ESTIMATING INCOME AND PRICE ELASTICITIES FOR FOOD COMMODITIES USING TIME SERIES DATA FOR PAKISTAN

Summera Maqbool Abbasi[1] and Dr. Zahid Asghar[2]

Abstract

This study is conducted to analyze the consumer's behavior in Pakistan regarding their income and prices of ten most commonly used food items incorporating annual disappearance data of Pakistan for the period 1971-72 to 2010-2011. Characteristics of time series data (stationarity and cointegration) have been checked before specifying the most appropriate form of the model. Three models namely LA/AIDS, static LA/AIDS and finally ECM LA/AIDS are estimated by employing the seemingly unrelated regression (SUR). The parameters estimates of static LA/AIDS and ECM- LA/AIDS are further used to find short- and long-run demand elasticities. The expenditure elasticities from LA/AIDS and Static LA/AIDS show that all commodities are necessities except rice and meat. However, while using ECM- LA/AIDS the results show that all commodities are necessities except milk and fruits. For almost all items the own price elasticities have negative signs and reasonable in magnitude except for rice and fruits while using LA/AIDS and Static LA/AIDS. However, own price elasticities for all commodities have negative sign with the exception of fruits while using ECM LA/AIDS.

Keywords: Food consumption, LAIDS model, SUR Models, elasticities, food commodities, Pakistan

1. Introduction

Food is the most basic requirement of human being to perform their daily routine activities. The food production and consumption trends play critical part in economic growth. Food consumption over time is has been growing rapidly, mainly because of increase in population and overall income level. Several components for example income levels, market

[1] Author is M.Phil Scholar at IIU, Islamabad and
[2] Author is Faculty Member at NIBAF, Islamabad and Quaid-i-Azam University, Islamabad

prices, urbanization, population growth, preferences etc affects demand for food.

In Pakistan, food consumption trends have modified with passage of time. Though cereals and milk products consists of more than half of the diet. Yet, there is shift in demand for food items related to animal products over the last two decades. This is mainly because there is an increase in size of middle and upper income class. Pakistan's population has increased, to 173.5 million from 85.09 million between 1980 and 2010 by an average population growth rate of more than 2%. In order to provide this populace smoothly, production of food needs to be raised accordingly.

A significant progress has been made by Pakistan in raising the per capita availability of major food items, accordingly the aggregate utilization of proteins and calories indicate generally a positive picture concerning food security. Yet unluckily, disaggregated facts refer that a substantial number of Pakistan's people still experiences low incomes and insufficient diets. In 2008, the rise in international prices for vital food commodities has expanded the danger of food insecurity and poverty in numerous developing countries, including Pakistan (Haq *et al.,* 2011). Individuals in Pakistan are vulnerable to food insecurity due to the absence of good governance and political will to resolve the problem of hunger. The government focused on food availability however no concentration has been paid on food accessibility and utilization issue (Mittal and Sethi, 2009).

Besides income and price other components also affect demand of consumers. if income increases, the consumers raise the utilization of additional and high esteemed food goods and the way around and with the ascend in prices of food items, low income people decrease their consumption or move to low cost and low quality food utilization and vice versa. Several studies in Pakistan like, Chaudry *et al.,* (1987), Alderman (1988), Burney and Khan (1991), Boius (1992), Burki (1997), Chaudry *et al.,* (1999), Aziz and Malik (2006), Haq *et al.,* (2009), Haq and Cranfield (2011), Haq *et al.,* (2011), and various others have evaluated the price and income elasticities. Calculated price and income elasticities are indispensable for the formulation of policies regarding taxes, targeting prices of essential goods, and motivate consumers and producers by providing certain incentives.

The purpose of the study is to estimate demand elasticities (price and income elasticities) of ten essential food items by incorporating time series annual data. The studies used in past differ in their scope and moreover in the nature of data utilized. Cross sectional data has been used by majority of the studies in past, except Chaudry *et al.*, (1987), Burki (1997), Chaudry *et al.*, (1999), Aziz and Malik (2006). The studies in Pakistan employed LA/AIDS for time series annual data but ignored the characteristics of time series annual data. Previous studies did not use ECM version of LA/AIDS for the estimation of food demand elasticities by using time series data. However, a genuine need is required to calculate the price and income elasticities for various food items with latest available data set and most modern technique. Particularly study has estimated:

- What is the pattern of per capita consumption for preferred food items in Pakistan over the period 1971-72 to 2010-2011?
- How to estimate income and price elasticities by employing system demand equations?
- What policies could be formulated on the basis of estimated elasticities (income and price elasticities) to deal with issue of accessibility?

The study is organized into 5 Sections: The Section 1 has been detailed earlier. Section 2 contains a detailed critical literature review. Section 3 is devoted to discussing the analytical foundations for the empirical analysis and the sources of the data used for the present study. Section 4 contains the estimates of our empirical analysis. Section 5 concludes the study with the conclusions and policy implications, suggestions and limitations of the study and directions for possible future research. References are given at the end.

2. Studies on Consumer Demand in Pakistan

Numerous countries have been organized various researches to analyze demand elasticities of food items and consumption trends over the years and to tackle with diverse problems associated with the consumption behavior of consumer. Several methodologies for investigating the price and income elasticities of food items have been evaluated by these studies. To examine consumer's demand patterns, Almost Ideal Demand System (AIDS) is the generally broadly employed methodology. Deaton and

Muellbauer (1980a) first employed this technique for examining elasticities of eight non-durable commodities while operating on annual data for the period 1954 to 1974. Deaton and Muellbauer (1980a) analyzed that AIDS model has the capacity to describe the high rate of variance for the goods share in budget.

Several studies in Pakistan has utilized Linear Almost Ideal Demand System (LA/AIDS) of Deaton and Muellbauer (1980a) and calculated demand elasticities of eatable items by incorporating cross sectional and time series data like, Burki (1996), Alderman (1988), Chaudry *et al.*, (1999), Aziz and Malik (2006), Farooq *et al.,* (1999), Haq *et al.,* (2011), Haq *et al.,* (2008), Aziz *et al.,* (2012) and Haq *et al.,* (2009). Linear form of the AIDS called as LA/AIDS was employed by Alderman (1988), but he calculated the elasticities by using formulas from the AIDS model, it was not suitable. Green and Alston (1990) mentioned while operating on LA/AIDS employing the AIDS elasticity formulas is justifiable only when either there are homothetic preferences or constant group price. To calculate demand elasticities Chaudry *et al.,* (1999), Aziz and Malik (2006) and Burki (1996) employed time series data. Ordinary Least Squares (OLS) has been employed by Chaudry *et al.,* (1987) using time series data for food grains to estimate the simple linear equation.

Different types of estimation methods are used in Pakistan for consumer demand analysis, which ranges as of simple double or semi log form to the very refined AIDS model. To estimate demand elasticities log linear, double log or semi log functional forms are employed in Pakistan by different studies like, Rehman (1963), Siddique (1982) and Burney and Khan (1991). The other popular techniques which has been used in past for calculation of income and price elasticities are the Stone's (1954) Linear Expenditure System (LES) and Lulch's (1973) Extended Linear Expenditure System (ELES). LES has been employed by Ahmad, *et al.,* (1988) and Ahmad and Ludlow (1987) to analyze consumer's response regarding income and prices utilizing survey data. ELES is estimated by Ali (1985) to analyze consumer's consumption and saving conduct.

To estimate expenditure and price elasticities Chaudry *et al.,* (1999), Aziz and Malik (2006) and Burki (1997) operated on time series disappearance data. Burki (1997) estimated the consumer demand elasticities for Pakistan by employing time series annual data for the

period 1972-73 to 1991-92 incorporating a set of food items (beef, fish, chicken, beef, mutton, rice, mung, gram and milk). Aziz and Malik (2006) examined income and price elasticities utilizing time series data over the period 1950 to 2003, only incorporated meat items (beef, chicken, fish and mutton). Chaudry *et al.,* (1999) analyzed consumer demand preferences by incorporating time series data from 1950 to 1997 for diverse food groups (vegetables, fruits, cereals, meat and pulses).

Error Correction Model is nowadays widely used for time series data analysis. It is employed only when the properties of time series data (stationary and co-integration) exists. To examine the consumer demand behavior for time series annual data, Karagiannis and Velentzas (1997), Sulgham and Zapata (2006), Karagiannis and Mergos (2002), Karagiannis, *et al.,* (2000) and Zahedi (2006) employed ECM LA/AIDS.

The time series annual disappearance data of ten food items (Rice, Wheat, Sugar Refined, Tea, Milk, Meat, Vegetables, Vegetable Ghee, Fruits and Pulses) is incorporated for the period 1971-72 to 2010-11.

Data set is acquired from various survey round/years of Economic Survey, Monthly Bulletin of Federal Bureau of Statistics, Statistical yearbook of Pakistan and Agricultural Statistics of Pakistan. The data for Production of relevant food items is acquired from various surveys of Monthly Statistical Bulletin of Federal Bureau of Statistics, Economic Survey and Statistical Yearbook of Pakistan. The import export and production data on sugar and tea is acquired through Statistical Supplement of Pakistan 2010-11. The data on import and export of other food items has been acquired from various surveys of Agricultural Statistics of Pakistan.

If overall data for annual per capita consumption is not available then disappearance data will be used as an appropriate proxy for annual consumption data.

Per Capita Consumption will be calculated using disappearance data
PCC= (Production + Imports – Exports)/ Population

To investigate per capita consumption trend Burki (1997), Chaudhry *et al.*, (1999), Aziz and Malik (2006) incorporated annual disappearance data in their studies.

2.1 Consumption Trends for Food Items in Pakistan

Pakistan has faced fast increase in population over the last few decades that have caused the massive increase in demand, particularly for food. Food consumption patterns have also undergone change overtime in Pakistan. To comprehend the consumer's response regarding changes of relative prices and income is significant, since this information is vital to formulate a broad range of development policy issues.

Figure1: Per Capita consumption trend from 1971-2010

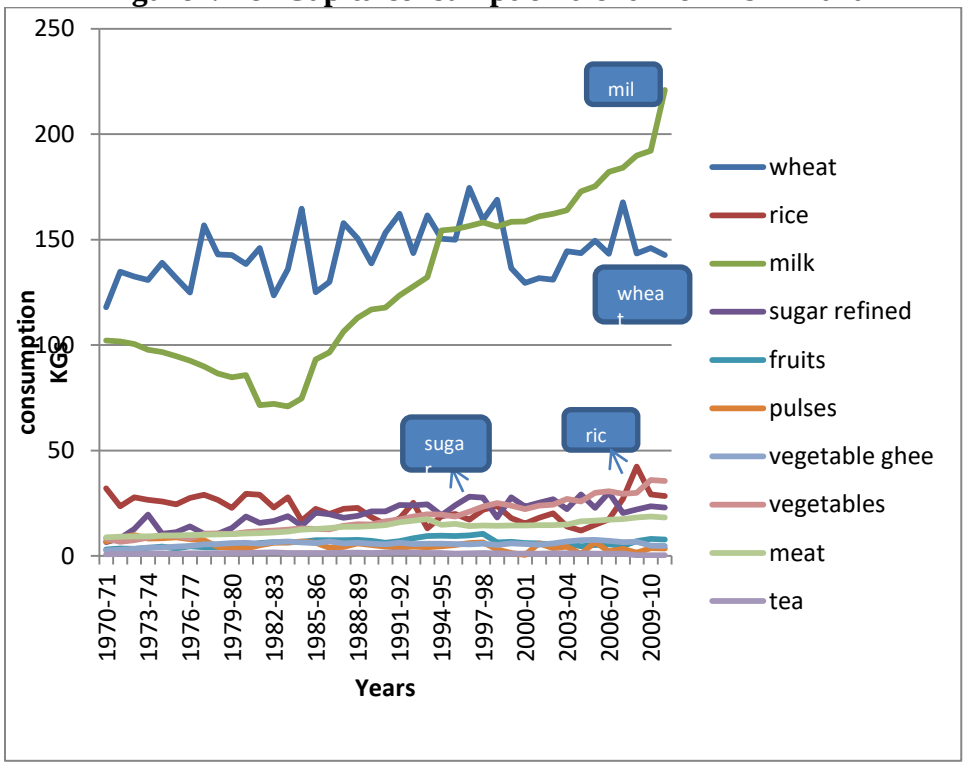

Figure 1 indicates per capita consumption trend for ten food goods consist of rice, wheat, milk, fruits, milk, vegetable ghee, pulses, vegetables, meat and tea, which is based on annual per capita consumption data. Milk and wheat constitute a major fraction in our food consumption

than other goods, because large proportion of population consumes wheat and milk in large quantity. The per capita consumption of rice and refined sugar also shows increasing trend, while per capita consumption for meat group has increased steadily since 1970's. The consumption of pulses and vegetables has decreased during the same period. The consumption for pulses indicates a steady turn down since 1970s throughout the study period. Although, the consumption of vegetables shows a decreasing trend since 1970s but there are some fluctuations in the last decade. The consumption of meat has steadily increased since early 1970s. The per capita consumption of fruits shows increasing trend since 1970's but after 1990 it shows fluctuations, have decreasing trend during 1990s and 2001-05 and after 2005 per capita consumption of fruits increased.

3. Empirical Model and Methodology

Since the last three decades, system-wide approaches have been adopted for consumer demand analysis. Various forms of demand systems exists to analyze consumer demand behavior, comprising the Rotterdam model, linear and quadratic expenditure systems, Translog models and the Almost Ideal Demand System (AIDS). But, the AIDS model has acquired much importance in demand systems in last three decades. Angus Deaton and John Muellbauer have introduced the AIDS model in 1980, it can be view as a considerable achievement in the development of demand systems.

$$w_i = \propto_i + \sum_j \gamma_{ij}\, lnp_j + \beta_i ln\left(x/P\right) \qquad (1)$$

Where,

w_i means the budget share for i^{th} commodity

x refers to the whole spending/expenditures at the entire goods within consumer's bundle

P_j are the j^{th} commodity's prices

lnP denotes the price index

x refers the whole spending or expenditures is calculated with $\sum_{i=1}^{n} P_i\, Q_i$, where P_i are prices for good i while Q_i refers to quantity demanded of the good i .

γ_{ij} implies the parameter on the natural log of the price of i^{th} good and the natural log of the price of j^{th} good.

β_i measures the change in the real expenditure and its effect on budget shares. β_i is negative for necessities and positive for luxuries.

lnp is a translog price index reported as,

$$lnp = \propto_0 + \sum_k \propto_k lnp_k + {}^1/_2 \sum_j \sum_k \gamma^*_{kj}\, lp_k lnp_j \qquad (2)$$

If this price index will be employed, demand system would be non-linear, that makes estimation procedure complex in result. It was recommended by Deaton and Muellbauer (1980) to employ stone price index instead of translog price index to make AIDS model linear. The linear and nonlinear AIDS only differ in the selection of the price index. Stone price index is written as;

$$lnP^* = \sum \mathrm{W_k}\, lnP_k \qquad (3)$$

The standard restrictions of demand theory (i.e., adding up, homogeneity, and symmetry) can be easily imposed

Adding up conditions are;

$$\sum \alpha_i = 1, \qquad \sum \beta_i = 0, \qquad \sum \gamma_{ij} = 0 \qquad (4)$$

Homogeneity and symmetry conditions are;

$$\sum \gamma_{ij} = 0 \qquad (5)$$

$$\gamma_{ij} = \gamma_{ij} \qquad (6)$$

3.1 LONG RUN AND SHORT RUN ANALYSIS

The LA/AIDS evaluated while avoiding the characteristics of the time series data is well-known as static LAIDS, which is additionally called as the long run LAIDS.

$$s_i = \alpha_i + \sum \gamma_{ij} lnP_j + \beta_i ln\left({}^m/_P\right) + G_i s_{it-1} \qquad (7)$$

s_{it-1} implies the lagged budget share for i^{th} commodity, and it represents the long run habit affect. The long run model suppose that short run and long run response of consumer has no difference, implies that behavior of consumer has been in equilibrium all the time. Yet, there are lot of reasons which avoid consumers to settle their expenditures immediately to change in prices and income, habit formulation, adjustment costs, incorrect data, wrong presumptions and unpredicted fluctuations in prices are some of these reasons (Anderson and Blundell, 1983). Therefore, consumers are always far from equilibrium level unless full adjustment happens. Furthermore, while making policies regarding tax and business strategies, policy makers are liable to be more concerned

with short-run elasticities. Thus, long run equilibrium relationship is significant to supplement with a short run adjustment instrument. Moreover, static LA/AIDS model ignores the properties of time series data, while nearly all time series data are non-stationary, and the existence of unit roots can nullify the asymptotic distribution of the estimated parameters. So, the estimation of the static LAIDS might give spurious results. Some authors like Attfield (1997), Ng (1995) and Karagiannis and Mergos (2002) suggested while incorporating the co-integration and error correction techniques spurious regression issue can be beaten. The long run and short run relationship is possible to analyze via transforming the co-integration regression into an ECM. Prior to examine the co-integration relationship, variables incorporated in model must be investigated for unit roots.

When the linear combination of explanatory variables and co-integration relationship in the dependent variables in the static LA/AIDS is developed, an ECM version of the LA/AIDS will be suitable to estimate. The ECM form of LA/AIDS employed in the study is specified as

$$\Delta s_i = \varepsilon_i \Delta s_{t-1} + \sum_{j=1}^{n} \gamma_{ij}\, lnp_j + \beta_i ln\left(m/P\right) + \lambda_i \mu_{it-1} + \mu_t \qquad (8)$$

In above model, Δ refers to difference operator, Δs_{it-1} shows consumer's habits in last period, μ_{it-1} indicates estimated lagged residuals from co-integration equations, the parameter λ_i measures the adjustment speed to the long run equilibrium.

3.2 Elasticities

Elasticities are more meaningful to measure the consumer's response for demand due to change in income or prices.

By using following formulas elasticities can be calculated;
Expenditure elasticity is written as

$$\eta_i = \beta_j / w_i + 1 \ , \qquad \eta_i > 1 \ if \ \beta_j > 0 \ and \ \eta_i < 1 \ if \ \beta_j < 0 \qquad (9)$$

If η_i is greater than 1 it means that good is luxurious while if η_i is less than 1 it implies that good is in necessities.

For uncompensated price elasticities

$$E = [BC + I]^{-1} (A + I) - I \quad (10)$$

The elements in A (an $n \times m$ matrix) are

$$a_{ij} = -\delta_{ij} + \gamma_{ij}/w_j - \beta_i(w_i/w_j) \; and \; \delta_{ij} = 1 \; if \; i = j, \; \delta_{ij} = 0 \text{ if } i \neq j \quad (11)$$

B (an n×1 vector) consists of $b_i = \beta_i/w_j$, and C (a 1×n vector) consists of $c_i = w_i ln P_i$ and I is identity matrix.

Compensated elasticities will be:

$$E^* = E + NW' \quad (12)$$

Where E is the matrix of uncompensated price elasticities, N is the matrix of income elasticities, and W' is an n-vector of budget shares.

Short run income and price elasticities will be calculated by employing above mentioned elasticity formulas and the estimated parameters from equation (8), however long-run demand elasticities will be calculated by employing the same elasticity formulas and the estimated parameters from equation (7) (Zahedi, 2006).

3.3 Time Series Econometric Methodology

Karagiannis and Velentzas (2000) mentioned that attempts done in previous years related to estimation of consumer's demand stressed progressively on the selection of the functional form, and very little consideration has been given to the statistical characteristics of the time series data. Subsequently Karagianni and Velentzas (2000), Karagiannis and Mergos (2002), to examine characteristics of time series data is important prior to establishing the most suitable form of the model, to evaluate if the long run demand relationships are economically significant or only spurious. At very first, the number of unit roots of every individual time series for stationarity (i.e. the order of integration) need to be identified before incorporating the co-integration techniques. Thus, to estimate the characteristics of time series data, initially the unit root tests will be incorporated and then co-integration among variables will be analyzed. When the variables used in analysis are integrated of order one and also co-integration exists, at that time ECM structure of the AIDS is likely to employ and estimate:

4. Empirical Results

The LA/AIDS, ECM-LA/AIDS and Static LA/AIDS models have been estimated by employing seemingly unrelated regression while estimated demand elasticities (price and expenditure elasticities) through incorporating the parameters estimated from the above mentioned systems. It is necessary to examine characteristics of time series data before employing ECM-LAIDS. The LA/AIDS system is estimated before employing characteristics of time series data. The complete system of budget share equations of ten food items is investigated with the LA/AIDS system. The system for ten budget share equations is evaluated while imposing symmetry and homogeneity restrictions in terms of model parameters. Only nine out of the ten equations are independent, to fulfill the adding up restriction and thus one budget share equation is deducted from the system of budget share equations, to secure the non-singularity of the error co-variance matrix. The dropped parameters of equation are retrieved while using the adding up property, which is $\Sigma S_{it} = 1$.

Table 1: Estimated Parameters using LA/AIDS over the period 1971-2010 in Pakistan

Parameters	Wheat	Rice	Milk	Sugar refined	Fruit Group	Pulses Group	Vegetable Ghee	Vegetable Group	Meat Group	Tea
γ_{i1}	0.189329 **(0.031914)**									
γ_{i2}	-0.04122 **(0.019533)**	0.125937 **(0.02)**								
γ_{i3}	-0.0797 **(0.03)**	-0.06991 **(0.0216)**	0.226808 **(0.045956)**							
γ_{i4}	-0.01108 **(0.02)**	0.009241 **(0.0136)**	-0.00512 **(0.02089)**	0.031502 **(0.0203)**						
γ_{i5}	0.011109 **(0.0132)**	-0.00677 **(0.009196)**	-0.1146 **(0.014834)**	0.004256 **(0.008445)**	0.074954 **(0.009515)**					
γ_{i6}	0.011092 **(0.013)**	-0.00013 **(0.010238)**	-0.02843 **(0.0155)**	0.000495 **(0.008829)**	-0.00205 **(0.007220)**	0.025685 **(0.009838)**				
γ_{i7}	-0.02451 **(0.012544)**	0.001997 **(0.008508)**	0.028693 **(0.013434)**	-0.01349 **(0.007477)**	0.006341 **(0.006604)**	0.000633 **(0.006486)**	0.014072 **(0.008554)**			
γ_{i8}	0.013301 **(0.0068)**	-0.00908 **(0.005270)**	-0.03507 **(0.008852)**	0.014085 **(0.005637)**	0.002537 **(0.003703)**	0.003412 **(0.004088)**	0.002833 **(0.003185)**	0.01391 **(0.002870)**		
γ_{i9}	-0.05906 **(0.01142)**	0.006208 **(0.012052)**	0.038488 **(0.018840)**	-0.01776 **(0.008200)**	0.002575 **(0.009085)**	-0.01019 **(0.009487)**	-0.00582 **(0.008382)**	-0.00182 **(0.004269)**	0.054693 **(0.054693)**	
γ_{i10}	-0.00926	-0.01629	0.03882	-0.01214	0.021642	-0.00052	-0.01075	-0.00412	-0.00732	7E-05
α_i	0.642329* **(0.08233)**	0.168252* **(0.05822)**	-0.309186* **(0.087)**	0.158334* **(0.0746)**	-0.020351 **(0.038)**	0.128033* **(0.039)**	0.077647* **(0.035531)**	0.056584* **(0.023151)**	-0.000631 **(0.003054)**	
β_i	-0.02462* **(0.007)**	-0.01225* **(0.00504)**	0.065955* **(0.008013)**	-0.00403 **(0.007)**	-0.00495 **(0.003221)**	-0.01203* **(0.003402)**	-0.0036 **(0.003)**	-0.004** **(0.0023)**	0.006361* **(0.002357)**	

Note: * Indicates significance at 5% level.

** Indicate significance at 10% level.

Table 1; display the estimated parameters by employing the above mentioned LA/AIDS model. The intercept terms α_i , having positive signs for rice, wheat, pulses, sugar, vegetable Ghee, and Vegetables and statistically significant at 5% level. It explains that there is an exogenous growth in the demand of these food items which is independent of the variation in income and prices. For meat and fruit groups, the intercept

terms are not statistically significant at 5% and 10% level. The intercept term for milk is negative in sign while it is statistically significant, which shows that in the share of milk there is exogenous descend during the whole time.

After LA/AIDS, to examine the long run habit effects the static LA/AIDS have been evaluated. The Static LA/AIDS model does not focus on the characteristics of time series data but used to acquire the long run habit effects. s_{it-1} indicates the lagged expenditure share for group i and shows the habit effects. Other studies also incorporated this variable s_{it-1} like Zahedi 2006, Karagianis *et al.*, 2000. With static LAIDS the system of ten expenditure share equations of food items is examined by employing seemingly Unrelated Regression. In terms of model parameters, symmetry and homogeneity restrictions are implemented. One equation is reduced from the system of budget share equations and adding up property is used to recover the parameters of excluded equation.

Table 2: Parameters estimates using Static LAIDS incorporating habit affect

Coefficients	Wheat	Rice	Milk	Sugar Refined	Fruit Group	Pulses Group	Vegetable Ghee	Vegetable Group	Meat Group	Tea
γ_{i1}	0.201285 **(0.028152)**									
γ_{i2}	-0.05756 **(0.017170)**	0.125631 **(0.017194)**								
γ_{i3}	-0.07628 **(0.024868)**	-0.06213 **(0.019124)**	0.213642 **(0.042264)**							
γ_{i4}	-0.00422 **(0.017558)**	0.003585 **(0.012052)**	-0.00112 **(0.019453)**	0.037745 **(0.020826)**						
γ_{i5}	0.008919 **(0.012212)**	-0.00926 **(0.008523)**	-0.0925 **(0.013733)**	0.00642 **(0.008688)**	0.057131 **(0.011212)**					
γ_{i6}	0.029021 **(0.013457)**	0.000171 **(0.010082)**	-0.03107 **(0.016526)**	-0.00827 **(0.010310)**	0.003441 **(0.007208)**	0.013798 **(0.010808)**				
γ_{i7}	-0.02845 **(0.011783)**	0.005213 **(0.008343)**	0.025219 **(0.013260)**	-0.00624 **(0.007883)**	0.004398 **(0.006690)**	-0.00259 **(0.006676)**	0.016995 **(0.008741)**			
γ_{i8}	0.00587 **(0.008141)**	-0.00182 **(0.006274)**	-0.03084 **(0.010769)**	0.00485 **(0.006754)**	-0.00225 **(0.004909)**	0.001128 **(0.005796)**	0.002972 **(0.004299)**	0.019278 **(0.004939)**		
γ_{i9}	-0.06563 **(0.013157)**	0.012123 **(0.012038)**	0.020666 **(0.018608)**	-0.02036 **(0.009020)**	0.005509 **(0.010104)**	-0.00811 **(0.009625)**	-0.00759 **(0.008404)**	0.00296 **(0.006134)**	0.066005 **(0.019182)**	
γ_{i10}	-0.01296	-0.01596	0.034415	-0.0124	0.018181	0.002477	-0.00993	-0.00215	-0.00559	-0.0039
β_i	-0.025478 **(0.006290)**	-0.009079 **(0.00444)**	0.057722 **(0.007646)**	-0.001248 **(0.006874)**	-0.003437 **(0.003098)**	-0.016529 **(0.004357)**	-0.001318 **(0.002850)**	-0.006429 **(0.002628)**	0.005757 **(0.002750)**	
G_i	-0.151552* **(0.03227)**	0.215574* **(0.078271)**	0.185284* **(0.049244)**	0.049408 **(0.089777)**	0.318073* **(0.139655)**	-0.269249* **(0.113306)**	-0.052353 **(0.172115)**	-0.181574 **(0.115624)**	-0.120076 **(0.124078)**	
α_i	^ И□^ Ŷ142* **(0.077116)**	0.109062* **(0.053910)**	-0.286* **(0.079152)**	0.134570** **(0.075468)**	-0.032161 **(0.036862)**	0.186624* **(0.048965)**	0.056266 **(0.036062)**	0.071185* **(0.028368)**	-0.002897 **(0.021509)**	

Note: For estimation procedure software Eviews 5 is used
* Shows significance at 5% level
**Shows significance at 10% level

Table 2 presents the estimated parameters by employing the Static LA/AIDS and also incorporated long run habit effects. Results indicates that intercept terms $\alpha_{i,}$ are statistically significant at 5% level for rice,

wheat, pulses, vegetables and vegetable ghee however, α_i for sugar is statistically significant at 10% level and having positive signs. It explains that some other factors affect demand for these goods except price and income of the consumers. Intercept term for milk is significant at 5 % level and has negative sign, which shows that over the time there is exogenous decrease in the demand for milk irrespective of change in income and prices. The Coefficients (Gi) of lagged budget share sit-1 are statistically significant at 5% for rice, wheat, fruits, milk and pulses. Rice, milk, sugar and fruits have positive sign indicating that consumption in last year positively affects the consumption in next year.

Further the characteristics of the time series data have been estimated to employ the ECM LA/AIDS. ADF test is employed to investigate each variable of the time series data to check the order of integration data and the existence of unit roots (non-stationarity).

Table3: Tests for time series characteristics

Variables	**Level**	**First Difference**	**Conclusion**
	ADF Test	**ADF Test**	**I(1)**
S01	-0.42017	-8.62045	I(1)
S02	-2.49534	-6.66796	I(1)
S03	-1.34285	-6.44225	I(1)
S04	-0.72104	-7.09389	I(1)
S05	-1.72710	-6.14057	I(1)
S06	-1.57492	-7.00559	I(1)
S07	-2.51022	-6.42336	I(1)
S08	-1.18834	-5.27876	I(1)
S09	-2.47867	-6.97587	I(1)
S010	-0.43871	-5.95233	I(1)
Lnp1	-0.24125	-5.32855	I(1)
Lnp2	0.77674	-2.76080***	I(1)
Lnp3	-2.17182	-5.73378	I(1)
Lnp4	-1.35330	-5.15155	I(1)
Lnp5	1.21689	-3.58065	I(1)
Lnp6	-0.29585	-7.70945	I(1)
Lnp7	0.09796	-5.44127	I(1)
Lnp8	-1.44068	-7.95121	I(1)
Lnp9	-2.40207	-4.30232	I(1)
Lnp10	-1.46707	-4.91410	I(1)
Ln(m/p)	-0.26925	-6.17186	I(1)

Note: The econometric package Eviews 5 is used and MacKinnon critical values are used for rejection of the null hypothesis of a unit root. The superscripts *, **, *** shows significance at 1%, 5% and 10% correspondingly.

The results related to the time series properties of these data are reported in Table.3. By employing the ADF (Dickey and Fuller, 1981) test, the null hypothesis is that all relevant prices and budget shares consists of a unit root which cannot be rejected at 1%, 5% or 10% level of significance. However, while using first difference, the presence of unit root is rejected at same significance level, indicating that variables are integrated of order one i.e. I(1). Results show that by taking first difference, series becomes stationary which means the existence of unit root and nonstationarity in the original data. After getting this information, it is necessary to check the short run and long run relationships among the variables. So, further for examining co-integration between variables Engle and Granger (1987) technique is employed.

Table 4 presents the findings for co-integration while employing Engle and Granger (1987) two step techniques. Results in table 4 indicate that all the budget shares are co-integrated with prices of goods and expenditures at 5% level of significance. Co-integration rectify that any disturbance affecting prices of goods or expenditures are exhibited on diverse expenditure shares in the same manner, indicating that these variables are going side by side in the long run while follow the equilibrium constraint.

Table4: Test to examine co-integration

Variables	**Co-integration test**
Budget Share(S01) of Wheat	-5.14
Budget Share(S02) of Rice	-8.24
Budget Share(S03) of Milk	-3.36
Budget Share(S04) of Sugar	-5.14
Budget Share(S05) of Fruits	-3.69
Budget Share(S06) of Pulses	-3.03
Budget Share(S07) of Vegetable Ghee	-2.20
Budget Share(S08) of Vegetables	-3.58
Budget Share(S09) of Meat	-1.55
Budget Share(S010) of Tea	-3.87

Previous results indicates that the entire prices, expenditures and budget shares are integrated of the same order i.e. I(1) and variables are also co-integrated. The system can be represented by error correction

model, if co-integration prevails among variables (Engle and Granger, 1987). After checking for desirable characteristics of the data, the ECM version of LA/AIDS is employed which can be written as;

$$\Delta s_{it} = \varepsilon_i \Delta s_{t-1} + \sum_{j=1}^{n} \gamma_{ij}\, lnp_j + \beta_i ln\left(m/P\right) + \lambda_i \mu_{it-1} + \mu_t \qquad (13)$$

The estimated parameters for ten food items by using ECM LA/AIDS are shown in table 5. The complete system for ten budget share equations of food items is estimated with ECM LA/AIDS. In system of budget share equations, symmetry and homogeneity conditions are applied as model parameters. In order to meet up adding up constraint, one equation is reduced from budget share equations and parameters of reduced equation are restored via using the adding up property, which is $\Sigma s_{it} = 1$.

Table 5: Parameter estimates by employing the ECM-LA/AIDS over the period 1971-2010

parameters	wheat	rice	Milk	Sugar	Fruits	Pulses	Vegetable Ghee	Vegetables	Meat	Tea
γ_{i1}	ˬ □≦68 **(0.0265)**									
γ_{i2}	-0.023 **(0.01516)**	0.05 **(0.02)**								
γ_{i3}	-0.085 **(0.023)**	-0.0035 **(0.02)**	0.24256 **(0.03434)**							
γ_{i4}	0.04546 **(0.02)**	-0.01021 **(0.0124)**	-0.047 **(0.019502)**	0.031530 **(0.023006)**						
γ_{i5}	-0.007 **(0.0096)**	-0.01452 **(0.00852)**	-0.01022 **(0.010913)**	-0.015 **(0.0084)**	0.041303 **(0.012)**					
γ_{i6}	-0.01051 **(0.0118)**	0.0074 **(0.00874)**	-0.0111 **(0.01375)**	0.012 **(0.011034)**	-0.00122 **(0.00621)**	0.011 **(0.009513)**				
γ_{i7}	-0.0282 **(0.00914)**	-0.0084 **(0.00785)**	-0.0085 **(0.0103)**	-0.0074 **(0.008)**	0.002 **(0.0076)**	-0.0003 **(0.006)**	0.04 **(0.009131)**			
γ_{i8}	-0.004045 **(0.0076)**	-0.00233 **(0.005712)**	-0.0151 **(0.009)**	0.007 **(0.007)**	-0.004 **(0.00444)**	-0.004 **(0.005410)**	0.0045 **(0.00406)**	0.014 **(0.004240)**		
γ_{i9}	-0.0391 **(0.013)**	-0.01102 **(0.01076)**	-0.02 **(0.01346)**	-0.01335 **(0.0098)**	-0.00222 **(0.0096)**	-0.00833 **(0.008)**	0.009 **(0.01023)**	-0.005 **(0.00532)**	0.104050 **(0.0221)**	
γ_{i10}	-0.02	0.02	-0.0425	-0.00313	0.0106	0.0052	0.000853	0.00837	-0.01432	-0.0326
β_i	-0.00997 **(0.023)**	-0.015 **(0.014)**	0.0106 **(0.025)**	0.0174 **(0.02142)**	-0.00103 **(0.0078)**	-0.00052 **(0.02)**	-0.001622 **(0.0076)**	0.000732 **(0.0086)**	-0.0006 **(0.009414)**	
λ_i	-1.1982 **(0.181314)**	-1.2583 **(0.121)**	-0.7603 **(0.097)**	-1.06686 **(0.16807)**	-0.76192 **(0.2004)**	-1.03313 **(0.175)**	-0.393454 **(0.165)**	-0.851806 **(0.18)**	-0.642456 **(0.19446)**	
ε_i	0.112672 **(0.094441)**	0.069789 **(0.085442)**	0.161520 **(0.07)**	0.042764 **(0.09933)**	0.166126 **(0.16)**	0.151527 **(0.12)**	-0.034930 **(0.1342)**	0.059202 **(0.0974)**	0.008585 **(0.13)**	

Note: The figures in parenthesis are standard errors.

The estimated parameters ε_i are all significantly different from zero and have positive sign except vegetable ghee, indicates that habit persistence has a significant contribution in food consumption decision-making process. It implies that allocation of food expenditures on different goods in past affects the current decision of consumer regarding selection of food merchandise. The coefficient (λ_i) of the error correction terms have the correct signs and are all statistically significant at 5% level,

reporting that any divergence of expenditures from the long-run equilibrium are corrected with the passage of time.

4.1 Elasticity Estimates

4.1.1 Expenditure Elasticities

The expenditure elasticities using LA/AIDS, ECM LA/AIDS and Static LA/AIDS for ten food commodities are given in Table 6.

Table 6: Expenditure Elasticities of food items in Pakistan, over the period 1971-2010

Expenditure Elasticities			
Commodities	**LA/AIDS**	**ECM LA/AIDS**	**Static LA/AIDS**
Wheat	0.879294	0.951118	0.875072
Rice	0.810345	0.768438	0.85945
Milk	**1.181897**	**1.029231**	**1.159191**
Sugar	0.953743	0.953743	0.98569
Fruits	0.846972	**1.536248**	0.893832
Pulses	0.554847	0.96193	0.388469
Vegetable Ghee	0.926292	0.989318	0.97303
Vegetables	0.754492	**1.044951**	0.605209
Meat	**1.053889**	0.995154	**1.048772**
Tea	0.82521	0.938742	0.999002

Note: Short run elasticities, evaluated by employing parameters of Static LA/AIDS, Yet long run elasticities estimated by employing parameters of ECM-LA/AIDS

For almost all items the expenditure elasticities from LA/AIDS model are positive and below one apart from meat and milk. However, the expenditure elasticities of milk and meat have positive signs and greater than unity, reports so as these are luxury merchandise while consumers increase their spending on these commodities when income expands. Haq *et al.,* (2011) also found the similar results that expenditure elasticities for fruits, meat and milk are greater than one, implies that these goods are

luxurious goods. Burki (1996) found that expenditure elasticity for chicken is more than unity representing chicken as a luxurious item.

Our results show that expenditure elasticities for rice and wheat have positive signs and below one indicate, these are necessary items. Usually, fruits are about 50 to 100% extra costly compare to vegetables in Pakistan so it is predictable that fruits have large expenditure elasticities. By means of above prediction, results found as fruits have higher expenditure elasticities compare to vegetables. The expenditure elasticities of vegetables are expected to be low since these are considered as the cheapest food items. These elasticities are higher than pulses but lower than other food items used in analysis. Expenditure elasticities for vegetable ghee and sugar have positive signs but somewhat near to unity, because of high expenditure share of these food items in sample. Expenditure elasticities of pulses as expected are quite lower than others.

While employing ECM LA/AIDS, short run expenditure elasticities for most of commodities have positive signs and less than unity. However, the elasticities of fruits, milk and vegetables are unexpectedly greater than unity, shows that these are luxury food items as compared to other goods. Long run expenditure elasticities derived through Static LA/AIDS indicates that all the long run expenditure elasticities for rice, wheat, sugar, Pulses, Fruits, Vegetable Ghee, Vegetables and Tea are positive in signs and below unity reports that people spend more on these food items as there income expands while rise in consumption is less than as income expands. However, expenditure elasticity of meat (1.048) and milk (1.16) is greater than unity and positive in signs implying that these are luxurious commodities. Expenditure elasticity of pulses group is smaller than other food items which are fairly reasonable due to the fact as income increases households want to spend more on other merchandise as compared to pulses. The expenditure elasticity estimates from Static LA/AIDS are almost similar to the estimates from LA/AIDS model.

4.2 Compensated and Uncompensated Price Elasticities

4.2.1 Elasticities by using parameters of LA/AIDS model

The Uncompensated price elasticities for ten food items calculated by incorporating the parameter estimates from LA/AIDS are presented in table 7.

Table 7: Uncompensated Elasticities while using parameters of LA/AIDS

	Wheat	Rice	Milk	Sugar	Fruits	Pulses	Vegetable Ghee	Vegetables	Meat	Tea
Wheat	-0.0607	-0.5707	-0.2334	-0.1035	0.1622	0.4446	-0.4095	0.8534	-0.4496	-0.1006
Rice	-0.5819	0.9456	-0.2337	0.0615	-0.7126	-0.2137	0.0404	-0.9357	0.0723	-0.384
Milk	-0.1853	-0.175	-0.3991	-0.2816	-3.7722	-1.7081	0.1137	-3.2125	0.111	0.3694
Sugar	-0.0747	0.1111	-0.3434	-0.6478	0.0135	-0.0268	-0.2728	0.7824	-0.1443	-0.2986
Fruits	0.4809	-0.1977	-4.3134	0.0991	0.8942	-0.2621	0.1196	-0.1788	0.0336	0.5683
Pulses	0.5456	-0.0136	-2.0376	-0.0943	-1.3093	-0.5966	-0.0194	-0.7724	-0.0532	0.0247
Vegetable Ghee	-0.4073	0.0507	0.081	-0.2896	-0.0722	-0.0729	-0.7149	0.0189	-0.0427	-0.2658
Vegetables	1.0972	-0.5299	-3.6777	0.8172	-0.5179	-0.0788	0.1633	-0.6944	0.0019	-0.0873
Meat	-0.4517	0.0639	0.1357	-0.1322	0.1732	-0.0159	-0.0431	0.1064	-0.5467	-0.2102
Tea	-0.1285	-0.4116	0.3419	-0.351	0.0715	-0.2245	-0.2861	-0.4971	-0.1946	-0.9797

Uncompensated Own price elasticities of almost every items are negative in signs and reasonable in magnitude while it is positive for fruits and rice. Burki (1997) found that own price elasticity for rice is positive and Aziz and Malik (2006) found that for mutton it is positive. Results in table 7 refers that for all food goods consumer demand presents an inelastic pattern, own-price elasticities about most of food merchandise is below one, showing an inelastic demand. More specifically, for wheat the own-price elasticity is -0.06 indicates, if price of wheat rise by 10% it leads to just 0.6% decline in demand for wheat, holding income and other prices as constant that indicates the own price elasticity of wheat is highly inelastic. If there is 10% increase in cost of sugar, pulses, milk, vegetables, vegetable ghee, tea and meat it decreases their demand by 6.4% ,5.9%, 3.9%, 6.9%, 7.1%, 5.4% and 9.7% respectively. Only the own-price elasticity for tea, as compared to others is found as very elastic.

4.2.2 Compensated price elasticities by using parameter estimates from LA/AIDS are reported in table 8.

Table 8: Compensated price elasticities employing LA/AIDS

	Wheat	Rice	Milk	Sugar	Fruits	Pulses	Vegetable Ghee	Vegetables	Meat	Tea
Wheat	0.1323	-0.1375	-0.0282	0.0329	0.0868	0.0814	-0.0713	0.0815	-0.1716	-0.0064
Rice	-0.1375	1.0142	-0.7196	0.2303	-0.0724	0.025	0.0798	-0.1243	0.2141	-0.213
Milk	-0.0282	-0.7196	-0.0119	0.0731	-0.2837	-0.0514	0.128	-0.0804	0.2242	0.1461
Sugar	0.0329	0.2303	0.0731	-0.5516	0.1638	0.0423	-0.3677	0.4514	-0.4305	-0.3358
Fruits	0.0868	-0.0724	-0.2837	0.1638	1.3477	-0.0363	0.2447	0.0947	0.1976	0.7076
Pulses	0.0814	0.025	-0.0514	0.0423	-0.0363	-0.0227	0.0723	0.1425	-0.259	0.0198
Vegetable Ghee	-0.0713	0.0798	0.128	-0.3677	0.2447	0.0723	-0.6632	0.0743	-0.001	-0.181
Vegetables	0.0815	-0.1243	-0.0804	0.4514	0.0947	0.1425	0.0743	-0.1295	0.0064	-0.2137
Meat	-0.1716	0.2141	0.2242	-0.4305	0.1976	-0.259	-0.001	0.0064	-0.4186	-0.0229
Tea	-0.0064	-0.213	0.1461	-0.3358	0.7076	0.0198	-0.181	-0.2137	-0.0229	-0.9591

For most of commodities compensated own price elasticities have negative signs but it is positive for rice, wheat and fruits. If for sugar, pulses, milk, vegetables, vegetable ghee, tea and meat price expands by 10% tend to decrease the demand by 5.5%, 0.22%, 0.11%, 1.2%, 6.6%, 9.5%, and 4.1%, holding other prices constant. For these commodities own price elasticities are below one shows, these goods have inelastic demand pattern. While comparing to others tea comprises of elastic response.

4.2.3 Elasticities by using parameters of ECM LA/AIDS

Estimates of uncompensated price elasticities of food items while incorporating the parameters from ECM LA/AIDS are presented in table 9.

Table 9: Uncompensated price elasticities incorporating parameters from ECM LA/AIDS

	Wheat	Rice	Milk	Sugar	Fruits	Pulses	Vegetable ghee	Vegetables	Meat	Tea
Wheat	-0.1756	-0.3187	-0.2359	0.5303	-0.1713	-0.331	-0.5464	-0.1613	-0.314	-0.4297
Rice	-0.3587	-0.2688	-0.0365	-0.1735	-0.5091	0.2264	-0.2048	-0.2628	-0.085	0.2328
Milk	-0.2246	-0.0069	-0.3379	-0.5736	-0.4229	-0.5411	-0.2453	-1.1386	-0.1983	-1.1505
Sugar	0.5365	-0.1061	-0.588	-0.6479	-0.4617	0.436	-0.1541	0.4048	-0.1101	-0.1261
Fruits	-0.0591	-0.4168	-0.366	-0.2873	0.468	0.1235	0.147	0.1482	-0.0239	0.8935
Pulses	-0.3203	0.308	-0.5563	0.4413	-0.0808	-0.6199	-0.0139	-0.2509	-0.0704	0.0885
Vegetable ghee	-0.5371	-0.1519	-0.2533	-0.1466	0.0202	-0.009	-0.2452	0.2677	0.0734	0.0098
Vegetables	-0.1157	-0.0837	-1.1554	0.4537	-0.2486	-0.2056	0.2863	-0.1081	-0.0406	0.2674
Meat	-0.3148	-0.0852	-0.1989	-0.1115	-0.0255	-0.0721	0.0723	-0.0444	-0.1179	-0.3705
Tea	-0.3823	0.5077	-1.1931	-0.089	0.2323	0.1121	0.0085	0.1666	-0.3647	-1.9045

For all goods own price elasticities are reasonable in magnitude and negative in signs but it is positive for fruits. The own price elasticities for almost all commodities is less than one, indicating consumer demand for these commodities have inelastic pattern, while own price elasticity for tea is greater than 1 shows that demand for tea is elastic which is 19%. For wheat own-price elasticity is -0.17 indicates that, a 10% price increase for wheat tends to 1.7% decline in its demand holding income and other prices constant, shows that for wheat own price elasticity is highly inelastic. Similarly if for sugar, pulses, milk, vegetables, vegetable ghee, tea and meat price expands by 10%, decreases demand by 6.4% and 6.1%, 3.3%, 1.0%, 2.4%, 19%, 1.1%, correspondingly. For tea own-price elasticity is found as fairly elastic.

The estimated compensated price elasticities while employing the parameters of ECM LA/AIDS are reported in table 10 below;

Table 10: Compensated elasticities employing parameters of ECM-LA/AIDS

	Wheat	Rice	Milk	Sugar	Fruit Group	Pulses Group	Vegetable Ghee	Vegetable Group	Meat Group	Tea
Wheat	0.0268	-0.0463	-0.0557	0.3101	-0.0018	-0.0245	-0.0894	-0.0035	-0.0737	-0.0421
Rice	-0.0463	-0.2183	0.3086	-0.0708	-0.1924	0.141	-0.081	-0.0198	-0.0526	0.3313
Milk	-0.0557	0.3086	0.0315	-0.0422	0.0042	-0.0035	0.0255	-0.0253	0.0641	-0.078
Sugar	0.3101	-0.0708	-0.0422	-0.5512	-0.1364	0.1632	-0.0356	0.0945	-0.035	0.0032
Fruit Group	-0.0018	-0.1924	0.0042	-0.1364	0.3082	-0.0106	0.103	-0.1002	0.0494	0.3656
Pulses Group	-0.0245	0.141	-0.0035	0.1632	-0.0106	-0.5805	0.0385	-0.1182	-0.1903	0.2314
Vegetable Ghee	-0.0894	-0.081	0.0255	-0.0356	0.103	0.0385	-0.1944	0.1077	0.2947	0.0565
Vegetable Group	-0.0035	-0.0198	-0.0253	0.0945	-0.1002	-0.1182	0.1077	-0.1258	-0.1756	0.553
Meat Group	-0.0737	-0.0526	0.0641	-0.035	0.0494	-0.1903	0.2947	-0.1756	-0.0005	-0.0822
Tea	-0.0421	0.3313	-0.078	0.0032	0.3656	0.2314	0.0565	0.553	-0.0822	-1.795

The own price elasticities of most of food goods are quite reasonable in magnitude and observe negative signs except for milk, wheat and fruits own price elasticities observes positive signs. For sugar, rice, pulses, vegetables, vegetable ghee, tea and meat, the own price elasticities shows if price boost up by 10% tends to reduce the demand of above mentioned commodities by 5.5%, 2.1%, 5.8%, 1.2%, 1.9%, 17.9% and 0.004%, holding other prices and income as constant. These commodities have inelastic demand as own price elasticities for these goods are below unity. When comparing with other goods, tea has most elastic demand. Unexpectedly meat shows inelastic demand when comparing with others, as it is nearly equal to zero.

4.2.4 Elasticities by using parameters of Static LA/AIDS

Uncompensated price elasticities are estimated while incorporating parameters from Static LA/AIDS are reported in given table 11.

Table 11: Uncompensated elasticities by employing Static LA/AIDS parameters

	Wheat	Rice	Milk	Sugar	Fruit group	Pulses group	vegetable ghee	Vegetable group	Meat group	Tea
Wheat	-0.0029	-0.8251	-0.2205	-0.0159	0.1579	1.1256	-0.4855	0.4209	-0.5113	-0.197
Rice	-0.8279	0.9377	-0.1973	0.0173	-0.5807	-0.1298	0.1078	-0.3666	0.1085	-0.3916
Milk	-0.1765	-0.1513	-0.4374	-0.2182	-3.1493	-1.7452	0.1001	-2.8496	-0.0031	0.3431
Sugar	0.0094	0.0462	-0.2556	-0.5691	0.1698	-0.318	-0.1266	0.2749	-0.1714	-0.3144
Fruit group	0.423	-0.2801	-3.5245	0.1786	0.5318	0.0122	0.0841	-0.351	0.0482	0.4697
Pulses group	1.1909	-0.0428	-2.0437	-0.4347	-1.2301	-1.1598	-0.0912	-1.1693	-0.0614	0.0829
Vegetable ghee	-0.4791	0.1156	0.0825	-0.1314	0.0322	-0.0741	-0.653	0.1306	-0.0636	-0.2521
Vegetable group	0.6311	-0.1214	-3.2565	0.2188	-1.0101	-0.3467	0.1559	-0.6271	0.0282	-0.0472
Meat	-0.506	0.1133	0.0073	-0.1609	0.1562	-0.0101	-0.06	0.1269	-0.4469	-0.161
Tea	-0.1988	-0.3935	0.345	-0.3148	0.466	0.0737	-0.2526	-0.0545	-0.1604	-1.0998

The own price elasticities for food items observes negative signs and also reasonable in magnitude but for fruits and rice own price elasticities have positive signs. For milk, wheat, sugar, pulses, vegetables, vegetable ghee, tea and meat own-price elasticities of reports that, 10% increase in their prices tend to decrease the demand of these commodities with the rate of 4.3%, 0.02%, 5.6%, 11.6%, 6.2%, 6.5%, 11%, 4.4%, holding other prices and income constant. The own price elasticities for wheat, milk, sugar, vegetable ghee, vegetables and meat lie below one implies that these goods have inelastic behavior. If compared with others, tea (-1.0998) and pulses (-1.1598) has most elastic demand. When comparing with others wheat has highly inelastic behavior that is -0.00287, means if price for wheat expands very small decline occurs regarding its demand.

Compensated price elasticities are estimated while incorporating parameters from Static LA/AIDS are reported in given table 12.

Table 12: Estimated compensated elasticities while incorporating parameters of static LA/AIDS

	Wheat	Rice	Milk	Sugar	Fruits	Pulses	Vegetable Ghee	Vegetables	Meat	Tea
Wheat	-0.1517	-0.974	-0.3694	-0.1648	0.009	0.9767	-0.6344	0.272	-0.6601	-0.3459
Rice	-0.9758	0.7898	-0.3452	-0.1306	-0.7286	-0.2778	-0.0401	-0.5145	-0.0394	-0.5395
Milk	0.0384	0.0637	-0.2224	-0.0032	-2.9343	-1.5302	0.3151	-2.6347	0.2118	0.5581
Sugar	-0.0059	0.0308	-0.271	-0.5844	0.1544	-0.3334	-0.142	0.2595	-0.1868	-0.3298
Fruits	0.3147	-0.3884	-3.6328	0.0703	0.4235	-0.0961	-0.0243	-0.4593	-0.0601	0.3613
Pulses	0.5704	-0.6634	-2.6643	-1.0553	-1.8507	-1.7804	-0.7118	-1.7899	-0.682	-0.5377
Vegetable Ghee	-0.5071	0.0876	0.0545	-0.1593	0.0043	-0.1021	-0.681	0.1027	-0.0915	-0.2801
Vegetables	0.2347	-0.5177	-3.6529	-0.1776	-1.4065	-0.7431	-0.2405	-1.0235	-0.3682	-0.4436
Meat	-0.4521	0.1673	0.0612	-0.107	0.2101	0.0438	-0.006	0.1809	-0.3929	-0.1071
Tea	-0.1998	-0.3946	0.344	-0.3159	0.465	0.0727	-0.2536	-0.0555	-0.1614	-1.1009

The own price elasticities for all items in table 12 are negative in sign while appropriate in magnitude excluding fruit group and rice. For milk, wheat, pulses, sugar, vegetables, vegetable ghee, tea, and meat, the own-price elasticities indicates, if there is ascend in price by 10% its demand declines by 1.5%, 2.2%, 17%, 5.8%, 10%, 6.8%, 11% and 3.9%, holding prices of other goods and income constant. For tea and pulses the own price elasticities has most elastic behavior while comparing with others. The elasticity for wheat shows that it has inelastic behavior, that there is minor decline in demand as price increases.

5. Conclusion

This has study focused on consumers' behavior concerning changes in income and prices for ten most extensively used food items in Pakistan by incorporating the time series disappearance data over the period 1971 to 2010. The LA/AIDS, Static LA/AIDS and ECM-LA/AIDS models have investigated through applying SUR. The characteristics of the time series data (co-integration and stationarity) has been checked by employing unit root tests, Engle and Granger technique earlier than applying the most suitable methodology that is ECM-LAIDS. The short and long run elasticities are estimated while incorporating the parameters estimates from ECM-LAIDS and static LAIDS models. Expenditure and price

elasticities (compensated and uncompensated) have been calculated by using the parameters from these models. The expenditure elasticities for almost all commodities show that these are necessary goods except milk and meat these show as luxury goods. The long run expenditure elasticities obtained through static LAIDS are quite similar to those obtained through LA/AIDS.

REFERENCES

Alderman, H. (1988).Estimates of Consumer Price Response in Pakistan using Market Price as Data. Pakistan Development Review. 27(2): 89-107

Aziz, B and Malik, S. (2006).Surmising Consumer Demand System & Structural Changes Using Time Series Data. MPRA Paper No. 22911, posted 26. May 2010

Ahmad, E., and S. Ludlow (1987). Aggregate and Regional Demand Response Patterns in Pakistan. Pakistan Development Review. 26(4): 645-657.

Ahmad, E., S. Ludlow and N. Stern (1988). Demand Response in Pakistan: A Modification of the Linear Expenditure System for 1976. Pakistan Development Review. 27(3): 293-308.

Ali, M. Shaukat (1985). Household Consumption and Saving Behavior in Pakistan. An Application of Extended Linear Expenditure System. Pakistan Development Review. 24(1): 23-38.

Burki, Abid A. (1997). Estimating Consumer Preferences for Food Using Time Series Data of Pakistan. Pakistan Development Review, Vol. 36(2): 131-153.

Burney, Nadeem A., and Ashfaque H. Khan (1991). Household Consumption Patterns in Pakistan an Urban-Rural Comparison using Micro Data. Pakistan Development Review, Vol. 30: 145-171.

BUSE, A. (1994). Evaluating the linearized Almost Ideal Demand System. American Journal of Agricultural Economics, Vol. 74: 781 - 793.

Bouis, Howarth E. (1992). Food Demand Elasticities by Income Group by Urban and Rural Populations for Pakistan. Pakistan Development Review, Vol. 31(4): 997-1017

Chaudhary A, Muhammad, Majid A, Syed and Saleem, N. (1987).An Analysis of Price and Income Elasticities of demand for Food grains. Pakistan Social and Economic Review, Vol. 25(1): 21-3

Deaton, A and Muellbauer, J (1980). An Almost Ideal Demand System. The American Economic Review, Vol. 70(3): 312-326

Engle, R. F. and Granger, C. W. F. (1987). Co-integration and Error Correction: Representation, Estimation, and Testing. Econometrica, Vol. 55(2): 251-276.

Green, R. and Alston, J.M. (1990). Elasticities in AIDS models. American Journal of Agricultural economics, Vol. 72: 442 - 445

Haq. Z, Nazli. H, Meilke. K, Ishaq. M, Khattak. A, Hashmi ,Arshad H and Rehman, Fasih. (2011). Food Demand Patterns in Pakistani Punjab. Sarhad journal of Agriculture, Vol. 27(2).

Haq, Z and Cranfield, J. (2011). Household food demand in Pakistan: Does demand specification matter? African Journal of Business Management. 5(26): 10524-10539

Karagiannis, G. and Mergos, G.J. (2002). Estimating theoretically consistent demand systems using cointegration techniques with application to Greek food data. Economics Letters, Vol. 74: 137–143

Karagiannis, Giannis and Velentzas, Kostas. (1997). Explaining food consumption patterns in Greece. Journal of Agricultural Economics, Vol. 48 (I): 83-92

Karagiannis, G., Katranidis, S. and Velentzas, K. (2000). An error correction almost ideal demand system for meat in Greece. Agricultural Economics, Vol. 22: 29–35

Mittal, S., and Sethi, D. (2009). Food Security in South Asia Issues and Opportunities. Working Paper No. 240.

Zahedi, Davood. (2006). Estimating an ECM-AIDS Model for Urban-Area's Household Expenditure: The Case of Iran. Iranian Economic Review, Vol. 10(17).

Zellner A. (1962): An Efficient Method of Estimating Seemingly Unrelated Regression Equations and Tests of Aggregation Bias. Journal of the American Statistical Association, Vol. 57: 500-509.