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ORIGINAL ARTICLE

ESTIMATION OF IRANIAN URBAN HOUSEHOLDS DEMAND: (AIDS) APPROACH

Yeganeh Mousavi Jahromi[1], Fatemeh Mohagheghzadeh[2*], Maryam Mahdizadeh[3]
1- Department of Economics, Payame Noor University, Tehran, Iran
2- Department of Economics, Buinzahra Branch, Islamic Azad University, Buinzahra, Ghazvin, Iran
3- Department of Economics, Arak Branch, Islamic Azad University, Arak, Iran

ABSTRACT: In this paper, the Iranian urban household consumption pattern during 1373-1389 is estimated in the form of almost ideal equations (AIDS). In order to design the model, goods are classified into seven main groups namely, food and tobacco, clothing and footwear, housing and furniture, recreation and entertainment, healthcare, transport and communication, and other goods. In this study, based on microeconomic theory, the share of cost is estimated and own price and income elasticities are stated using economic variables. The data have been extracted from the Central Bank, and all homogeneity, symmetry and Slutsky tests are performed. In this paper, the own price and income elasticities were calculated which indicated that food has the lowest elasticity and transportation has the highest elasticity. Also, according to the data, food, clothing, and housing are listed into the essential goods, and furniture, healthcare, transportation, and other goods are listed as luxury goods for Iranian urban consumers.

KEYWORDS: Seven groups of goods, urban households, demand systems, the Almost Ideal Demand System (AIDS)

INTRODUCTION

The Almost Ideal Demand System (AIDS) of Deaton and Mullbauer is one of the most widely used flexible demand specifications. When their demand system was applied to annual British data from 1954 to 1974, Deaton and Mullbauer, (1980) found plausible structural parameter estimates and reasonable price and income elasticity estimates; however, homogeneity and symmetry restrictions were rejected. Based on these and other results they concluded that influences other than current prices and current total expenditure must be explicitly incorporated into the model to explain consumer behavior in a theoretically coherent and empirically robust way. They suggest generalizing their static model by adding dynamic elements and including other factors to improve their original framework. During the period 1980-1991, 89 empirical applications used the AIDS in demand studies (Buse, 1994). At the same time, a lot of effort has been devoted into two interrelated problems associated with the specification and the estimation of the AIDS: the first one has to do with the choice between its linear or non-linear specification and the second with the choice of an aggregate commodity price deflator (Pashardes, 1993; Buse, 1994; Moschini, 1995).

Despite these problems, the AIDS remains one of the better alternative available for the better alternative available for empirical demand analysis. The AIDS has been estimated with conventional econometric techniques, i.e. OLS, SUR and MLE, without paying any attention to either the statistical properties of the data or the dynamic specification arising from time series analysis.

Several studies have been conducted in relation to the demand systems. Deaton and Muellbauer proposed an almost ideal demand system in 1980, and with this model, "Melina" estimated the Spanish food demand over the period 1964 to 1989.

Also in the Iranian economy, a case study of these models is performed, among which Sepahvand, (2004) is notable who has estimated the elasticity of different groups of household budget for housing, clothing, food and ... using linear expenditure system.

Akhondzadeh *et al.*, (2010) in a research entitled “On the welfare effects of energy carriers price adjustment during the years 1376 to 1386”, by using the linear AIDS equations and SUR-GLS method estimated the welfare effects of energy subsidies removal. The authors have considered the international prices to analyze the elimination of subsidies. Based on the results obtained in the research, diversity of the energy

Corresponding Author: Fatemeh Mohagheghzadeh, Department of Economics, Buinzahra Branch, Islamic Azad University, Buinzahra, Ghazvin, Iran. **E-mail:** fmohagheghzadeh@yahoo.com

can compensate the costs due to rise in the energy carrier prices, and also variable CV for higher deciles of urban and rural communities is more.

The outline of the paper is as follows. In section II, we discuss the theoretical foundation of the AIDS .In Section III, the model is estimated on the Iranian urban household consumption pattern during 1373 – 1389 in the form of almost ideal equations (AIDS). Finally, in section IV, we offer a conclusion.

THEORETICAL FOUNDATIONS

The purpose of this section is to review the characteristics and features of some demand systems. In the table 1, extraction method of all functions are compared to each other Therefore, recognizing all types of demand systems, their characteristics and limitations, their relationship with each other, and being aware of the degree of success of each demand system in explaining consumer's behavior is essential in this study. Then the Almost Ideal Demand System (AIDS) is investigated comprehensively.

Table 1: Demand systems

Demand system and the Founders	Extraction method	Model statement
Linear Expenditure System(LES) Establishers: Klein and Rubin (1948) and Gary and Samuelson (1950)	Description of the conditioned form of the direct utility function and Stone Grey $u = \sum \beta_i \log(q_i - \gamma_i)$ $M = \sum p_i q_i$	$p_i q_i = p_i \gamma_i + \beta_i \sum (p_i q_i - p_i \gamma_i)$
An Implicitly Direct Additive Demand System (AIDADS) Founders: Cooper and McLaren (1992); Cooper and McLaren (1996); Rimmer and Powell (1996)	It is obtained from the Hanoch direct additive utility function $\sum U_i(x_i, u\ ) = 1$	$w_i = \frac{(\alpha_i - \beta_i(G(u))}{(1 - G(u))} + \left[\frac{p_i \gamma_i - \frac{(\alpha_i - \beta_i G(u))}{(1 - G(u)} p\gamma}{M} \right]$
Rotterdam model Founders: Burton (1965) and Tile (1964)	It is derived from the utility function without any particular form Max U$(q_1, \ldots, q_n)$ s.t:$\sum p_i q_{i=m}$	The traditional model offered by Tile: $w_i d \ln q_i = \gamma_{ib_i} d \ln Q + \sum_j s_{ij}\, dlnp_j$ $dlnQ = dlnm - \sum_j w_j\, dlnp_j$ and finally the Rotterdam model: $w_i dlnq_i = b_i \left(dlnm - \sum_j dlnp_j \right) + \sum_j s_{ij} dlnp_j$
Translog demand system Founders: Jorgensen, Christensen, and Lau (1975)	It is obtained from the emphasized indirect utility function	$w_i = \frac{\alpha_i + \sum_j \beta_{ij} \log \left({p_j}/{M} \right)}{-1 + \sum_k \sum_j \beta_{kj} \log \left({p_j}/{M} \right)}$

Table 1: continued

Demand system and the Founders	Model statement and Extraction method
The Almost Ideal Demand System (AIDS) Founders: Moellbauer (1976) and Deaton and Moellbauer (1980)	$\frac{\partial \ln c(u,p)}{\partial \ln p_i} = w_i = \alpha_i + \sum \gamma_{ij} \ln p_j + \beta_i \ln({M}/{p})$ $\ln({M}/{p}) = \ln M - \ln p$ $\ln p = \alpha_0 + \sum \alpha_i \ln p_i + \sum_i \sum_j \gamma_{ij} \ln p_i \ln p_j$ Since the model is non-linear, to linearize the system, usually the "Stone index" is used as a proxy or replacement instead of the actual index price $stone\ Index = \sum_{i=1}^{N} w_{it} \ln p_{it}$ $w_i = \alpha_i + \sum \gamma_{ij}\, ln\, p_j + \beta_i\, ln({M}/{stone\ Index}) + \varepsilon_{it}$

2.1. Model Description

p_i is the price good i, q_i is the value of good i, $p_i q_i$ is the minimum wage, $(p_i q_i - p_i \gamma_i)$ is the beyond subsistence expenditure, w_i is the share of good i in the expenditure total, M is the total household expenditure, γ_i indicates the change in consumer behavior, b_i is the marginal propensity to consume, $dlnQ$ is the Divisia value indicator, α_i is the intercept, and lnp_j is the price index of the goods.

2.2. Almost Ideal Demand System

Deaton and Muellbauer (1980) introduced the almost ideal demand system in 1980. They preceded the following steps to extract the application system:

1- Determination of the costs providing preferences.
2- Extraction of the compensation demand function through a derivation is taken from the expenditure function defined in the previous step with respect to prices.
3- To achieve the indirect utility function, the cost function is reversed.
4- Using the indirect utility function, the non-compensatory demand function is obtained
5- To find the almost ideal demand function consider first the cost function below

$$\text{In } C(P,u) = (1-u) \quad \text{Lna}(p) + u\,\text{Lnb}(P) \qquad (1)$$

The cost function (1) is known as the extended logarithmic price-independent expenditure function, which was introduced first by Deaton and Muellbauer (1980). In this function, C represents the total cost, u is the utility index, and p is the price vector. Logs of a(p) and b(p) are presented as follows:

$$\text{Lna}(p) = \alpha_0 + \sum_j \alpha_j \text{LnP}_j + \frac{1}{z}\sum_i \sum_j \gamma^*_{ij}\text{Lnp}_i \text{Lnp}_j \qquad (2)$$

$$\text{Lnb}(P) = \text{Ln a}(P) + \beta_0 \prod_j P_j^{\beta_j} \qquad (3)$$

Where, P_j is the index of the product (group) j, n is number of the goods in the system, and β_j, β_0,γ_{ij},α_j,α_{00} are the coefficients. Using the above definitions, the logarithm of the cost function is:

$$\text{Lnc}(p,u) = \text{Lna}(P) + u[\text{Lnb}(P) - \text{Lna}(P)] \qquad (4)$$

$$\text{Lnc}((p,u) = \alpha_0 + \sum_j \alpha_j \text{LnP} + \frac{1}{2}\sum_i \sum_j \gamma^*{}_{ij}\text{LnP}_i \text{lnp}_j + u\beta_0 \prod_j P_j^{Bj} \qquad (5)$$

Since the cost function must be homogeneous of degree one with respect to prices, so we have:

$$\text{Lnc}(kp,u) = \alpha_0 + \sum_j \alpha_j \text{LnkP}_j + \frac{1}{2} \pm \sum_i \sum_j \gamma_{ij}\text{LnP}_i \text{lnp}_j + u\beta_0 \prod_j P_j^{Bj} +$$
$$u\beta_0 \prod_j (K_p)_j^{\beta_j} = \alpha_0 + \sum_j \alpha_j \text{lnp}_j + \frac{1}{2}\sum_j \sum_j \gamma^*{}_{ij}\text{lnp}_i \text{lnpj} + \qquad (6)$$
$$\left[u\beta_0 \pi_j p_j^{\beta_j}\right] k^{\sum_g \beta_j} + \text{lnk}\sum_j \alpha_j + \frac{1}{2}\sum_i \sum_j \gamma^*_{ij}\left(\text{lnp}_i \text{lnk} + \text{lnklnp}_j + \text{lnklnk}\right)$$

Since the cost function must be homogeneous of degree one with respect to the price, the following restrictions must be imposed on the parameters:

$$\sum_j \alpha_j = 1 \quad , \sum_i \gamma^*_{ij} = \sum_j \gamma^*_{ji} = 0 \quad , \sum_j \beta_j = 0 \qquad (7)$$

With restrictions (7) will have:

$$\text{Lnc}(kp.u) = \text{Lnc}(p,u) + \text{Lnk} \qquad (8)$$

Therefore, if the condition (7) is satisfied, the cost function (8) will be homogeneous of degree one with respect to prices.

2.3. Share equations and almost ideal demand system of equations

In order to extract share equations, we use the logarithmic form of the Shepherd's Lemma. *Based on the* Shepherd's *Lemma*, by derivation of the expenditure function with respect to the cost of good i, the compensatory demand function i is obtained:

$$\frac{\partial C(P,u)}{\partial P_i} = q_i$$

Then we multiply both sides of the equation of Shepherd's Lemma by $\frac{P_i}{C(p,u)}$ and let the total expenditure to be equal to the total income of the individual $M = C(p,u)$. We achieve:

$$\frac{p_1 q_1}{M} = \frac{\partial C(P,u)}{\partial P_i} \cdot \frac{p_i}{C(p,u)}$$
$$W_1 = \frac{\partial \text{Lnc}(P,u)}{\partial \text{Lnp}_1} \qquad (9)$$

Thus, derivative of the logarithmic cost function with respect to the price of good i results in the compensatory for good I as the share of good. By derivation of the logarithmic cost function (5) with respect to logarithm of the price of good i we have:

$$\frac{\partial \text{Lnc}(P,u)}{\partial \text{Lnp}_1} = W_1 = \alpha_1 + \sum_j \gamma_{ij} p_j + \beta_1 u \beta_0 \Pi_j P_j^{B_j} \qquad (10)$$

The second term on the right side of (10) $(\sum_j \gamma_{ij}\text{LnP}_j)$ is due to the fact that a quadratic form can always be written in a symmetrical way:

$$\frac{1}{2}(\sum_i \sum_j \gamma_{ij}\text{Lnp}_1 \text{Lnp}_j = \frac{1}{2}\sum_j \sum_j \gamma_{ji}\text{Lnp}_j \text{Lnp}_i$$

Where; $\gamma_{ij} = \frac{\gamma^*{}_{ij} + \gamma^*_{ji}}{2}$

Note that the function of expenditure share (10) and the corresponding demand function is the compensated demand function, and as it is seen w_i is a function of prices and utility, thus the above compensated function can be converted to the corresponding uncompensated function. In order to derive the non-compensatory share equations, using equation (5), we find the value of u as:

$$u = \frac{\ln M - (\alpha_0 + \Sigma \alpha_j \ln P_j + \frac{1}{2}\Sigma\Sigma \gamma_{ij} Lnp_i \ln p_j)}{\beta_0 \Pi_j P_j^{B_j}} = \frac{\ln M - \ln a(p)}{\ln b - \ln a(p)} \quad (11)$$

Equation (11) represents the indirect utility function of the almost ideal demand system, since it is derived from the reverse of cost function. We show this function with $V(P,M)$. Substitution of u in the compensatory share equation (10) gives:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i [\sum_j \frac{LnM - (\alpha_0 + \Sigma \alpha_j Lnp_j + \frac{1}{2}\Sigma\Sigma \gamma_{ij} Ln_p iLnp_j}{\beta \pi_j P_j^{\alpha_j}}] \beta_0 \Pi_j P_j^{B_j}$$

By rearrangement of the equation above, the non-compensatory share equations of the almost ideal demand system are obtained as follows:

$$w_i = \alpha_i + \sum_j \gamma_{ij} Lnp_j + \beta_j (LnM - Lnp) \quad (12)$$

In which LnP is introduced as follows:

$$Lnp = \alpha_0 + \sum_j \alpha_j Lnp_j + \frac{1}{2}\sum_j \sum_j \gamma_{ij} Lnp_i p_j \quad (13)$$

Thus, the almost ideal demand model in its general form as above is nonlinear. Usually, the "Stone index" is applied as a proxy instead of the actual index to linearize this system. The Stone index is:

$$Lnp_i^* = \sum_{j=1} w_{jt} \ln p_{jt} \quad (14)$$

Using Equation (14), the model is linear and can be easily estimated which is known as the "Linear Approximation of Almost Ideal Demamd System" (LA/ADS). Deaton and Muellbauer showed that this approximation can be accountable in experimental works well.

2.4. Parametric Restrictions in the Almost Ideal Demand Model

In this system, restrictions such as homogeneity, symmetry, and add-up depend only on the undetermined parameters of the model, and these restrictions can be applied simply in the model to be tested. These restrictions include:

(budget) add-up constraint	$\sum_i \alpha_i = 1 \quad , \sum_i \beta_i = 0 \quad , \sum_j \gamma_{ij} = 0$	(15)
Homogeneity constraint	$\sum_i \gamma_{ij} = 0$	(16)
Symmetry constraint	$\gamma_{ij} = \gamma_{ji} \quad i \neq j$	(17)

Since the almost ideal demand system of equations is not achieved by utility maximization with respect to a specified level of income, so there is no reason for the theoretical demand constraints such as (budget) add-up, homogeneity, and symmetry constraints to hold for transactions of this system. Here it is explained how to extract these constraints. The first constraint is the budget add-up constraint meaning that the summation of all contributions of the system must be unity:

$$\sum_i w_i = \sum_i \alpha_i + \sum_i \sum_j \gamma_{ij} Lnp_j + \sum_i \beta_i Ln(\frac{M}{P}) = 1$$

$$\sum_i w_i = \sum_i \alpha_i + \sum_i \gamma_{ij} \sum_j Lnp_j + \ln(\frac{M}{P}) \sum_i \beta_i = 1$$

The necessary condition for obtaining the unity in summation of the following contributions is:

$$\sum_i \alpha_i = 1 \quad , \sum_i \beta_i = 0 \quad , \sum_j \gamma_{ij} = 0$$

Which is the same (15) equation known as the add-up or summation condition. Homogeneity constraint suggests that demand functions arising from utility conditions regarding a certain income level, are homogeneous of degree zero with respect to the level of prices and income. In other words, consumers in the consumption of goods and services are not in a money illusion because in making decision on consumption they pay attention to the costs and real income not to nominal values. According to Euler's theorem, the homogeneity constraints described above can be written as follows:

$$\sum_j \frac{\partial w_i}{\partial LnPj} + \frac{\partial w_i}{\partial LnM} = 0$$

$$\sum_j \frac{\partial w_i}{\partial LnP_j} = \gamma_{ij} - \beta_i (\alpha_j + \sum_i \gamma_{ij} Lnp_i) \quad (18)$$

$$\sum_j \frac{\partial w_i}{\partial LnP_j} = \sum_j \gamma_{ij} - \beta_i \Sigma \alpha_j - \beta_i \sum_i Lnp_i \sum_j \gamma_{ij})$$

But according to the condition due to the summation $\sum_j \alpha_j = 1$. Thus:

$$\sum_j \frac{\partial wi}{\partial LnPj} = \sum_j \gamma_{ij} - \beta_i - \beta_i \sum_i Lnp_i \sum_j \gamma_{ij})$$

We know that $\frac{\partial w_i}{\partial LnM} = \beta_i$. Therefore by its replacement together with the equation above into (18) we have:

$$\sum_j \gamma_{ij} - \beta_i - \beta_i (\sum_i Lnp_i \sum_j \gamma_{ij}) + \beta_i = 0 \quad (19)$$

Since $\sum_i Lnp_i \neq 0$ and $\beta_i \neq 0$, so the only condition for the equation (19) is that $\sum_j \gamma_{ij} = 0$ which is known as the homogeneity constraint which is expressed by equation (16).

The next constraint is Slutsky symmetry constraint. These constraints suggest that crossover effects of compensated demand must be equal to each other. In other words:

$$\frac{\partial q_i}{\partial P_j}\Big|_{u=\bar{u}} = \frac{\partial q_j}{\partial P_i}\Big|_{u=\bar{u}}$$

According to Slutsky equation:

$$\frac{\partial q_i}{\partial P_j} = \frac{\partial q_i}{\partial p_j}\Big|_{u=\bar{u}} - q_j \frac{\partial q_i}{\partial M} \Rightarrow \frac{\partial q_i}{\partial P_j}\Big|_{u=\bar{u}} = \frac{\partial q_i}{\partial P_j} + q_j \frac{\partial q_i}{\partial M} \quad (20)$$

Therefore, Slutsky symmetry condition reads:

$$\frac{\partial q_i}{\partial p_j} + q_j \frac{\partial q_i}{\partial M} = \frac{\partial q_j}{\partial p_i} + q_i \frac{\partial q_j}{\partial M} \quad (21)$$

By multiplying both sides of equation (31-2) by $p_i p_j$, condition in the share state can be written as follows:

$$\frac{\partial w_i}{\partial Lnp_j} + w_j \frac{\partial w_i}{\partial LnM} = \frac{\partial W_i}{\partial Lnp_i} + w_i \frac{\partial w_j}{\partial LnM} \quad (22)$$

The symmetry constraint in the AIDS is:

$$\gamma_{ij} - \beta_i \alpha_j - \beta_i \sum_i \gamma_{ij} Lnp_i + \beta_i w_j = \gamma_{ji} - \beta_j \alpha_i - \beta_j \sum_i \gamma_{ij} Lnp_j + \beta_j w_i$$

By achieving $\sum_j \gamma_{ij} Lnp_j$ from equation (22) and substituting in the above equation, we get:

$$\gamma_{ij} - \beta_i \alpha_j - \beta_i w_j + \beta_i \alpha_j + \beta_i \beta_j (\ln M - \ln p) + \beta_i w_j =$$

$$\gamma_{ji} - \beta_j \alpha_i - \beta_j w_i + \beta_j \alpha_i +_i \beta_i \beta_j (\ln M - \ln p) + \beta_j w_i$$

Therefore;

$$\gamma_{ij} = \gamma_{ji}$$

Which tells the symmetry condition in Slutsky that is expressed by equation (17). The reason for the choice of word "almost" is that the negativity constraint related to the negative semi-definite identity of the Strusky matrix depends on sample data (the matrix is a function of the amount of contributions, prices, and expenditures. Thus, the negativity can be considered only in a certain point).

2.5. Elasticity in the Almost Ideal Demand Model

Since the AIDS is based on shares of goods (W_i), it is necessary first to obtain the formula of price and income elasticities based on W_i:

$$w_i = \frac{p_i q_i}{M}$$

Differentiation with respect to Pi gives:

$$\frac{dw_i}{dp_i} = \frac{1}{M}[q_i + p_i \frac{\partial q_i}{\partial p_i}]$$

Multiplication of both sides of the above equation by $\frac{P_i}{W_i}$ yields:

$$\frac{dw_i}{dp_i} \cdot \frac{P_i}{w_i} = \frac{1}{M}[q_i + p_i \frac{\partial q_i}{\partial p_i}] \frac{p_i}{w_i} = \frac{p_i q_i}{M} \cdot \frac{1}{w_i} + \frac{P_i}{M} \cdot \frac{\partial q_i}{\partial p_i} \cdot \frac{p_i}{w_i}$$

Since, $\frac{P_i}{M} = \frac{w_i}{q_i}$, a replacement in the equation above gives:

$$\frac{dw_i}{dp_i} \cdot \frac{P_i}{w_i} = 1 + \frac{w_i}{q_i} \cdot \frac{\partial q_i}{\partial p_i} \cdot \frac{P_i}{q_i}$$

$$\frac{d\ln w_i}{d\ln p_i} = 1 + \varepsilon_{ii} \Rightarrow \varepsilon_{ii} = -1 + \frac{d\ln w_i}{d\ln p_i}$$

For crossover elasticity:

$$\frac{dw_i}{dp_j} = \frac{P_i}{M} \cdot \frac{\partial q_i}{\partial p_j}$$

$$\frac{dw_i}{dp_j} \cdot \frac{P_j}{w_i} = \frac{p_i}{M} \cdot \frac{\partial q_i}{\partial p_j} \cdot \frac{p_j}{w_i}$$

$$\frac{d\ln w_i}{d\ln p_j} \cdot = \frac{w_i}{q_i} \cdot \frac{\partial q_i}{\partial p_j} \cdot \frac{p_j}{w_i} = \varepsilon_{ij}$$

With the introduction of Kronecker delta δ_{ij} which is equael to one for i=j and zero for $i \neq j$, the general formula for price elasticity yields:

$$\varepsilon_{ij} = \frac{\partial w_i}{\partial \ln p_j} \cdot \frac{1}{w_i} - \delta_{ij} \qquad \begin{cases} \delta_{ij} = 1 & i = j \\ \delta_{ij} = 0 & i \neq j \end{cases} \tag{23}$$

For the income elasticity:

$$\frac{dw_i}{dM} = \frac{P_i}{M}\left(\frac{\partial q_i}{\partial M} - \frac{q_i}{M}\right)$$

$$\frac{\partial q_i}{\partial M} = \frac{dw_i}{dM} \cdot \frac{M}{P_i} + \frac{q_i}{M} = \frac{dw_i}{dLnM} \cdot \frac{1}{P_i} + \frac{q_i}{M}$$

By multiplying the both sides of the above equation in $\frac{M}{q_i}$ we have:

$$\frac{\partial q_i}{\partial M} \cdot \frac{M}{q_i} = \frac{dw_i}{dLnM} \cdot \frac{M}{P_j q_i} + 1$$

$$\varepsilon_i = \frac{dw_i}{dLnM} \cdot \frac{1}{W_i} + 1 \tag{24}$$

In order to extract uncompensated price elasticity from the almost ideal share demand equations (23) we make derivation with respect to $\ln p_j$ and get:

$$\frac{\partial w_i}{\partial Lnp_j} = \gamma_{ij} - \beta_i \frac{\partial Lnp}{\partial Lnp_j} = \gamma_{ij} - \beta_i (\alpha_j + \sum_k \gamma_{jk} \ln p_k)$$

By replacement it in (23) we have:

$$\varepsilon_{ij} = \frac{\gamma_{ij} + \beta_i (\alpha_j + \sum_k \gamma_{jk} Lnp_k)}{w_i} - \delta_{ij} \tag{25}$$

As mentioned earlier, since the system of almost ideal demand equations are nonlinear, usually the Stone index is used to linearize it. This type of system of equations is known as the linear approximation of the AIDS equations. Note that the linear approximation of the system is only one method of linearizing the model, and other ways can be applied too. With this approximation, the price elasticities are:

$$\varepsilon_{ij} = \frac{\gamma_{ij} - \beta_i w_j}{w_i} - \delta_{ij} = \begin{cases} \varepsilon_{ij} = \dfrac{\gamma_{ij}}{w_i} - \beta_i - 1 & i = j \\ \varepsilon_{ij} = \dfrac{\gamma_{ij}}{w_i} - \beta_i \left(\dfrac{w_j}{w_i}\right) & i \neq j \end{cases} \tag{26}$$

To achieve the expenditure elasticities in the linear approximation model, the derivation of the contribution in terms of the total expenditure is taken in the AIDS equations that are:

$$\frac{\partial w_i}{\partial LnM} = \beta_i$$

So by substituting the above equation in (24), expenditure elasticity in the almost ideal we have:

$$\varepsilon_i = 1 + \frac{\beta_i}{w_i} \tag{27}$$

ECONOMETRIC RESULTS

The AIDS is one of the appropriate methods to calculate the own price and -income elasticities. In this context, this paper uses the system for urban households and to analyze the consumption patterns. According to the following equation:

$$w_i = \alpha_i + \sum_{j=1} \gamma_{ij} P_j + \beta_j Ln \frac{M}{P}$$

The applied equations are: food and tobacco, clothing, housing, furniture, healthcare, transport and communication and other goods. Share of each good group has been collected from the Statistical Center of Iran. Also, the price index of these groups for urban households is collected from the central bank, and the study interval is during the years 1373-1389. According to the above equation, the random form of the linear AIDS model is considered as:

$$w_i = \alpha_i + \sum_{j=1} \gamma_{ij} P_j + \beta_j Ln \frac{M}{P} + \varepsilon_{it}$$

Before model estimations, first they are examined to be stationary by K.P.S.S test. The test statistic is the sum of squared residuals since if a shock occurs in the time series and it is long-lasting, affects the sum of squares, and grows to a critical area with time; in this condition, H_0 hypothesis is no longer acceptable (Seddighi, 2006).

Table 2: variables used in demand equations

Cost	Urban household	lM State
Food and tobacco	H hypothesis accepted	0/167
Clothing and footwear	H hypothesis accepted	0/155
Housing	H hypothesis accepted	0/163
Furniture and services of households	H hypothesis accepted	0/151
Healthcare	H hypothesis accepted	0/171
Transportation and communication	H hypothesis accepted	0/182
Recreation and entertainment	H hypothesis accepted	0/195

The variables used in demand equations are all in stationary level and there is no spurious regression problem (Table 1).
To estimate the equations considered in SUR method, it is first necessary to examine the existence of contemporaneous autocorrelation using *Breusch and Pagan* test.
H hypothesis suggests that all covariance are zero, and if it is verified there will be no need to use seemingly unrelated regressions method, and one can achieve the efficient estimations through OLS.
The *Breusch and Pagan test* statistic λ is as follows:

$$\lambda = n \sum_{i-2}^{G} \sum_{j=1}^{i-1} r_{ij}^{2}$$

Which has the asymptotic distribution X^2 and with $\frac{G(G-1)}{2}$ degrees of freedom (Seddighi, 2006).
According to the test introduced above, the value of λ for urban households is 54.22.
According to the asymptotic distribution statistic X-24/99, H_0 cannot be accepted, and actually one of the covariance values is non-zero indicating the presence of contemporaneous correlation, so the SUR method must be used for the estimation.

Table 3: Test of homogeneity (chi-square statistic X^2)

	Recreation and entertainment	Transportation	Healthcare	Furniture	Housing	Clothing	Food
Urban	4/2	6/67	9/14	20/94	4/83	7/73	4/31
	Null hypothesis is rejected	Null hypothesis is rejected	Null hypothesis is rejected	Null hypothesis is rejected	Null hypothesis is rejected	Null hypothesis is rejected	Null hypothesis is rejected

Table 4: Test of symmetry (chi-square statisticX^2)

Region	Test statistic	Test result
Urban	190.1	Rejection of the null hypothesis

3.1. Almost ideal demand system with constraints
This section deals with the estimation of AIDS with constraints. Application of constraints means that the homogeneity $(\sum_{i=1}^{5} s_{ij} = 0)$ and symmetry $(s_{ij} = s_{ji})$ constraints are applied in the model. Since seven groups of: 1- Food and Tobacco, 2- Housing, 3- Clothing and Footwear, 4- Furniture and household services, 5- Healthcare, 6- Transportation and Communications, and 7- Recreation and entertainments are supposed for the model estimation, so the AIDS equation is estimated with statistical data of 1373 to 1389 and using the simultaneous equations system SUR, and the results of AIDS pattern after the elimination of defects due to classical assumptions are presented in tables 5 and 6.

To find reliable price income elasticities, it is necessary to examine homogeneity and symmetry constraints to be regarded in demand equations in the case they do not hold. As it is evident from the test results of homogeneity and symmetry constraints, they do not hold in the study interval, and they must be applied in the model. After that, with these estimated coefficients, own price and income elasticities are calculated. Based on the model estimation results, most of the estimated variables are statistically significant. However, due to insignificance of some variables, the increase level is considered to be high. Elasticities of the main groups are calculated in urban society based on which the position and importance of each major group of goods can be seen according to income and price changes.

Table 5: test of own price and income elasticities

Groups	food	clothing	housing	furniture	healthcare	transportation	Other goods	Elasticity of income
Food	-0/05	-0/73	-0/42	-1/11	-1/82	-0/28	-1/42	0/29
Clothing		-0/71	-0/37	-0/27	-0/71	-0/28	0/36	0/76
Housing			-0/71	-0/52	-0/73	-0/54	-0/87	0/41
Furniture				-1/3	-0/02	-0/023	0/31	1/93
Healthcare					-1/81	0/05	1/35	1/73
Transportation						-2/03	2/21	2/44
Other goods							-2/37	1/57

According to own price elasticities, it can be seen that among the items of goods, food has the lowest elasticity. In fact, it can be stated that urban households have a slight reaction in food consumption with price changes, which is obvious since food is the main requirement of any individual. Also, the transportation has the highest own price elasticity which is -2.03. If the price of this group changes, urban households put it aside from their consumption faster than other groups.

Table 6: test of the costs of contribution in the household

Other goods	transportation	Health care	furniture	housing	clothing	food
0/137	0/139	0/091	0/044	0/318	0/047	0/225

According to the Table 6, it is viewed that the largest costs contribution in the household budgets is for housing. Families spend 31.8% of their income for housing, and the lowest spend is related to furniture and clothing groups with respectively 4/4% and 4.7% of income. Also, it is seen form the table that food, clothing, and housing are essential goods, and furniture, healthcare, transportation, and other groups are luxury goods to urban consumers in Iran.

CONCLUSION

In this article according to the purpose of this research, the AIDS was estimated using data from the annual consumption expenditure of Iranian urban households and annual price index of the whole country in the period 1373-1389. Results of the model estimation, and assumptions about consistency with theoretical properties of consumer behavior showed that in the almost ideal system, homogeneity and symmetry constraints do not hold and these two conditions were imposed in the research. In addition, with the results obtained, housing has the highest, and furniture and clothing have the lowest contribution in the household budget. Results show the own price and income elasticities were calculated which indicated that food has the lowest elasticity and transportation has the highest elasticity. Also, food, clothing, and housing, are essential and furniture, transportation, healthcare, and others are luxury items.

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