overline{w}_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(x^*/P) + \sum_f \beta_{if} D_f^*,$$

where

$$x^* = \prod_h x_h^{r_h},\ \text{and}\ D_f^* = \sum_h r_h D_{fh}.$$

The income-share-weighted means capture the effect of distributional changes in consumer income and demographics on the aggregate demand functions. There are functional relationships between these income-share-weighted means and their simple mean counterparts, $\bar{x} = \sum_h x_h /N$, and $\overline{D}_f = \sum_h D_{fh} /N$, where N is the size of consumer population. First, focus on the income variable. By substituting $x_h = r_h(\sum_h x_h) = r_h X$ (where $X = \sum_h x_h$) into the weighted geometric mean definition of income, one obtains

$$(6)\quad x^* = \prod_h (x_h)^{r_h} = \prod_h (r_h X)^{r_h} = (\prod_h r_h^{r_h})(N\bar{x}) = \left(\frac{N}{Z}\right)\bar{x},$$

where $Z = (\prod_h r_h^{r_h})^{-1}$.

Note that $\log Z = -\sum_h r_h \log(r_h)$ is Theil's entropy measure of the distribution (dispersion) of consumers' income shares. It can be shown that Z achieves its maximum value of N when the consumers' expenditure shares, $r_h$'s are identical, i.e., $r_h = 1/N\ \forall\ h$ (Theil, 1971). In the general case where the consumer's income shares are not identical, the value of Z is always smaller than N. In this case, $N/Z > 1$, which implies that $x^*$ is larger than $\bar{x}$. This indicates that the simple mean value of income is always an under-estimate of the true value of the weighted geometric mean. Thus, the use of per capita income as opposed to the weighted geometric mean of income is a potential source of bias in the specification of the aggregate demand function, especially when consumer income and demographic variables have undergone significant distributional changes during the study period.

For demographic variables, the income-share-weighted means are not generally equal to their simple mean counterparts. The direction and magnitude of the difference between these two means for a particular demographic variable is affected by the correlation between the demographic variable and consumer income. If a particular demographic variable (e.g. household size) is negatively correlated with consumer income, it would be expected that the income-share-weighted mean will be smaller than the simple mean since higher income consumers have a relatively larger weight in calculating the weighted mean than in calculating the simple mean relative to low income consumers. If a particular demographic variable (e.g., years of education for household head) is positively correlated with consumer income, it would be expected that the income-share-weighted mean will be larger than the simple mean. Furthermore, it is evident that a change in consumer income distribution would directly affect the weighted means but not the simple means. Thus, using the income-share-weighted means in aggregate demand analysis can represent the effects of distributional changes on the aggregate demand function. Alternatively, parameter estimates in the aggregate demand function are generally biased if simple means replace weighted means. This important issue has most often been neglected in empirical work.

In order to account for the effects of distributional changes in consumer income and demographics on aggregate demand functions, the income-share-weighted means of socioeconomic and demographic variables should be used. It is evident that calculation of these weighted means literally requires time series information on shares of aggregate income (income distribution) and the demographic information for each consumer. The detailed information required for these calculations is generally unavailable. However, time series information on the average income and selected demographic variables within various income categories and the proportion of consumers belong to these income categories are often available. We now present a method of approximating the aforementioned income-share weighted means by utilizing socioeconomic and demographic information available by income categories.

Redefine the average budget share of a particular commodity for the entire consumer population in terms of the numbers of consumers in each income category, as

$$(7)\quad \bar{w}_i = \frac{\sum_k N_k p_i \bar{q}_{ik}}{\sum_k N_k \bar{x}_k} = \frac{\sum_k N_k \bar{x}_k \bar{w}_{ik}}{\sum_k N_k \bar{x}_k} = \sum_k r_k \bar{w}_{ik},$$

where $\bar{w}_i$ is the budget share for the $i^{th}$ commodity in the entire consumer population, $N_k$ and $\bar{x}_k$ are respectively the number of consumers and the average income (expenditure) in the $k^{th}$ income category, $p_i$ and $\bar{q}_{ik}$ are respectively price and simple average quantity consumed for the $i^{th}$ commodity in the $k^{th}$ income category, $r_k$ is the share of aggregated income (expenditure) represented by the $k^{th}$ income group.

In (7), the budget share for the $i^{th}$ commodity in the $k^{th}$ income category can be written as

$$(8)\quad \bar{w}_{ik} = \frac{\sum_h x_{kh} w_{ikh}}{\sum_h x_{ikh}} = \sum_h r_{kh} w_{ikh}$$

where $x_{kh}$ is the income (total expenditure) for the $h^{th}$ consumer in the $k^{th}$ income category, $r_{kh}$ is the share of the aggregate group $k$ income attributable to the $h^{th}$ consumer in the $k^{th}$ income category, i.e. $r_{kh} = x_{kh} / \sum_h x_{kh}$ , and $w_{ikh}$ is commodity i's budget share for the $h^{th}$ consumer in the $k^{th}$ income category.

The budget share of commodity $i$ for the $h^{th}$ consumer in the $k^{th}$ income category can be expressed as

$$(9)\quad w_{ikh} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(x_{kh}/P) + \sum_f \beta_{if} D_{fkh}.$$

Substituting (9) into (8), results in

$$(10)\quad \overline{w}_{ik} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log(\overline{x}_k^*/P) + \sum_f \beta_{if} \overline{D}_{fk}^*,$$

where $\overline{x}_k^*$ is the weighted geometric mean of income (total expendature) for consumers in the $k^{th}$ income category, defined as $\log(\overline{x}_k^*) = \sum_h r_{kh} \log(x_{kh})$, and $\overline{D}_{fk}^* = \sum_h r_{kh} D_{fkh}$.

As a first approximation, assume that income is uniformly distributed among consumers within a given income group so that the income share, $r_{kh}$ simplifies to $1/N_k$. Then, for the purpose of specifying the aggregate demand function, income and demographic variables within a given income category can be treated as constant and equal to their corresponding arithmetic category means, denoted respectively by $\overline{x}_k$ and $\overline{D}_{fk}$. For a continuous demographic variable such as household size, $\overline{D}_{fk}$ would then be the simple average of household sizes across consumers in a particular income group. For a discrete demographic variable such as race, e.g. Black, $\overline{D}_{fk}$ would be the proportion of Black consumers in a particular income group. The aforementioned approximation will improve as the number of income categories increase.

Incorporating the preceding approximation into the specification of (10) and then substituting that equation into (7), the overall average budget shares for all consumers expressed in terms of the group means of income and demographic variables is obtained as

$$\begin{aligned}(11)\quad \overline{w}_i &= \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i \log([\prod_k (\overline{x}_k^*)^{r_k}]/P) + \sum_j \beta_{if} [\sum_k r_k \overline{D}_{jk}] \\ &= \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i \log(\overline{x}^*/P) + \sum_j \beta_{if} \overline{D}_f^*,\end{aligned}$$

where $\overline{x}^*$ and $\overline{D}_f^*$ correspondingly represent the bracketed terms in the preceding expression. To the order of the first approximation, equation (11) is a theoretically consistent aggregate demand function that accounts for distributional changes in consumer income and sociodemographic variables in the consumer population.

**Empirical Application**

The above theoretical framework to model the effect of distributional changes in consumer income and demographics on aggregate demand functions is applied to China's Urban Household Expenditure Data obtained from the 1983-93 China Statistical Yearbooks. The data includes expenditure information on various aggregate categories of goods. In particular, the expenditure categories of grains, non-grain food (non-staple food), tobacco & beverage (liquor and tea), clothing, and all other goods are available. The data also includes information on average consumer income and a limited amount of demographic information for different income groups as well as the proportions of consumers in each income group.

An iterative Seemingly Unrelated Regression (SUR) procedure is used to estimate the linearized version of the aforementioned AIDS models that utilizes Stone's price index in place of the AIDS price index, P. The all other goods equation is dropped to eliminate singularity of the budget share demand system. The iterative SUR procedure generates parameter estimates that are invariant to the equation deleted. Due to the limited degrees of freedom because of the restricted availability of data, only one demographic variable, household size, is included in the analysis.

**Table 1. Model Specification Test[1]**

| Test | $H_0$: w/o distrib. | $H_0$: w/ distrib. | DF |
|---|---|---|---|
| $P^m$ -Test Statistic | 1.07 | 3.85 | 4 |
| (Chi-square prob. value) | (0.90) | (0.43) | |

[1]DF refers to the degrees of freedom for the Wald chi-square test $P^m$. Probability values are tail probabilities.

Two variations of the AIDS model are estimated. Model I uses simple averages of consumer income and household size and can be thought of as an attempt to specify a system of aggregate consumer demand functions using proxy variables (simple mean income and household size) for the theoretically appropriate income and household size terms (which would be based on an income share-weighted geometric and arithmetic mean, respectively). Model II (equation 11) uses the group-income-share weighted geometric mean of consumer income and mean of household size, which implements the aforementioned approximation to the theoretically correct specification of the aggregate AIDS model.

In order to investigate the necessity of using income-share weighted means of income and household size for representing aggregate demand properly, the outcomes of a non-nested hypothesis test is quite informative. A non-nested hypothesis test (multi-parameter P-test) was applied to contrast the income-share weighted AIDS specification (Model II) with the simple mean AIDS specification (Model I). A multi-parameter P-test is an extension of the P-test, Davidson and MacKinnon (1981); that relaxes the single parameter restriction placed on the test coefficients in the conventional P-test. The test is conducted by including in each budget share equation of the null-hypothesized model an additional variable equaling the respective predicted budget share generated from the model corresponding to the alternative hypothesis. The multiparameter P-test allows more flexibility in the types of mispecification that can be detected and can avoid the potential bias induced by the restriction to a single test parameter in the P-test. The results are presented in Table 1. The multiparameter P test of Model I ($H_0$: model without distribution effects) and Model II ($H_0$: model with distribution effects) indicate that neither model can be rejected as being data incompatible at conventional levels of type I error.

The expenditure and Marshallian price elasticities for Models I and II are presented in Table 2. The price elasticities for Model II are smaller in absolute value, except for the grain-clothing cross prices elasticities. The Model II income elasticity for grain indicates that grain is an inferior good when income distributional effects are accounted for. Non-grain, and tobacco and beverage expenditure elasticities are smaller when income distributional effects are accounted for while income elasticities for clothing and other goods increase.

Relatively speaking, the estimated elasticities from the model accounting for income distributional effects are more consistent with priori knowledge concerning recent changes in consumption behavior of urban Chinese consumers. For example, the negative income elasticity for grain is to be expected given the rapid increase in consumer income in urban areas during the last ten years. This finding is consistent with a recent study on food demand for Chinese urban households (Chern and Wang, 1994). The overall smaller expenditure elasticities for food commodities in the model that accounts for income distributional effects is consistent with the increasingly dispersed income distribution in China. During the last ten years, the income distribution in China has become more skewed in the sense that a greater proportion of aggregate income is held by higher income consumers. According to Engel's Law, as income increases, the percent of consumer income spent on food decreases, and concomitantly the marginal propensity to consume (MPC) food decreases. Thus, at a given level of aggregate income, redistributing income in favor of wealthier consumers would be expected to decrease aggregate food expenditure. This phenomenon could be contributing to the smaller income elasticities for food groups in the model accounting for income distributional changes.

**Table 2. Marshallian Elasticities and Standard Errors for Aggregate AIDS Models: Simple Means (Model I) Versus Income-Share Weighted Means (Model II).**

| | Model I. AIDS Model not Accouting for Income-Share Weighting | | | | | |
|---|---|---|---|---|---|---|
| | Grain | Non-Grain Food | Beverage & Tobacco | Clothing | Other Goods | Expenditure Elasticity |
| Grain | -1.350 | .618 | .194 | .727 | -.359 | .170 |
| | (.261) | (.229) | (.092) | (.172) | (.342) | (.171) |
| Non-grain Food | .067 | -.872 | -.053 | -.401 | .234 | 1.026 |
| | (.051) | (.135) | (.024) | (.065) | (.187) | (.097) |
| Beverage & To-bacco | .211 | -.500 | -1.840 | -.411 | 1.201 | 1.339 |
| | (.137) | (.158) | (.065) | (.135) | (.250) | (.101) |
| Clothing | .393 | -1.088 | -.138 | -1.175 | 1.175 | .832 |
| | (.105) | (.156) | (.057) | (.222) | (.339) | (.125) |
| Other goods | -.139 | .165 | .154 | .320 | -1.641 | 1.141 |
| | (.054) | (.135) | (.029) | (.094) | (.197) | .086) |
| | Model II. AIDS Model Accouting for Income-Share Weighting | | | | | |
| Grain | -1.105 | .269 | .188 | .795 | -.114 | -.032 |
| | (.265) | (.329) | (.099) | (.190) | (.489) | (.141) |
| Non-Grain Food | -.016 | -.779 | -.013 | -.355 | .215 | .947 |
| | (.071) | (.203) | (.025) | (.098) | (.271) | (.085) |
| Beverage & To-bacco | .202 | -.161 | -1.407 | -.257 | .484 | 1.140 |
| | (.150) | (.179) | (.133) | (.150) | (.362) | (.072) |
| Clothing | .407 | -1.039 | -0.094 | -1.174 | .906 | 0.994 |
| | (.116) | (.265) | (.064) | (.245) | (.452) | (.129) |
| Other goods | -.115 | .092 | .054 | .248 | -1.502 | 1.222 |
| | (.084) | (.209) | (.045) | (.126) | (.325) | (.086) |

Note: Elasticities are measured at sample means. Figures in parentheses are bootstrapped standard errors.

The larger income elasticity for clothing in Model II is also consistent with recent observations on the spending behavior of Chinese urban residents. Relative to their rural counterparts, Chinese urban consumers spend more on goods which satisfy the need for self-esteem and esteem by others. In China, an important consideration in judging social status is how well one dresses. In the U.S., the motto is "Dress for Success," in China, its counterpart is "Dress Well to Be Respected."

In recent years, due to the rapid increases in consumer income, urban consumers have spent relatively higher proportions of their income on home appliances, such as color televisions, washing machines, refrigerators, and air conditioners. These electronic home appliances are included in the "Other Goods" category. It is to be expected that the income elasticity of the Other Goods category would be larger when accounting for income distribution effects. The comparison of Model I and Model II results are consistent with this expectation.

Comparing the price elasticities between the two models, the magnitudes of price elasticities in Model I are almost uniformly larger in absolute values than those in Model II. For example, the own price elasticities for grain food, non-grain food, beverage & tobaco, clothing, and other good in Model I are respectively 22.17%, 11.94%, 30.77%, 0.09%, and 9.25% larger in absolute values than their counterparts in Model II. The more inelastic price response in the Model II especially for food categories, is consistent with the priori knowledge that as consumers become more affluent they also become less price-responsive regarding food consumption decisions. Household size (with and without income share weighting) was used as a control variable in an attempt to capture its effect on aggregate demand behavior (see Table 3). It is evident that the effects of household size are considerably different between Models I

**Table 3. Goodness of Fit and Effect of Household Size.**

| Equation | Model I: Not Accounting for Income-Share Weghting | | Model II: Accounting for Income-Share Weighting | |
|---|---|---|---|---|
| | $R^2$ | Household Size Effect | $R^2$ | Household Size Effect |
| Grain Food | 0.982 | 0.03208 | 0.981 | -0.002062 |
| | | (2.008) | | (0.115) |
| Non-grain Food | 0.350 | 0.09104 | 0.201 | 0.07864 |
| | | (1.983) | | (1.570) |
| Beverage & Tobaco | 0.542 | 0.01195 | 0.698 | 0.00322 |
| | | (1.715) | | (0.467) |
| Clothing | 0.843 | -0.05735 | 0.755 | -0.03781 |
| | | (3.0081) | | (1.713) |
| Other Goods | | -0.07772 | | -0.04198 |
| | | (1.548) | | (0.744) |
| Joint Test on Household Size $\chi^2_{.10(4)} = 7.78$ | $\chi^2 = 294.250$ d.f. = 4 | | $\chi^2 = 7.851$ d.f. = 4 | |

Note: The figures in parentheses are t-values.

and II. The joint significance test of household size is significant at the 0.10 level for both models, supporting the inclusion of household size in the models. However, it was unexpected that the significance of household size would deteriorate after accounting for income distributional effects. A likely explanation for this relates to a relatively high multicollinearity between the distribution-corrected household size and RHS price and expenditure variables. This phenomenon is discussed further in the next section.

## Summary, Conclusions, and Limitations

Food demand-related research focusing on transitional economies such as China has increasingly attracted attention due to the potential impact of these economies on world food supply and trade. It was hypothesized that for a transitional economy experiencing increasing income inequality and other sociodemographic changes, such as China, the estimated income elasticities and price elasticities of consumer goods, in particular food, based on the aggregate demand function accounting for the effect of distributional changes in consumer income would be different compared to a model not accounting for the distributional effects. China has attracted worldwide attention because of its potential effects on the world economy, especially on the world food economy, given its rapid economic growth and the size of its population. During the last 15 years, China has undergone dramatic changes in consumer income, income distribution, and in sociodemographics. The traditional time series approach for modeling aggregate demand behavior does not account for distributional changes in consumer income and socio-demographics and can produce misleading price and expenditure elasticities for food and other goods. An empirically tractable procedure to allow such income distribution changes to be explicitly accounted for in the specification of the aggregate demand functions was presented. The proposed procedure was applied to China's Urban Consumer Expenditure Data. For comparison purposes, the traditional demand model, which does not account for distribution effects of consumer income was also estimated.

The empirical results suggest that not accounting for income distributional effects overestimates the magnitude of Chinese price and expenditure elasticities for food products and underestimates expenditure elasticities for clothing and other non-food goods. In particular, the negative expenditure elasticity for grains, smaller expenditure elasticities for food categories and larger expenditure elasticities for non-food categories that were observed for the model incorporating distributional effects are more consistent with the recent changes in the income distribution and spending behavior of Chinese urban consumers. The discrepancies can have significant effects on forecasts of Chinese food demand, particularly for grains. Relatedly, ignoring income distributional effects can lead to misleading projections of the levels of production and trade needed to satisfy a growing Chinese economy.

The result that the non-nested test did not reject Model I, which did not account for distributional effects, is somewhat disappointing, but not entirely unexpected in this application. The power of the test was not expected to be high because of the limited number of observations. More fundamentally, it is possible that the non-nested P-test fails to reject Model I because the RHS variables are able to proxy the omitted distributional effects to some degree. High correlations between distributionally corrected household size and expenditure variables and the corresponding simple mean household size and expenditures (with correlation coefficients respectively 0.98 and 0.99) suggest that this may have been the case for this application. However, this result by no means implies that Model I, without income distributional corrections, is therefore an acceptable Model of Chinese aggregate consumer expenditures, because the estimated impacts of price and expenditure changes no longer represent ceteris-paribus effects, but rather are entangled with any distributional changes that they also proxy. In particular, the rather dramatic joint significance of the household size variables in Model I, and the magnitudes of the household size effects themselves, may very well be largely attributable to their role as proxies for income distribution effects, and not solely due to the effect of household size per se. Additional research to investigate this phenomenon is currently underway.

This study presented a procedure to account for the distributional changes in income and socio-demographics in the specification of aggregate demand functions. However, due to limited sample size, especially related to the number of parameters in the AIDS Models, only one demographic variable (i.e., household size) was included in the current application. Limited sample size decreases the power of statistical tests and limits the precision of individual parameter estimates. Future research utilizing more observations on aggregate demand behavior accounting for income and demographic distributional changes in transitional economies is encouraged in order to document the significance and scope of the aggregation effect.

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