CONSUMPTION BEHAVIOUR IN KERALA :
A STUDY OF NATIONAL SAMPLE SURVEY DATA 1965/66 to 1983

DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PHILOSOPHY IN APPLIED ECONOMICS OF THE JAWAHARLAL NEHRU UNIVERSITY, NEW DELHI.

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I hereby affirm that the research for this dissertation titled "Consumption Behaviour in Kerala : A Study of National Sample Survey Data 1965/66 to 1983" being submitted to the Jawaharlal Nehru University for the award of Master of Philosophy in Applied Economics, was carried out entirely by me at the Centre for Development Studies, Trivandrum.

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Certified that this dissertation, the bonafide work of Sri. K.P.Sunny, has not been considered for the award of any other degree by any other University.

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CHAPTER I

INTRODUCTION

1.1. The Background

Consumption demand is considered to be the most important component of aggregate demand. The composition of the consumption basket and the quantities of different items consumed reveal considerable variation not only among the societies but also within the same society over time. Consumption habits are determined by a complex set of socio-economic, cultural, religious and ecological factors. There have been various attempts at both conceptual and empirical levels to explain the differences in consumption pattern and to measure the nature of changes attributed to the causal. variables. The factors influencing consumer demand and the means of measuring it are extensively covered in the recent discussions on demand analysis.

In the history of demand analysis two related but separable approaches can be identified. One set of approach is available from the work of economists interested in the discovery of general laws governing the operation of markets, particularly agricultural markets; and the second set originates from the initial efforts of statisticians, interested in the psychological laws governing what has come to be called consumer preference. Brown and Deaton (1972) hold the view that this dichotomy still continues to characterize the subject. Recently, theoretical economists and mathematicians have developed more sophisticated estimation techniques which help us in understanding the complex nature of the pure mathematics of preference relations. This interplay between the theory and reality has been perhaps more fruitful in demand analysis than in any other branch of economics.

Throughout 18th and 19th centuries the empirical approach had made little progress in the measurement of demand curves despite its early and promising beginning. Ernest Engel in 1857 made an outstanding contribution to demand theory that turned out to be the most enduring empirical laws governing the relationship between income and the expenditure pattern of the people. In the late 19th century the fusion between the theoretical and empirical approaches in the writings of Alfred Marshall (1890) perhaps acted as a catalyst which inspired agricultural economists to apply the newly discovered technique of correlations in the analysis of single markets. Marshall's great contribution was the clarification and elaboration of the concept of elasticity of demand which offered a precise framework for numerical measurement of market characteristics.

A substantial progress in the econometric study of demand was achieved by agricultural economists in the United States beginning with Moore (1929) who published a number of important studies between 1914 and 1929. By 1939, most of the strengths and weaknesses of classical demand analysis had been probed into and most of the techniques still in use had been discovered. We may characterize this classical approach as the application of variations in least-squares single-equation fitting, to both time series and cross-section data, of market models based on the theoretical contributions of Slutsky (1915), Allen and Hicks(1934) and Hicks(1936). Studies by Schultz(1938), Wold and Jureen(1952) and Stone(1953) can be regarded as a consolidation of the theoretical and empirical attempts at static demand models in the first half of this century. Since then there have been a number of important developments in demand analysis. Samuelson's (1938) introduction of revealed preference theory was a new approach to the theory of consumer demand. While the question to which the classical approach addressed itself was of the type "what is the income or price elasticity of a good X?". Recent investigations have posed and begun to answer some more fundamental questions. These are basically questions of methodology : for example, how should demand functions be specified? What is the best way of allowing for changes in prices? These are the questions concerning how to go about measuring elasticities rather than questions about what numerical values these co-efficients should take. In this context the theory is regarded not as part of the general equilibrium analysis or of the welfare theory but as a tool of empirical investigation (Deaton, 1974).

Although serious econometric work relating to consumer behaviour started in the 1930's (Stigler, 1954), in India hardly any attempt was made prior to 1950's. However, this lack of interest was mainly due to the general stability of consumption patterns and the non-availability of relevant data on household consumption (GOI, 1957,p.55). Since the inception of Five Year

Plans per capita income of the people considerably increased and along with this data on household consumption on a nation wide basis was made available with the setting up of the National Sample Survey (NSS) Organization in 1950. This stimulated interest in consumption demand studies.

During the last several years, numerous studies relating to consumer behaviour have been undertaken in India. The first such effort on consumer behaviour was a collection of papers by researchers of the Indian Statistical Institute, Calcutta. The majority of the research in this field were concerned with the calculation of income elasticities by the method of least squares. The method of concentration curves (Iyengar, 1964, 1967) has also found favour with the researchers at the ISI Calcutta. The concentration curves method is generally unsuited to deal with two or more explanatory variables and it is rarely used elsewhere, thus rendering comparison with other studies difficult (Gupta,1973).

Most of the consumer studies in India are based on the consumption data published by the NSS. The use of published information tends to limit the scope of these studies mainly on the ground that the NSS publishes data on total expenditure and items of expenditure (both expressed in per capita terms) for major commodity groups in respect of rural and urban sectors separately, and it does not give any decomposition of household expenditure by different household characteristics. Therefore, most studies confined to the effect of expenditure only.

It is viewed that the country wide models may not be useful for analysing the consumption habits of a particular region (Radhakrishna et al.,1979). Considerable regional variations may exist in a country like India with wide variety of cultural climatic conditions, availability of natural resources, etc. Since every state is considered as a separate unit for administrative as well as for planning purposes, it would be desirable to estimate complete demand systems for each state.

2. Objective of the Study

The main objective of the study is to analyse the consumption pattern in Kerala. For that, an analysis of the changes in the allocation of consumer budget shares over time has been looked into. Since the sensitivity of consumption behaviour with respect to income and price changes are not being captured adequately by the share analysis, the elasticity tools are used. The usual elasticity tools used for the analysis of sensitivity are the income and price elasticities. Income elasticity tells us the responsiveness with which consumption behaviour changes when consumer's income level changes. Price elasticity explains the price responsiveness of the consumer over time. This study is also aimed at verifying the universally valid Engel's law in Kerala. As far as price elasticities are concerned we are trying out a method of recovering the price elasticities from the Engel functions using only two cross sections data in the tradition of Iyengar and Jain, and Pollak and Wales.

The major objectives of the study can be listed out as follows:

(1) To analyse the changes in the expenditure pattern over time and to see in what way it differs from the all India pattern;

(2) To verify the relevance of all India rural and urban consumption patterns in the context of Kerala;

(3) To estimate expenditure elasticities for all the commodities in rural and urban Kerala using Engel functional forms and to compare the consumption behaviour between rural and urban consumers;

(4) To verify the validity of Engel's law in the context of Kerala and to compare income elasticities with national and international estimates;

(5) To develop a method for recovering price elasticities from Engel functions using only two cross section data;

(6) To evaluate the price responsiveness of rural and urban consumers in Kerala.

3. Methodology of the Study

In order to analyse the consumption behaviour in Kerala we have considered the movement of expenditure shares, income and price elasticities over a specified period of time. For the estimation of income elasticities we have selected three functional forms, viz, linear, quadratic and double log functions. We have used these three functional forms in order to assess the sensitivity of expenditure elasticities to different functions. For the estimation of price elasticities we have used a particular method of estimation which enables us to recover price elasticities from Engel functions. One advantage of this method is that it enables us to recover price elasticities as small a sample of size two.

4. Out line of the Study

Chapter I, gives a brief introduction of the study. In Chapter II, we have briefly reviewed from the vast literature on the demand theory only that part which is relevant to our study. Chapter III discusses data and variables used in the present analysis. The problems one may face while using the National Sample Survey (NSS) data for the analysis of consumption behaviour are also discussed. Chapter IV is divided into six sections. In the second section we discuss the Engel elasticity estimation and the different functional forms which have been frequently used in the empirical estimation. Third section discusses the general trends in consumption behaviour observed in Kerala and all India by analysing the NSS data. In the fourth section expenditure elasticity estimates obtained from empirical analysis are reported. Section five makes an attempt to test the validity of the Engel's law for Kerala. Further, these estimates are compared with national and international estimates. In chapter V a method of recovering price elasticities using Engel function is developed. It also includes an analysis of the rural-urban difference in the consumer's price responsiveness in Kerala. Chapter VI gives a concluding remark of the study and makes suggestions for further research.

CHAPTER II

DEMAND THEORY : A REVIEW

2.1. Introduction

The literature on Demand Analysis is enormous as shown by the large number of excellent surveys, notably by Brown and Deaton(1972), Barten(1977), Deaton(1986) and Ronald Bewley(1986). In this study, we review the theory which formulates the demand function as an optimization problem and has relevance to the present empirical analysis.

The outline of the survey is as follows : In the second section we have given a brief review of the duality theory in demand analysis. Third section discusses the general constraints of the demand theory. Section IV deals with the functional specification, additive and non-additive, for the estimation of the demand system. This section also deals with the implications of additivity, the most popular functional form in the literature.

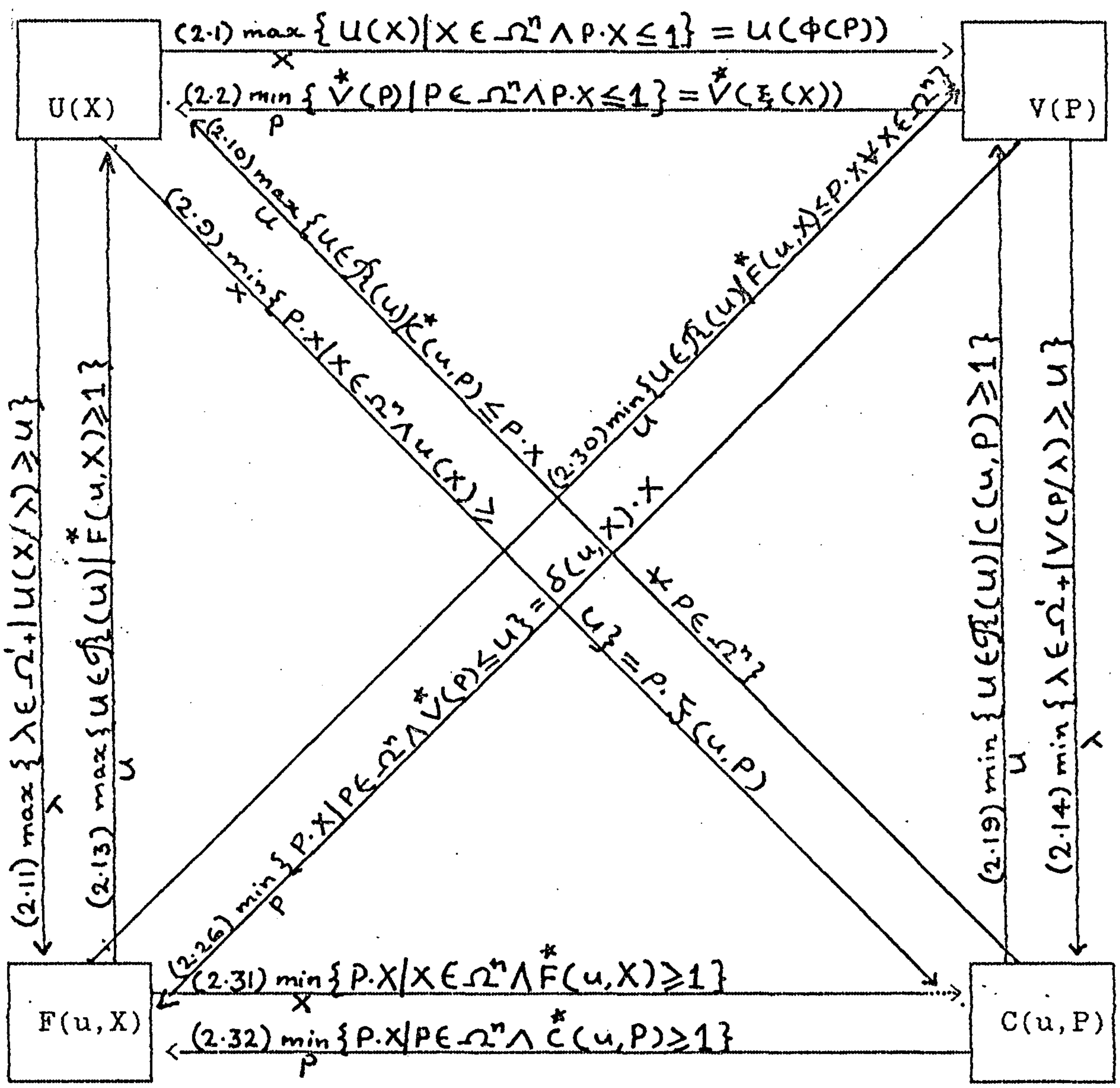
II

2.2. Demand System : As an optimization Problem

2.2.1. Application of Duality and Consumer preference

Demand system can be explained as an optimization problem. Using duality theory the optimization problem can be formulated in four equivalent ways as explained in Blackorby et al.(1978, chapter 2). These four representations of direct utility (U), indirect utility (V), cost (C) and transformation (F) functions of consumer preferences as summarized by Blackorby et al.(1978) is given in figure 1. This type of representation is possible only if the preference ordering satisfies certain regularity conditions, viz, continuity, positive monotonicity and quasi-concavity (see Appendix IA).

Figure 1



Source : Reproduced from Backorby et.al.,1978,p.39,fig.2.7.

Figure 1 shows that it is possible to construct any one of the four functions (U,V,C,F) from any other function, invoking the appropriate optimization problem signified by the arrow running from the latter function to the former. Once the representation is decided which is purely arbitrary the corresponding demand system can be obtained using the appropriate theorem. More specifically, the demand system from Indirect utility function can be estimated using Roy's theorem. In the case of direct utility function, the demand system can be derived from the application of Wold's theorem. Applying Hotelling's theorem to the cost function will generate the constant-utility quantity-demand function. Similarly Shephard's lemma can be used to obtain the constant-utility price-demand function from the transformation function (See Blackorby et al., 1978).

The existence of these alternative ways of representing a preference ordering is important for the study of functional structure. For example the possession of a particular structural property by one of these functions does not necessarily imply that any of the other three functions possesses this property. Once the representation is selected arbitrarily, implies a particular type of structural form, hence, corresponding to different structural forms in other equivalent representations.

However, in the present study we have decided to impose a structure on the utility maximization problem. This problem is taken up for detailed discussion in the next section.

2.2.2. Utility Maximization

The consumer optimization problem becomes,

$$U(q) - \tau(p'q - \mu), \text{ -------} \quad (2.1)$$

Where $U(q)$ is the utility function for the 'n' commodities $q1, \ldots qn$; p' is the transpose of the column vector of prices of 'n' commodities; μ is the income of the consumer and τ the lagrangian multiplier. The first order conditions for a maximum are,

$$\left.\begin{aligned} \frac{\delta U}{\delta q} &= \tau p \\ p'q &= \mu \end{aligned}\right\} \quad (2.2)$$

The second order condition for a maximum is that the Hessian matrix is negative semi definite (for a detailed discussion see appendix IB). Solving for q and using (2.2) gives the demand equations for the n goods. These equations must satisfy certain restrictions (Bewley, 1986). Let us consider the restrictions in detail.

2.2.3. General Constraints on the System

The constraints on demand theory are adding up, homogeneity (both are originating from the first order conditions), symmetry and negativity conditions (emanating from the second order conditions). It is generally assumed that the demand system $q(p,\mu)$ is differentiable with respect to μ and p. In differential form (Barten, 1977) the system of demand equation can be expressed as,

$$dq = q_\mu d\mu + Q_p\ dq, \text{ ------} (2.3)$$

where q_μ is the n-vector of derivatives of q with respect to μ, and Q_p is the nXn matrix of derivatives of q with respect to p.

Likewise, differential version of budget constraint is $d\mu = p'dq + q'dp$ ------(2.4).

a. Adding-up Condition

Adding-up condition usually guarantees that the sum of the individual expenditures are equal to total expenditure. In terms of derivatives adding-up condition amounts to (Barten 1977)

$p'q_\mu = 1$ ------ (2.5a), and $p'Q_p + q' = \emptyset$ ------(2.5b).

Equation (2.5a) is called Engel aggregation which shows the effect of a change in income on consumption and equation (2.5b) is called Cournot aggregation which is the price effect of a specific item while the prices of all other commodities remains the same (George and King 1971). In terms of elasticities, Engel aggregation states that the sum of the product of income elasticity ($e_{i\mu}$) and corresponding expenditure shares (w_i) must be equal to one. This can be written as,

$$\sum_{i=1}^{n} w_i \, e_{i\mu} = 1$$

$$\text{where } w_i = \frac{p_i q_i}{\mu}$$

$$\text{and} \qquad e_{i\mu} = \frac{\delta q_i}{\delta\mu}\frac{\mu}{q_i}, \qquad i=1,\ldots\ldots,n$$

Rearranging (2.5b) in terms of elasticities Cournot aggregation becomes,

$$\sum_{i=1}^{n} w_i \, e_{ij} = -w_j$$

where w_i is ith item budget share and $e_{ij} = \frac{\delta q_i}{\delta p_j} \frac{p_j}{q_i}$ $i,j=1,\ldots,n$

Cournot aggregation states that the product of specific commodity budget shares and the cross price elasticities should add-up to the negative of the expenditure share on jth item.

b. Homogeneity Condition

The homogeneity condition states that the demand equations are homogeneous of degree zero in μ and p. That is to say, if all the prices and income change in the same proportion, consumers' demand for a particular commodity remains the same. Using Euler's theorem this condition becomes,

$$q_\mu \mu + Q_p p = \emptyset \quad \text{-----------} \quad (2.6)$$

Converting in terms of elasticities (2.6) becomes(George and King, 1971),

$$\sum_j e_{ij} + e_{i\mu} = \emptyset, \qquad i=1,\ldots\ldots\ldots n.$$

where e_{ij} stands for cross price elasticities and $e_{i\mu}$ for expenditure elasticities. This condition demands that the income and own and cross price elasticities for a particular commodity should add-up to zero.

c. Symmetry and Negativity Condition

The "symmetry" condition also known as the Slutsky condition, can be summarized as(Barten,1977,p.27) ;

$$K = Q_p + q_\mu q' = K' \qquad ------- (2.7)$$

where K is a nXn matrix. In principle, this condition on its own provides n(n-1)/2 constraints on the matrix K. And, hence on Q_p and q_μ. From equation (2.5a&b) it follows that

$$p'K = \emptyset \qquad ------ (2.8)$$

which is the adding up condition in terms of K. The equation (2.8) implies n constraints. The homogeneity condition (2.6), together with budget constraint implies that

$$Kp = \emptyset \qquad ------- (2.9)$$

Equation (2.9) gives the homogeneity condition in terms of K. Again there are n constraints on K because of equation (2.3). In addition to the adding-up and homogeneity conditions if the symmetry condition is applied, it generates in fact only (n-1)(n-2)/2 constraints.

From (2.8) and (2.9) it is clear that the matrix K is not of full rank (Barten,1977). This can be shown by the negativity condition as:

$$y'Ky < \emptyset \quad -------- (2.1\emptyset)$$

for all $y \neq \alpha p$, α real scalar. This condition implies that the diagonal elements of K are negative.

The symmetry condition can thus be regarded as a guarantee of consistency of choice. Negativity states that the elements in the substitution matrix as a whole should be negative semi-definite. This condition derives from the assumption of maximization of utility. For example, if adding-up, homogeneity, and symmetry all hold but the substitution matrix is positive semi-definite, the consumer would be minimizing rather than maximizing utility (Angus Deaton 1975).

From this condition we can arrive at Slutsky's equation which states that the effects of simultaneous changes in prices and income can be obtained by taking total derivatives of the first order conditions in equation (2.2). A change in the consumption of ith commodity as a result of a change in jth commodity price can be represented as

$$\frac{\delta q_i}{\delta p_j} = \left[\frac{\delta q_i}{\delta p_j}\right]_{U=constant} - q_j \left[\frac{\delta q_i}{\delta \mu}\right] \quad \text{--- (2.11)}$$

The first term in the right hand side is the substitution effect and the second term is the income effect (for details see appendix IB). Substitute goods are those goods whose demand will go in opposite directions as a result of a price change i.e.,$(\delta q_i / \delta p_j) > 0$. The substitution effect can further decomposed into specific substitution effect and general substitution effect. In the case of complementary goods when the price of other goods increases the demand for the specific item will decrease i.e., $(\delta q_i / \delta p_j) < 0$. Those commodities which have no impact on price variation are called independent goods.

III

2.3. Specification for Estimation

Any estimation of the demand system needs an explicit specification of the utility function. This would mean that U(.) is specified explicitly as (A) additive or (B) non-additive functions. Additive functions are of two types (i) directly additive and (ii) indirectly additive. Now we shall consider each one separately.

2.3.1. Directly Additive

Directly additive utility functions may be written in the form

$$u(q) = \theta\left(\sum_{k=1}^{n} u_k(q_k)\right) \quad \text{------------- (2.12)}$$

where u is utility, defined over the space of the 'n' quantities q, the u_k are sub-utility functions, each a function of q_k only, while $\theta(.)$ is an arbitrary monotone increasing function.

Most of the functional forms which were used in the early stages of demand studies belong to the general class of additive strongly separable direct utility functions as proposed by Johansen(Barten1977). The Johansen function is as follows:

$$U = \sum_i \frac{\beta_i}{\alpha_i} \left(\frac{q_i - b_i}{\beta_i}\right)^{\alpha_i}, \quad \text{--------- (2.13)}$$

where $\alpha_i < 1, \beta_i > 0$, and $b_i < q_i$ are constants. From the first-order condition (2.5 a&b) one obtains (Barten, 1977),

$$q_i = b_i + \beta_i (\tau p_i)^{1/(\alpha_i - 1)} \quad \text{--------- (2.14)}$$

For estimation purposes one could select one particular commodity, say the nth one, to eliminate τ from equation (2.14), then the Johansen demand function becomes,

$$q_i = b_i + [((q_n - b_n)/\beta_n)^{\alpha_n - 1} (p_i / p_n)]^{1/(\alpha_i - 1)} \quad \text{----- (2.15)}$$

$$\alpha_i < 1, \; b_i < q_i \qquad (i=1,.......,n-1)$$

Most of the functions used at the initial stages of demand studies can be derived from equation (2.13) by imposing restrictions on the parameters and assuming utility maximizing behaviour as shown below.

(i) $\alpha_i = 0$, $b_i < q_i$, (2.13) gives the linear expenditure system (Klein and Rubin,1947/48; Stone,1954) :

$$q_i = b_i + (\beta_i / p_i)(\mu - \Sigma p_k b_k) \text{ ------------- } (2.16)$$

where μ is the income and p_i is the price of the ith commodity.

(ii) $\alpha_i = 0$, $b_i = 0$, (2.13) gives the Cobb-Douglas demand function:

$$q_i = (\beta_i / p_i)\, \mu \text{ --------------- } (2.17)$$

(iii) $\alpha_i = \alpha$, $b_i < q_i$, (2.13) gives the 1-branch system of demand equations

$$q_i = b_i + \beta_i (p_i / p)^{1/(\alpha-1)} \frac{m - \Sigma p_k b_k}{p} \text{ ------- } (2.18)$$

$$\text{where } p = [\Sigma \beta_k p_k^{\alpha/(\alpha-1)}]^{(\alpha-1)/\alpha}$$

(iv) $\alpha_i = \alpha$, $b_i = 0$, (2.13) gives the CES demand function or the self-dual addilog system (Houthakker,1965):

$$q_i = \beta_i [p_i / p]^{1/(\alpha-1)}\, \mu / p \text{ -------- } (2.19)$$

where p is same as in case (iii).

(v) $\alpha_i < 1$, $b_i = 0$, (2.13) gives the direct addilog system (Houthakker,1960):

$$q_i = \beta [\, (q_n / \beta_n)^{\alpha_n - 1}\; p_i / p_n \,]^{1/(\alpha_i - 1)} \text{ ------- } (2.20)$$

If the Johansen function is extended to include a quadratic term, it can be shown that flexible functional forms such as the quadratic function and the translog function are special cases of equation (2.13) (Barten,1977). Among the above additive forms, LES is the most popular functional form. It is taken up for a detailed analysis since our empirical work is based on such a system.

2.3.1.1. Linear Expenditure System

The Linear Expenditure System (LES) was proposed by Klein and Rubin (1947-48). Theoretical results have been extended by Geary (1949) and Samuelson (1949). Stone (1954) and others have applied the models to British data and have suggested various extensions. It represents the first formal treatment of demand analysis using a specific utility function. Utility maximization function underlying the LES model of consumer demand is the Stone-Geary cardinal utility function :

$$U = U(q_1, \ldots\ldots, q_n) = \sum_{i=1}^{n} a_i \ln(q_i - b_i) \text{ ------- } (2.21)$$

where $\sum_{1}^{n} a_i = 1, \; q_i - b_i > 0$

Applying maximization principle given in equation (2.21) using the specific utility function and solving for the demand function,

we have

$$q = q(p, \mu) = b_i - \frac{a_i}{p_i} \sum_{k=1}^{n} p_k b_k + \frac{a_i}{p_i} \mu \text{ -------} (2.22)$$

Multiplying (2.22) by p_i throughout, we get the expenditure function

$$p_i q_i = p_i b_i + a_i \left[\mu - \sum_{k=1}^{n} p_k b_k \right] \text{ ------ } (2.23)$$

The equation (2.23) satisfies the theoretical restrictions such as adding up, homogeneity and symmetry and negativity. Adding up implies $\Sigma a_k = 1$. The demand system in equation (2.22) can be interpreted in the following way (Pollak and Wales, 1978).

It is not necessary that any a_i be positive. In order to explain the equation more easily Pollak and Wales (1978) considered the parameters b_i as subsistence values. First, necessary (subsistence) expenditure on ith item $P_i b_i$ is made and after that non-necessary (supernumerary) expenditure is incurred which is considered as residual ($\mu - \Sigma P_k b_k$). Thus, besides $\Sigma p_k b_k$, total expenditure is distributed in a fixed fashion on various commodities.

As compared to recent developments in this field, this method seems to have many limitations. If the b's are positive and income is greater than $\Sigma p_k b_k$, we may describe the individual as purchasing necessary quantities of the various goods ($b_1, .., b_n$) and then dividing his remaining or "supernumerary" income ($\mu - \Sigma p_k b_k$) among the goods in fixed proportions. If b_i is negative, the demand for the ith good is elastic with respect to its own price. Positive b's imply inelastic demand.

2.3.2. Indirectly Additive Functions

As the demand equations are homogeneous in prices and total expenditure, the indirect utility function is also homogeneous of degree zero. Indirectly additive functions are defined in terms of the ratios of expenditure to price,

$$U(\mu,p) = \phi\left(\sum_{k=1}^{n} u_k \, (\mu/p_k) \right) \text{ -------------- } (2.24)$$

where $\phi(.)$ is an arbitrary function and each of the functions U_k is a function of μ/p_k alone. The demand system under equation (2.24) can be derived from Roy's theorem, i.e.,

$$\log q_i = \log(-\delta u/\delta p_i) - \log(\delta u/\delta \mu) \quad \text{-------} \quad (2.25)$$

One of the most commonly used indirectly additive demand model is the indirect addilog system (IAS).

2.3.2.1. Indirect Addilog System

Leser (1941) specified a demand system which Houthakker (1960) later on showed could be derived from an additive indirect utility function. By substituting the demand function in the utility function, we may express utility indirectly as a function of prices and income (Bewley,1986),i.e.,

$$u = § (\mu, P) \quad \text{-----------} \quad (2.26)$$

The IAS in its familiar form can be written as :

$$p_i q_i = \frac{\alpha_i \beta_i (\mu/p_i)^{\beta i} \mu}{\sum_{j=1}^{n} \alpha_j \beta_j (\mu/p_j)^{\beta j}} \quad \text{-------} \quad (2.27)$$

$$i = 1 \ldots\ldots n$$

where $q1 \ldots\ldots qn$ and $p1 \ldots\ldots\ldots\ldots pn$ are the nX1 vectors of quantities consumed and prices paid by an individual consumer with a given income μ. Here the α's and the β's are the parameters known as preference co-efficients and reaction parameters respectively. The β's are also called as the urgency parameters.

In its share form equation (2.27) can be written as :

$$w_i = \frac{\alpha_i \beta_i (\mu/p_i)^{\beta i}}{\sum_{j=1}^{n} \alpha_j \beta_j (\mu/p_j)^{\beta j}} \quad \text{----------} \quad (2.28)$$

and then the logarithm of the ratio of w_i to w_j linearizes the model for estimation as,

$$(2.29)\quad \ln(w_i/w_j) = \ln(\alpha_i\beta_i/\alpha_j\beta_j) + \beta_i\ln(\mu/p_i) - \beta_j\ln(\mu/p_j) + u_i - u_j$$

This can be estimated under certain restrictions on the error terms (Bewley, 1986).

2.3.3. Implications of Additivity

Angus Deaton (1973) has argued that the additivity implies approximate linear relationships between own-price and income elasticities; under direct additivity the ratio of own price to income elasticity is approximately constant, while under indirect additivity the sum is approximately constant. Some of the limitations of various functional forms are pointed out by several economists (Barten (1969), Byron (1970a) and (1970b), Theil (1971), Deaton (1974). They argued that a given demand system may be consistent with additive utility functions of direct and indirect types, each representing the same ordinal preference ordering, although the cardinal levels of utility and of marginal utility will be different for each function. Samuelson (1965) calls this problem non-simultaneous direct and indirect additivity. Further he has demonstrated that the most general form of utility function consistent with both direct and indirect additivity should assume that the income elasticities are all unity and the own price elasticities are all equal. The empirical implication is highly restrictive.

However, it is possible to argue that additivity is regarded primarily as a means of dealing with cross-price responses in a simple and theoretically plausible manner. Its rejection on the basis of limitations is not likely to be of crucial importance because in econometric work, the whole range of cross-price effects is almost never measurable without prior information, and such terms are likely to be of limited importance. Therefore, additivity assumptions are enormously helpful in the estimation of a complete system of demand equations on very limited information (Deaton,1973). However, convenience and ease of estimation are purchased at the cost of severe distortion of those effects which is most desirable to measure accurately. On this argument the extent to which additivity has been used in applied work seriously over-states its real usefulness.

2.3.4. Separability and Additivity

Separability is characterized in terms of utility function. The representation theorems of Blackorby et al. (1978) shows the intimate relationship between separability and aggregation. The separability of a group of variables from its complement is equivalent to the possibility of forming an aggregate function from that group which can be aggregated consistently into a macro function of the image of the aggregator function and the complementary variables. They defined separability in two ways, i.e., general separability and strict separability. The difference between separability and strict separability has been stated formally as a lemma. That is, "if the utility function u is non decreasing in q_i, then each singleton (i) is separable in u from its complement in I. Moreover, if u is increasing in q_i, then each singleton (i) is strictly separable in u from its complement in I". The main conclusion of the lemma is that when the utility function is non decreasing, each individual variable is separable from all the other variables. However, when the utility function is not increasing, an individual variable need not be strictly separable. It is also found that strict monotonicity is not necessary for strict separability. Though Lemma suggests that strict monotonicity is a sufficient condition for the equivalence of separability and strict separability.

Another interpretation of separability and additivity is given by Bewley (1986) defines separability into two types, weakly separable and strongly separable. If the utility function can be written in terms of the aggregates, it is said to be <u>weakly separable</u>. If a further restriction is placed on the utility function, such that, the utility can be expressed as the sum of functions of the aggregates, i.e.,

$$u(q_1, \ldots\ldots q_n) = \sum_{i=1}^{n} u(q_i), \qquad \ldots\ldots\ldots(2.30)$$

where the q_i's are aggregates, the u is said to be <u>strongly separable</u>. If the q_i are individual goods but u can still be expressed as equation (2.30), then u is said to be additive. Therefore, additive function is a special case of strongly separable utility function.

Since the demand equations from a given utility function and a monotonic, differentiable function of that utility function are identical, the separability and additivity definitions can be expressed more generally in terms of differentiable function of the utility function having the desired properties.

2.3.5. Non-additive functions

The limitations of additive models can be overcome using non-additive functional forms, such as Translog models and Almost Ideal Demand Systems etc. These models are extremely flexible unlike the additive models and can be used to models of a wide range of non-additive price behaviour (Blackorby et al.1978).

Recent developments in the implementation of non-linear estimation programs have made feasible the estimation of less structured functional forms that do not maintain 'a priori', homotheticity or separability restrictions. Therefore, it is necessary that a set of reasonable criteria must be formulated in order to facilitate the choice of functional specification (see Blackorby et al., 1978, p.290).

Most of the non-additive flexible form specifications have interpretations as Taylor-series approximations. Some commonly used flexible functional forms are Quadratic, Generalized Leontief (Diewert 1971), Generalized quadratic mean of order τ (Harenkamp,1973), Translog (Christenson,Jorgenson and Lau,1975) and Almost Ideal Demand System (Deaton and Muellbaur,1980).

Some of the popular flexible functional forms in current literature, such as Translog functions and Almost Ideal Demand Systems are briefly discussed below.

2.3.5.1. Translog Models

Christenson, Jorgenson and Lau (1975) developed tests of the theory of demand that do not employ additivity or homotheticity as part of the maintained hypotheses. Their second objective was to exploit the duality between prices and quantities in the theory of demand. They considered utility function as direct and indirect. The direct utility function is useful in characterizing systems of indirect demand function as giving the ratios of prices to total expenditure as functions of the quantities consumed. They referred direct/indirect utility function as direct/indirect translog utility function. The indirect utility function or indirect translog utility function is useful in characterizing systems of direct demand functions, giving quantities consumed as functions of the ratios of prices to total expenditure. The use of direct and indirect translog permits us to test the restrictions (i.e., additivity and homotheticity) on direct and indirect demand functions. These two versions of translog are called "Basic Translog"(BTL). Pollak and Wales (1980) extended this BTL and named it "Generalized translog"(GTL).

In the translog direct utility function approach, an unknown direct utility function is approximated by a second order Taylor series approximation.

$$-\ln[u(q)] = \alpha_0 + \Sigma\alpha_i \ln(q_i) + \tfrac{1}{2}\Sigma\Sigma\beta_{ij} \ln(q_i) \ln(q_j) \text{ -----(2.31)}$$

The demand equations, in the share form, are given by:

$$w_i = \frac{\alpha_i + \sum_j \beta_{ij} \ln(p_j/\mu)}{\Sigma\alpha_k + \Sigma \sum_j \beta_{kj} \ln(p_j/\mu)}, \quad \text{-------- (2.32)}$$

Symmetry of Hessian is equivalent to $\beta_{ij} = \beta_{ji}$ for all i&j,

$$\Sigma\alpha_k + \Sigma_j \Sigma \beta_{kj} = 1$$

where w_i is the share of the good in total expenditure of the included categories; the α's and the β's are the parameters to be estimated. The obvious problem with this model is that the equation (2.32) is written as functions of the endogeneous variable q. As Mc Laren(1982) argues, Christensen et al. did not observe this estimation problem, and consequently their results corresponding to the direct utility function are inappropriate.

Translog indirect utility function can be expressed as

$$\ln[v(p,\mu)] = \alpha_0 + \Sigma\alpha_i \ln(p_i/\mu) + \tfrac{1}{2}\Sigma\Sigma\beta_{ij} \ln(p_i/\mu) \ln(p_j/\mu) \text{--(2.33)}$$

and from Roy's theorem the demand equations can be written as equation (2.32). A normalization rule is required to identify the α parameters, and it is usual to impose $\Sigma\alpha_i = -1$

The demand functions generated by the indirect utility function of GTL (Pollak and Wales 1980) are given by,

$$\phi(p,\mu) = -\Sigma a_k \log[p_k/(\mu - \Sigma_t p_t b_t)]$$
$$- \tfrac{1}{2} \Sigma_j \Sigma \beta_{kj} \log[p_k/(\mu - \Sigma_t p_t b_t)] \log[p_j/(\mu - \Sigma_t p_t b_t)], \text{--(2.34)}$$

$$\beta_{ij} = \beta_{ji} \text{ for all i and j ; } \Sigma\alpha_k + \Sigma_j \Sigma\beta_{kj} = 1 .$$

From the Roy's theorem the demand equations can be derived. The GTL demand equations, in share form, are given by,

$$w_i = \frac{b_i p_i}{\mu} + [1 - (\Sigma p_k b_k)/\mu] \frac{\alpha_i + \Sigma_j \beta_{ij} \ln[p/(\mu - \Sigma p_k b_k)]}{\Sigma\alpha_k + \Sigma_j \Sigma \beta_{kj} \ln[p_j/(\mu - \Sigma p_k b_k)]}, \text{-----(2.35)}$$

$\beta_{ij} = \beta_{ji}$ for all i,j ; $\Sigma\alpha_k + \Sigma\Sigma \beta_{kj} = 1$, where the α's, β's and b's are parameters to be estimated. Some of the criticisms levelled against the translog system by Bewley (1986) suspects the implications for the model as a second-order approximation to an arbitrary utility function.

2.3.5.2. Almost Ideal Demand System

Deaton and Muellbauer (1980) have proposed and estimated a new model called Almost Ideal Demand System (AIDS) which has comparable generality to the Rotterdam and Translog models but has considerable advantages over both. This model gives an arbitrary first order approximation to any demand system. This model has a functional form which is consistent with known household budget data and it is simple to estimate, largely avoiding the need for non-linear estimation. The optimization problem is cast in terms of minimizing the cost of attaining a given level of utility, C, and this minimum is in fact the total expenditure μ. This theory starts not from some arbitrary preference ordering, but from a specific class of preferences, which by the theorems of Muellbauer (1975, '76) permit exact aggregation over consumers. We can represent the cost function for utility u and price vector p. These preferences are represented via the cost or expenditure function as,

$$\ln c(u,p) = (1-u) \ln a(p) + u \ln b(p) \text{ -------- } (2.36)$$

where $0 \leq u \leq 1$, u is preference function

a(p) = costs of subsistence

b(p) = costs of bliss

p = vector of commodity prices

Now we shall take specific functional forms for a(p) and b(p). The a(p) is a second order approximation to prices as,

$$\ln a(p) = a_0 + \Sigma \alpha_k \ln p_k + \tfrac{1}{2} \Sigma \Sigma \Gamma_{kj}^* \ln p_k \ln p_j \text{ --- } (2.37)$$

The b(p) function is defined as

$$\ln b(p) = \ln a(p) + \beta_0 \pi\ p_k^{\beta k} \text{ ---------- } (2.38)$$

The choice of the functional forms in equations (2.37) and (2.38) are determined by the need for flexible functional form and to get the desired properties for demand function. Substituting equations (2.37) and (2.38) in (2.36) we get, the AIDS cost function as :

$$\log c(u,p) = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2} \sum_k \sum_j \Gamma_{kj}^* \log p_k \log p_j + u\, \beta_0 \prod_k p_k^{\beta_k} \quad \text{------(2.39)}$$

where α_i, β_i and Γ_{ij}^* are parameters. Γ is an nXn symmetry matrix of constants, and ln(p) is an nX1 vector with elements ln(pi). Since the cost function is not directly estimable we have to find out the demand functions. For c(u,p) to be a valid representation of consumer preference, it must be linearly homogeneous in p provided that $\Sigma\alpha_i=1$, $\Sigma\Gamma_{ij}=\Sigma\Gamma_{kj}=\Sigma\beta_j=0$. i,j = 1,2,......n. Here utility is ordinal. Demand function can be directly derived from equation (2.39). By Hotelling's theorem $\delta\, c(u,p)/\delta p_i = q_i(u,p)$, the Hicksian demand function expressing in share form,

$$\frac{\delta \ln c(u,p)}{\delta \ln p_i} = \frac{p_i q_i}{c(u,p)} = w_i \quad \text{-------- (2.40)}$$

where w_i is budget share of commodity i.

Logarithmic differentiation of equation (2.39) with respect to i gives,

$$w_i = \alpha_i + \Sigma\, \Gamma_{ij} \ln p_j + \beta_i\, u\, \beta_0 \pi p_k^{\beta_k} \quad \text{--------- (2.41)}$$

where $\Gamma_{ij} = \frac{1}{2} (\Gamma_{ij}^* + \Gamma_{ji}^*)$ ---------- (2.42)

Equation (2.41) is a share equation of ith commodity expressed in terms of unknown utility value. Estimation is possible only if equation (2.41) is expressed in terms of observable quantities. Here we can apply duality theory to derive the estimable function,

$$c(u,p) = \mu \quad \text{and} \quad u = u(q,p) \quad \text{------- (2.43)}$$

c(q,p) is indirect utility function.

Substituting equation (2.43) in (2.39) we get,

$$\ln \mu = \alpha_0 + \Sigma\alpha_k \ln p_k + \tfrac{1}{2} \Sigma\Sigma\Gamma_{kj} \ln p_k \ln p_j + u(q,p)\beta_0\pi p_k^{\beta_k} \quad \text{----- (2.44)}$$

From equation (2.38)

$$u(q,p) = \frac{\ln\mu - \ln p}{\beta_0\pi p_k^{\beta_k}} \quad \text{--------- (2.)}$$

$$\text{where } \ln p = \alpha_0 + \sum_k \alpha_k \log p_k + \tfrac{1}{2}\sum_j \sum_k \Gamma_{kj} \log p_i \log p_j \quad \text{-----(2.46)}$$

Substituting equation (2.45) in (2.41) and imposing the restrictions for linear homogeneity, the AIDS demand functions in budget share form is,

$$w_i = \alpha_i + \sum_j \Gamma_{ij} \log p_j + \beta_j \log \{x/P\} \quad \text{--------- (2.47)}$$

where P is as shown in equation (2.46) price index.

The AIDS has the properties of both the flexible functional form and the Rotterdam model. It can be estimated using linear methods if an approximate price index is available. It can be considered as a first order approximation of any demand function. It satisfies the axiom of choice exactly. The Engel curve derived from AIDS has been shown to be a better representation of the household behaviour than any other form (Deaton and Muellbauer,1980). It justifies exact aggregation over households without invoking linear engel curves.

IV

2.4. Conclusion

Among the demand models, the LES, Translog, and AIDS are the most popular in empirical application. The LES assumes that the consumer purchases the necessary quantities of each commodity first and then divides the remaining income among the items in a fixed proportion (Pollak and Wales,1980). The LES does not permit the existence of inferior or complementary commodities (Brown and Deaton, 1972). Moreover, it is based on an additive form of the utility function (Barten 1977). It is found that additivity assumption has been highly restrictive (Deaton and Muellbauer,1980).

To sum-up the review we made in this section, the general conclusion is that the non-additive flexible functional forms are the most suitable form for the empirical analysis of demand estimation. The additive demand models are of a limited type of demand systems incorporating restrictions. Though the flexible functional forms have several advantages like non-additivity etc., we are constrained to use the additive models for the empirical estimation because of the non availability of sufficient number of data points and the computational difficulties involved with non linear estimation.

CHAPTER III

DATA BASE AND SPECIFICATION OF VARIABLES

3.1. Introduction

The present study, Consumption Behaviour in Kerala, is based on various rounds of household consumer expenditure data collected by National Sample Survey (NSS) Organization of India. The present chapter briefly analyses some of the details regarding the data. Section II attempts to give an outline of the nature of NSS Organization and the method by which data is being collected. Section III explains the quantum of data collected by the NSS using the consumer expenditure schedules and how much of it is being published. Concepts and definitions followed in data collection are described in Section IV. Section V discusses variables used in the study. Section VI deals with the problems related with NSS data. Section VII explains the limitations of the study.

II

3.2. The National Sample Survey Organization

The consumer-budget inquiry forms an integral part of the general programme of the NSS to conduct national socio-economic inquiries to provide data needed for developmental planning. Since 1951, data on household consumer expenditure relating to all the states in India are being collected every year, sometimes twice an year, through a series of repetitive surveys called Rounds. Since 1972-73 quinquennial survey of consumer expenditure had been started, i.e., collection of data once in five years. These surveys have been conducted on a probability sampling basis in the form of independent samples[1].

NSS has so far published thirty eight rounds of consumer expenditure sampling inquiry. The detailed information on consumer expenditure is available since the second round for rural India and from the third round onwards for urban India. In the case of Kerala, detailed reports published in a comparable form is available for rural and urban areas from the 20th round onwards (see Table 3.2.1). An important feature of the NSS is the adoption of a moving reference period. It means that the data collected do not refer to a fixed time period. This procedure helps in obtaining more meaningful estimates because of the relative importance of seasonal factors in the economy.

Table 3.2.1

Particulars of NSS Rounds for Kerala (Reference period - a month)

NSS Round Nos.	Survey Period	Sample size			
		Rural		Urban	
		Village	House holds	Census blocks	House holds
20th	Jul'65-Jun'66	359	614	144	260
21th	Jul'66-Jun'67	360	713	144	411
22nd	Jul'67-Jun'68	357	729	144	302
23rd	Jul'68-Jun'69	360	391	141	273
24th	Jul'69-Jun'70	360	1380	144	517
25th	Jul'70-Jun'71	352	1573	144	519
27th	Oct'72-Sep'73	---	3789	131	1407
28th	Oct'73-Jun'74	360	645	127	245
32nd	Jul'77-Jun'78	360	4320	144	1728
38th	Jan'83-Dec'83	315	3105	142	1395

Note : Number of villages in NSS 27th round (rural) is not available from the NSS reports.

Source : Relevant NSS Reports (see appendix IIA&B for the data).

III

3.3. Data : Collected and Published

From a comparison of the consumer household inquiry schedules with the NSS published reports one may find that NSS collects much more detailed and useful information than it has been able to publish. The NSS collects data on consumption out of purchased articles for each commodity entering into consumer-budget, home-grown stocks and transfer receipts. These data are recorded in terms of value as well as quantity wherever possible. Data on demographic particulars of each sample household, e.g., age-sex composition of members, and their occupation, are also collected. As against this, the published reports contain the following details for each of the fixed-per capita expenditure classes[2] : (i) average total monthly expenditure per capita, (ii) the average monthly expenditure per capita for each group of commodities (iii) total number of sample households and (iv) average household size.

Table 3.3.2 given below reports the items included in the commodity groups which we have considered for the empirical analysis. The grouped data used for the empirical analysis is reported in Appendix II A&B.

Table 3.3.2

Commodity aggregations used.

Sl.No. 1	Group of Commodities 2	Commodities included in the group 3
1.	Cereals and cereal substitutes	Rice, wheat, jowar, bajra, maize, barley, small millets, ragi, Bengal gram and their products, and cereal substitutes such as tapioca, pea, etc.
2.	Milk and milk products	Liquid milk, ghee, butter, dahi, ghol, lassi channa, khoa and other milk products
3.	Edible oil	Mustard oil, coconut oil, gingelly oil, groundnut oil, vanaspati and oilseeds used as food
4.	Meat,egg and fish	Meat, eggs,poultry, fish,bird and others.
5.	sugar	Sugar(factory),Khandsari sugar, gur(cane and others), sugar candy and others
6.	Other food items	Pulses and their products, vegetables, fruits and nuts, spices, beverages, refreshments and processed food, and pickles, jams and jellies, sea salt,rock salt and other salts.
7.	Clothing	Men's, women's and children's clothing made of cotton, silk and wool,and all items of bedding and upholstery.
8.	Fuel and light	Coke, coal, firewood, electricity, gas, dung-cake, charcoal, kerosene oil, candles, matches, and other fuel and lighting oil.
9.	Other non-food items	Pan(betel), etc., tobacco and its products, drugs and intoxicants, amusement and sports, education, medicine, toilets, sundry goods, services,conveyance, ceremonials, furniture, musical instruments, ornaments, domestic utensils, footwear and other durable and semi-durable goods and their repairing expenses including maintenance of residential houses.

Note : Details under column (3) refer to the number of commodities actually included in the NSS Consumer Expenditure Schedule.

Source : NSS reports (various issues).

IV

3.4. Concepts and Definitions

Some of the important concepts and definitions followed in the NSS consumer expenditure surveys are noted below:

3.4.1. Household:

A household is a group of persons normally living together and taking food from common kitchen. A boarding house, a hotel boarder (with his dependents or guests) forms a separate household. Households maintained and fed directly by the government such as those in prisons, police quarters, cantonments, hospitals, relief camps, are, however, excluded from the scope of the enquiry.

3.4.2. Cash purchase:

This refers to all cash purchases except for enterprise purposes of the household during the reference period. Only such purchases that are made for non-productive domestic purposes are considered.

3.4.3. Home Grown Stock:

Home grown stock means commodities produced at home. This includes produce from leased in as well as from leased out land, produce from kitchen garden and livestock products and produce from household industries. Produce brought from village home is also included in this. The value of home grown stock is imputed at ex-farm price or ex-factory rate which excludes any transport or distributive cost or middleman's profit or any other trade margins.

3.4.4. Household Consumer Expenditure:

Consumer expenditure of a household comprises of all the expenditures incurred by the household during a reference period of 30 days preceding the date of survey exclusively towards its non-productive domestic consumption. Thus all expenses towards the enterprise activities of the household are excluded. Transfer payments in kind, like loans, advances and charities are not considered as consumer expenditure. But, any consumption out of transfer receipts in kind, like, borrowings, gifts, charities, perquisites received by the household, free collections and other receipts in kind is considered for determining total consumption of the household.

3.4.5 Household Size and Occupation

Although, as mentioned earlier, data on household characteristics, like, age-sex composition and occupation have been collected in the NSS rounds since its inception, it is only in the report on household consumer expenditure pertaining to the 19th Round onwards that consumption data cross-classified by income and household size, and by income and occupation respectively, have been presented. These cross tabulations have considerably widened the scope and add to the depth of the Engel function analysis mainly because the consumers within a state are likely to be more homogeneous in their habits and tastes and to face, more or less, the same price structure as compared to consumers within a group of states taken together or India as a whole. Besides, states, being independent units of planning and development, follow sufficiently independent economic policies, particularly with regard to movement of food grains and other essential commodities, fixation of prices, etc.

V

3.5. Variables used in the Analysis

It is customary in analysing consumer behaviour from cross-section data to set out a relationship between the consumption expenditure and disposable income. In the present study, instead of using disposable income, we have considered the relationship between specific item expenditure to total expenditure. One reasoning behind this type of an analysis is that the entire disposable income is assumed to be spent on present consumption and future consumption. Present consumption can be considered as real expenditure incurred and future consumption as savings. If we assume that the allotment for future expenditure is equal to zero, then we can say that income is equal to total present consumption or budget. Another reasoning for doing away with using actual income is that earnings of a significant part of the population in Kerala depend mainly on agricultural income, petty business and remittances from abroad. Since such earnings and receipts are not properly accounted in income data, the only option left out is to use expenditure data across the size classes as a proxy for income.

In view of insufficient number of sample households with different sizes, we have not examined the influence of household size on consumption by estimating separate regression equations for each household size. In some of the studies, the influence of household size is taken into account by considering expenditure in per capita terms. But this type of a study also can be refuted on the ground of adult-equivalence scale analysis, i.e., quantity consumed varies according to the age of each consumer. Therefore, the average age of the household rather than the average number of the household that matters while considering the consumption expenditure. Because of the difficulties involved in computing the age composition, in this study, we ignore the possibility of economies (or diseconomies) of scale in consumption.

One argument in favour of the use of per capita expenditure is that it is generally suited for economic analysis, especially in a state like Kerala, where rural urban merge phenomenon (ruban) has been observed along with the breaking-up of the old joint family system leading to the formation of nuclear families. This, in turn, is likely to change the pattern of households by the age of the head and the influence of the age of the head on household consumption.

The use of cross-section data assumes constancy of prices. This assumption is valid when all the consumers face same set of prices. But the time series analysis considers price as a changing factor. Because of the non-availability of consumer price index data in published form we are forced to find a suitable alternative. Hence, for the estimation of price responses in the consumption behaviour we use the wholesale price indices.

VI

3.6. Data Problems

The major data problems observed here are related with grouping of the data, zero expenditure values and price data. These can be explained as given below:

3.6.1. Grouped Data

In many situations, data on individual households (per capita average) are not available but are grouped according to such classifications as income range, household size and the like. When individual observations are classified according to income classes and only average expenditures given for each commodity group and for total expenditure, a number of statistical problems arise.

It can be shown that, for a given equation, heteroscedasticity is introduced in the disturbance term unless it so happens that the same number of households are represented in each group (Prais and Aitchison, 1954). It can also be shown that the variance of the disturbance term is inversely proportional to the number of households within each group, and this form of heteroscedasticity can be corrected using weighted least squares (which involves multiplying each variable in the system, including any constant term, by the square root of this frequency) (Bewley, 1986).

Prais and Aitchison(1954) have demonstrated that weighted least squares on grouped data provide unbiased estimates, but that proof is dependent on the linearity of the relationships being aggregated. If, for example, the logarithm of total expenditure is present in an equation (as it is in the Working-Leser model), when the individual relationships are averaged within a group, the geometric mean (and not the arithmetic mean) of total expenditure is required to avoid bias. Similarly, the presence of the reciprocal of a variable necessitates the use of the harmonic mean. Nanak Kakwani (1977) established that the bias is greater for models with reciprocals than with logs, but this is not surprising since the harmonic mean is not greater than the geometric mean, which in turn is not greater than the arithmetic mean. The bias resulting from using arithmetic means with non linear functions is minimized if the groups are so defined that there is minimal variation in each variable within each group. Since both regressor and regressand may appear in some non linear fashion, the groups should be chosen so as to minimize individual household behaviour variation within each group.

3.6.2. Zero Expenditure

When a survey of household expenditure patterns is conducted , it is possible that some households may record zero expenditures for certain goods and services. Thus, if individual household data are to be analysed , the Engel curve specification must not include terms involving the logarithms of such variables. Even if logarithms are not used, problems can occur in the estimation depending on the reason for the zero expenditures; some of these problems and their solutions have been discussed in Wales and Woodland (1983).

Essentially there appear to be three main reasons for recording a zero expenditure:
(1). Because of taste, the commodity is never consumed (e.g. tobacco for a non-smoker). (2). Income is insufficient to consume the commodity i.e. , there is a threshold level of income below which the commodity is not consumed. (3). The commodity is not consumed in the survey weeks by chance (e.g. clothing tends to be bought relatively infrequently).

When data are presented in grouped form for highly aggregated items such as food, clothing and so forth, it is reasonable to assume that points (1) and (2) are not the causes of a zero expenditure. Thus, it might be regarded that in groups with a small number of households, point (3) may occasionally occur and the simple solution to the problem is to delete that group's data for all goods and services. Certainly, elaborate estimation schemes would be unwarranted, and it might not be desirable to aggregate the goods to remove the problem, particularly, if the proportion of observations that contain zero is relatively small.

3.6.3.Price Indices

For the present analysis we have used whole sale price index data instead of consumer price index data. It is mainly because of the non-availability of consumer price index for different commodity groups. These two price index figures may not be the same for any commodity at a particular time point. For example whole sale price index plus a certain mark up will constitute the consumer price index. This mark up differs from commodity to commodity and place to place. Therefore, the actual market price variations may not be fully captured by the whole sale price index data.

VII

3.7. Limitations of the Study

The NSS data on consumer expenditure are collected by the interview method are likely to have non-sampling errors and biases of varying degrees but it is very difficult to assess the quality of the NSS data especially in the absence of comparable other sources of data. Any discussion on the accuracy of the NSS estimates will require a great deal of further research. Ever since the NSS started publishing the results of the consumer expenditure surveys, increasing attention has been paid to study the trends in consumption expenditure distribution (Suryanarayana, 1980). Besides, the fact that the NSS consumption figures are direct estimates, collected in a scientific way, other factors in its favour include: (i) consumption is a "more direct measure of level of living of the people" than income (Dandekar and Rath, 1971) and(ii) "consumption is a better proxy for permanent income distribution", than current income which is subject to more transient factors (Bardhan, 1974).

However, in view of the observations made above, it is found that the utility of the NSS consumer-budget inquiries for the analysis of consumer behaviour would be considerably enhanced if the data on some more detailed type, both in terms of value and quantity, whenever possible, and household characteristics- are also made available in a comparable form. It may be observed that while consumption out of homegrown produce was evaluated at the prevailing retail price before the 9th round, it has been evaluated at the ex-farm price subsequently. Again, the similarities or otherwise in the structure and pattern of consumption of different regions could be better analysed if the consumption data relating to the same set of regions were available for all the rounds (Mahajan,1971).

VIII

3.8. Conclusion

In this section we have discussed the details regarding NSS data collection, definitions used, and the problems and limitations of the data while applying in the empirical context. We found that though there are several problems related with NSS data, it is still considered to be the best source on several grounds. In the next chapter, we will be discussing the estimation of expenditure elasticities.

Notes

1. Within each independent sub-sample, the sampling design is generally stratified two stages with household as the ultimate unit and village or the census block as the penultimate unit according as the sampling frame relates to the rural or urban areas. The artifice of at least two independent sub-samples is adapted inter alia to have an idea of the reliability of sample estimates in the absence of standard errors which are difficult to calculate in view of the complex sampling design adopted by the NSS.

2. The classes are: 0-8, 8-11, 11-13, 13-15, 15-18, 18-21, 21-24, 24-28, 28-34, 34-43, 43-55 and 55 and above. The last class has been split as 55-75 and above 75 from the 17th Round onwards. Beginning with the 27th Round, the first three classes have been collapsed into a single class and the last class has been split into four classes, namely, 75-100, 100-150, 150-200 and 200 and above.

CHAPTER IV

ESTIMATION : EXPENDITURE ELASTICITIES

4.1. Introduction

This chapter contains an analysis of the expenditure (Engel) elasticity estimates of various commodity groups given in Chapter III. The analysis is done in five sections. Section II deals with the theoretical part of Engel estimation. Section III provides a discussion on the consumption pattern in Kerala vis a vis all India. Section IV reports and analyses the Engel Elasticities from linear, quadratic and log linear expenditure functions. And section V compares expenditure elasticity estimates of Kerala with similar estimates for all India. An international comparison is also undertaken in this section.

II

4.2. Theory of Engel Fuctions

Engel function can be defined as a restricted form of demand function. In other words, demand function becomes the expenditure function if the prices are constant. This assumption is approximately valid for cross-section data pertaining to a point of time. Therefore, family 'budget survey' for a single period can be used for the estimation of such functions.

The current study belongs to the category of studies which are referred to as "family budget studies", which have a long history. Ernest Engel(1857), on the basis of his pioneering analysis of family-budget data relating to 153 Belgian families, proposed the following law, "the poorer a family is, the greater is the proportion of total outgo (total expenditure) which must be used for food". Later on this came to be known as Engel's law. Although the law relates to food only, his budget studies included other heads of expenditure as well. So the law has found its generalization that the proportion devoted for food decreases, while the proportion devoted to luxuries and semi-luxuries increases (Allen and Bowley, 1935). "It is interesting to note that this is one of the cases in economics where observed regularities of human behaviour were discovered years before a theoretical framework was developed to explain them" (Stigler, 1954). There are numerous expenditure elasticity studies using data from a wide range of countries. An extensive review of literature has been given in Deaton (1986).

There has been a long and excellent tradition of household budget and Engel curve analysis in India, where high quality data have been gathered for many years. Of the numerous relevant studies, a representative few include those of Krishnan (1964), Bhattacharya and Maitra (1970), Radhakrishna et al. (1979), Coondoo et al. (1981), Suryanarayana (1980) and Mukhopadhyay (1987) etc.

The basic law of Engel was based on certain assumptions such as the consumption behaviour displayed at alternative levels of income have been completed instantaneously. Assuming that the effects of the composition of household size etc., are absent and prices (p) are merged into the functional form, then the demand function yields;

$$p_i q_i = f_i \ (\mu) \quad \text{------------} \quad (4.1)$$

$$i=1,2,\ldots\ldots,n$$

where q_i = amount of ith commodity demanded

μ = total expenditure (income)

p_i = prices of ith good

The Engel curve is employed to classify goods into luxuries, necessities and inferior based on the income elasticities, defined as $\frac{\delta q_i}{\delta \mu} \frac{\mu}{q_i}$,

Hence, if $e_{i\mu} > 1$, the goods are luxuries

$e_{i\mu} < 1$, the goods are necessaries

$e_{i\mu} < 0$, the goods are inferior.

Further, the expenditure on each commodity group will increase/decrease with the increase/decrease in total expenditure if the expenditure elasticity ($e_{i\mu}$) is greater/less than unity.

The estimation of the above function requires an explicit specification of (4.1). This is discussed below.

4.2.1. Functional Specification

It is obvious from (4.1) that Engel function do not include other variables, such as, commodity prices, family size, asset holding, etc., which influences consumption of commodities[1]. The selection of the functional form should be based on economic, statistical and practical considerations (Working, 1943 and Mahajan, 1983). These criteria can be discussed as follows.

Economic criterion provides the view that expenditures on all commodities add up to income. This is the budget restriction or the adding-up restriction. This criterion is fitted to a set of data and the one giving the best fit is considered to be the best approximation to the true but unknown Engel curve.

Under statistical acceptability criterion a number of alternative Engel functional forms can be chosen. To judge the best fitting function certain statistical criteria are used. It is the co-efficient of determination or R^2.The Engel function which has the highest R^2 value is adjudged the best.

Among the practical considerations governing the choice of the Engel functions are the satisfactory estimation, simplicity, both in terms of computation and interpretation of the parameters. This probably explains why log linear form of the Engel curve is used so commonly.

But there is no general consent to the above criteria in the literature (Dax, 1987). Therefore, there is no 'a priori' reason to trust and use one specific functional form in the estimation of Engel curve. It is well known that income elasticities for the same commodity and estimated for the same set of household budget data can differ widely when they are derived from different functional forms. Though there are several criticisms levelled against the use of single equation methods (Deaton,1986, Bewley,1986), for the estimation of Engel (expenditure) elasticities we have also used the same methods. Now let us specify some of the equations which we arbitrarily selected for the empirical estimation.

(a). Linear Function

This functional form is given as :

$$p_i q_i = \alpha_i + \beta_i \mu$$

where $p_i q_i$ is the consumption expenditure on a particular item and μ is the total consumer expenditure, α_i and β_i are the parameters of regression co-efficients for the function. Expenditure elasticities can be obtained by differentiating the function partially with respect to total expenditure, μ, we get,

$$p^i \frac{\delta q_i}{\delta \mu} = \beta_i$$ Here a_i is equal to linear regression estimates

$$\frac{\delta q_i}{\delta \mu} = \frac{\beta_i}{p_i}$$ Since income elasticity $e_{i\mu} = \frac{\delta q_i}{\delta \mu} \frac{\mu}{q_i}$

$$\frac{\delta q_i}{\delta \mu} \frac{\mu}{q_i} = \frac{\beta_i}{p_i} \frac{\mu}{q_i}$$ if, $\frac{\mu}{p_i q_i} = x_i$

Then, $e_{i\mu} = \beta_i \; x_i$

It is a simple version of Engel curve as far as computation and interpretation of the parameters are concerned. This form fulfills both the conditions,i.e., adding-up and homogeneity (Stone, 1954). In terms of marginal propensity to consume (mpc / elasticity), this form implies that mpc (β) is constant. That is, if expenditure elasticity ($e_{i\mu}$) is positive (between Ø and 1) , the items are necessities; if ($e_{i\mu}$) is negative (less than Ø) , the items are inferior ones; and , if $e_{i\mu}$ is more than unity, the items are luxuries. This implies that no initial income-level required for expenditure on necessities while luxuries do require. The expenditure elasticity and α_i are inversely related (Anil Gupta, 1986). The linear function implies that expenditure elasticity is unity as income rises for all items, which seems to be unreasonable. Such consideration creates some doubt but it does not suffice to reject this form.

(b). Double log or log linear Function

This form is given by :

$$\ln p_i q_i = \alpha_i + \beta_i \ln \mu$$

Constancy of the expenditure elasticity (β) is implied from the double-log function. It is independent of the unit of measurements; hence, can easily be applied to such Engel function, having exogenous and endogenous variables in heterogeneous units of measurement.

This measure provides an automatic corrective mechanism to eliminate hetro-scedasticity of disturbances (Anil Gupta, 1986). It is, however, silent with regard to income levels (initial and satiety). Double log form is identical with respect to the elasticity hypotheses that expenditure elasticity is constant and, is inversely proportional to the level of consumption and to the level of total expenditure (income). Further, the linear function is identical in terms of mpc hypotheses that mpc is constant, inversely proportional to income and is inversely proportional to the square of the income.

(c). Quadratic Function

This form is given by :

$$Y_i = \alpha_i + \beta_1 \mu + \beta_2 \mu^2$$

This is a generalization of the linear method in which demand equations are quadratic in nature. Analytic regularity conditions are assumed in this method(Pollak and Wales, 1980).

In this section we have discussed the functional specification of the single equation forms which we have selected for the estimation purposes. Before going for a detailed analysis based on these functions it would be useful to discuss, in brief, the general trends in the consumption pattern of Kerala.

III

4.3. Consumption Pattern in Kerala : An over view

The basic motivation behind all the Five Year Plans is to bring the standard of living of the people above the poverty line in both rural and urban areas. Planning Commission has defined Poverty line as 2100 calorie per person per day nutrition intake in the case of urban areas and 2400 calorie per person per day for rural areas. A study by George (1980) considers food expenditure as the most important and sensitive item to income changes, therefore, an analysis of the changes in food consumption patterns over time has a special significance to poverty studies. Direct estimates of consumption of food items and non-food items are available from nation-wide consumer surveys carried out periodically by the NSS Organization. Ahluwalia (1978) pointed out that though there are several criticisms against the use of NSS data, the direct consumption estimates obtained from the NSS provide a more reliable source for analysing the structure of consumer demand.

If we look at the per capita income estimates of CSO (computed for a month) and per capita monthly expenditure data of NSS we may find that per capita expenditure data reflects more meaningfully the changes in the economy (see table 4.3.1). In 1983 one can observe that there occurred a sudden spurt of consumerism in Kerala compared to all India levels while the per capita income in Kerala remained well below the all India average. We can give several explanations for this type of a phenomenon i.e., growth of agricultural income due to more intensive cash cropping, remittances from out side etc. A study by Gopinathan Nair (1986) observed that in Kerala there was an unprecedented inflow of foreign remittance from the emigrants to the Middle East during the late seventies and early eighties. This phenomenon may be one among the reasons that may have contributed to the divergence from the normal course of order in consumption habits.

A number of comparative studies on food consumption habits in India have been conducted in recent years, although only a few have utilized the most recent NSS consumer expenditure data. The reporting of the NSS data by the expenditure classes has stimulated many studies concerned with the distribution of consumption. The study by Dandekar and Rath (1971) defined

Table 4.3.1

Distribution of monthly per capita expenditure and Income over the period 1965-1983.

Years	Kerala		All India	
	Income[1]	Expenditure[2]	Income[1]	Expenditur[2]
1965/66	31.67	23.37	35.50	32.50
1966/67	33.25	30.01	40.17	39.30
1967/68	39.08	31.68	46.17	39.11
1968/69	41.33	37.26	46.00	39.67
1969/70	45.08	37.59	49.83	42.55
1970/71	49.50	41.88	52.75	44.08
1972/73	53.83	50.23	58.50	52.83
1973/74	67.58	62.14	72.50	61.89
1977/78	86.92	78.48	99.50	82.52
1983	140.58	160.78	169.55	138.24

Note : 1. Simple averages of income computed for a month.
2. Simple averages of rural and urban per capita consumption

Source : NSS reports (various issues), and Statistics for Planning (1983 and 1986 issues), Department of Economics & Statistics, Trivandrum.

poverty levels for rural and urban India and induced a number of further studies on poverty, notably, by Srinivasan and Bardhan(1974), Mellor and Desai(1986). Many of the studies concerning nutrition intake and food consumption have also been based on the NSS data. Of particular relevance to the present data survey is a study by George (1980) comparing survey data for 1964-65 and 1973-74 at the all India level. His study revealed a decline in food consumption over the reference period to approximately 10 per cent in both rural and urban areas. However, the study concluded that no decline had taken place in the consumption of the lowest expenditure quartile.

Estimates obtained from the several cross section data can be used for analysing the changes in consumption habits according to the socio-economic characteristics across regions. In this section we use the data of NSS 22nd Round for 1967-68, NSS 27th Round for 1972-73, NSS 32nd Round for 1977-78 and NSS 38th Round for 1983 for analysing the changes in per capita consumption in both Kerala and all India[1].

4.3.1. Changes in Per Capita Consumption

Normally consumption pattern differs from urban to rural areas. In Kerala one would observe a converging consumption pattern in rural and urban sectors compared to similar all India figures[2]. As we have seen earlier, factors, both economic and non-economic might have contributed to this difference in consumption pattern in Kerala. Some of these non-economic factors can be identified as the fast spreading of urban consumption habits among the rural consumers due to the high mobility and literacy rate in Kerala compared to the rest of India. Moreover, there is relatively more even distribution of income among the people as a consequence of land reforms and social reforms. This argument can be verified by analysing the changes in consumption shares over time as given in table 4.3.2.

(a). Rural areas

It is evident from table 4.3.2 that between 1967-68 and 1983, in rural areas the total expenditure shares on food items declined from 74.13 per cent to 61.67 per cent. The NSS data for different survey rounds are reported according to current expenditure classes. This table shows that considerable shifts have taken place in rural consumption pattern. Consumption expenditure during the NSS 22nd and 38th rounds shows that the proportion of expenditure on food items has decreased while that on non-food items increased. This type of consumer preference pattern can be attributed to Engel's Law. Hence, it may be said that Table 4.3.2 indirectly suggests that the general standard of living and per capita income in rural areas have increased over time as reflected in the expenditure pattern in rural areas.

(b). Urban areas

Between 1967-68 and 1983, the proportion of total expenditure on food items in the urban areas of Kerala declined by nearly 12 per cent. In 1967-68 the proportion of food consumption expenditure on total expenditure was 70.98 per cent, whereas in 1983 it was 59.38 per cent. This shows that in urban area also there is considerable shift in the consumption preferences among the people. As we have seen in the case of rural area here also several factors may have contributed to such changes in the consumption pattern. The most important factor to this effect may be the more even distribution of income compared to the rest of India and the subsequent growth of the middle income people in the total population. For example, in 1983, more than 40 per cent of the per capita monthly expenditure was for non-food items including luxurious items. In rural areas also the expenditure on non-food items were nearly 40 per cent of the total expenditure. This points towards the disappearance of the rural-urban difference in Kerala.

While the consumer behaviour in urban areas of Kerala and all India remained almost the same there are striking differences in the consumption pattern of rural areas of Kerala and with rest of India (see table 4.3.2). Between 22nd and 38th NSS rounds, in all India, the proportion of food consumption in rural areas declined from 77.5 per cent to 65.6 per cent whereas in urban areas it declined from 66.5 per cent to 59.1 per cent.

Table 4.3.2

Food and non-food expenditure as percentage to total expenditure

	Food		Non-food		TotalExp.	
NSS Rounds	Kerala	India	Kerala	India	Kerala	India
<u>Rural</u>						
22	74.13 (20.46)	77.34 (25.88)	25.87 (8.08)	22.66 (7.52)	100 (28.54)	100 (33.40)
27	70.50 (29.71)	72.92 (32.16)	29.50 (12.48)	27.08 (12.01)	100 (42.19)	100 (44.17)
32	61.20 (45.42)	64.34 (44.33)	39.04 (28.98)	35.66 (24.56)	100 (74.22)	100 (68.89)
38	61.67 (89.54)	65.58 (73.73)	38.33 (55.66)	34.42 (38.77)	100 (145.2)	100 (112.5)
Urban						
22	70.98 (23.75)	66.55 (29.82)	29.02 (11.06)	33.45 (15.00)	100 (34.81)	100 (44.82)
27	66.28 (37.79)	64.49 (40.84)	33.72 (20.48)	35.51 (22.49)	100 (58.27)	100 (63.33)
32	61.61 (50.97)	59.99 (57.97)	38.39 (31.76)	40.01 (38.18)	100 (82.73)	100 (96.15)
38	59.38 (104.73)	59.12 (96.97)	40.62 (71.63)	40.88 (67.03)	100 (176.4)	100 (164.0)

Note : Absolute values are given in brackets.
Source : Computed from relevant NSS rounds(See Appendix IIA & B).

4.3.2. A Comparative Analysis

If we compare the changes in the expenditure shares on different consumer items for both all India and Kerala, we may be able to observe certain interesting features. First of all, the share of expenditure on the food items over time can be viewed on a disaggregated level in both rural and urban areas. Later on the differences in non food consumption habits will be analysed.

Different components in the food basket show almost similar trends in both Kerala and all India. In the case of total cereals consumption it is evident from Tables 4.3.3 and 4.3.4 that in both all India and Kerala the proportion of expenditure on cereals has declined considerably over the years. Gram and Cereal substitutes also have followed the same pattern. But regarding consumption of pulses there is a marginal increase in the proportion in Kerala whereas the all India figures both in rural and urban areas show no increase at all. The proportion of income expended on milk and milk products show an increasing trend in rural areas of both Kerala and all India whereas a slight decline in expenditure proportion is observed in the urban areas. Per capita expenditure shares shows an increasing trend in both Kerala and all India for the following items: edible oil; meat,egg and fish; vegetables and fruits and nuts. Since these items are relatively costly and having more nutrient content, the proportion of expenditure spent on these items can be considered as an indicator of the rise in the level of the standard of living of the people of India in general and Kerala in particular. The proportion of income spend on sugar, salt and spices, and beverages show nearly a declining trend over this period.

Expenditure on non-food items also changed significantly over the reference period. The shares of non-food consumption in rural and urban areas of Kerala during 1967-68 were only 25.9 and 29 per cent, respectively, but that increased to the extent of 38.3 and 40.6 per cent by 1983 (see table 4.3.3).

Table 4.3.3

Item expenditure as percentage to Total expenditure by Broad groups of items and by rounds in Kerala

Sl.No. Items	Rural				Urban			
	38nd	32th	27nd	22th	38nd	32th	27nd	22th
1. Cereals	24.17	23.71	32.01	34.34	19.48	20.19	24.84	26.03
2. Gram	.17	.19	.10	.15	.19	.27	.12	.09
3. Cereal subs.	1.63	2.83	5.46	5.83	.44	1.25	2.21	2.54
4. Pulses	1.61	1.51	1.28	.94	1.71	1.81	1.81	1.58
5. Milk & pdts.	4.11	4.14	3.61	3.37	5.12	5.26	5.37	5.44
6. Edible oil	2.73	2.13	1.95	2.07	2.86	2.47	2.19	2.45
7. Meat,egg&fish	6.18	5.39	4.56	4.46	6.59	5.77	5.19	4.78
8. Vegetables	2.84	2.33	2.23	2.25	2.83	2.39	2.25	2.24
9. Fruits&nuts	5.59	5.20	4.25	4.42	5.53	5.56	4.31	4.57
10. Sugar	2.03	2.03	2.49	2.79	1.92	2.19	2.88	3.35
11. Salt&spices	4.56	3.53	3.08	3.15	2.21	3.17	2.46	2.87
12. Beverages	8.07	8.21	9.49	10.36	10.46	11.30	12.66	15.03
13. Food (total)	61.67	61.20	70.50	74.13	59.38	61.61	66.28	70.98
14. Pan,Tob.etc.	3.10	3.44	3.75	4.03	.24	2.88	3.37	3.14
15. Fuel & light	5.82	5.93	5.89	5.94	5.80	6.29	5.52	6.10
16. Clothing	6.68	7.55	4.22	4.09	8.14	6.95	4.96	3.77
17. Foot wear	.65	.35	.12	.07	.96	.48	.26	.15
18. Misc.goods	16.42	15.16	13.29	11.74	19.66	14.72	16.77	15.87
19. Durablegoods	5.95	6.80	2.23	0.00	3.66	7.07	2.34	0.00
20. Nonfoodtotal	38.33	39.04	29.50	25.87	40.62	38.39	33.72	29.02
21. Total Exp.	100	100	100	100	100	100	100	100

Source : NSS reports (various issues)

All India estimates on non food consumption show that during the year 1967-68 the respective shares in rural and urban areas were 23 and 33 per cent, whereas it went up to 34 and 40 per cent respectively in 1983 (see table.4.3.4). In Kerala consumer behaviour in rural and urban areas shows almost a similar pattern over the years while that of all India estimates show a diverging picture (table 4.3.4). This is mainly due to the fact that the rural urban difference in Kerala is not as striking as observed in the rest of India.

Table 4.3.4

Item expenditure as percentage to Total expenditure by Broad Groups of items and by Rounds in <u>all India</u>.

Sl.No. Item	Rural				Urban			
	38nd	32th	27nd	22th	38nd	32th	27nd	22th
1. Cereals	32.30	32.78	40.58	45.39	19.41	20.45	23.32	25.33
2. Gram	.26	.42	.57	.84	.19	.25	.32	.31
3. Cereal sub.	.19	.33	.54	.84	.08	.10	.13	.16
4. Pulses	3.52	3.82	4.28	4.40	3.24	3.57	3.41	3.75
5. Milk&pdts.	7.52	7.68	7.30	7.40	9.24	9.53	9.33	9.40
6. Edible oil	4.03	3.57	3.51	2.90	4.84	4.64	4.85	4.08
7. Meat,egg&fish	3.02	2.67	2.47	2.40	3.61	3.46	3.27	3.24
8. Vegetables	4.71	3.77	3.60	3.26	4.98	4.40	4.37	4.15
9. Fruits&nuts	1.39	1.12	1.11	.90	2.11	1.96	2.01	1.83
10.Sugar	2.81	2.64	3.76	3.20	2.46	2.64	3.60	3.59
11.Salt & spices	2.52	3.04	2.78	2.69	2.14	2.66	2.27	2.43
12.Beverages	3.31	2.50	2.42	2.40	6.82	6.33	7.61	8.28
13.Food (total)	65.58	64.34	72.92	77.34	59.12	59.99	64.49	66.55
14. Pan,tob.etc.	2.99	2.89	3.08	2.93	2.44	2.43	2.76	2.70
15.Fuel & light	7.04	6.00	5.64	5.63	6.93	6.42	5.64	5.71
16.Clothing	8.59	8.69	7.00	5.45	7.63	7.05	5.27	4.57
17.Foot wear	.99	.74	.52	.54	1.10	.61	.41	.47
18.Misc.goods	12.54	10.34	8.64	8.05	20.53	14.61	19.22	19.98
19.Durable goods	2.27	7.00	2.15	.06	2.25	8.89	2.21	.02
20.Non Foodtotal	34.42	35.66	27.08	22.66	40.88	40.01	35.51	33.45
21.Total Exp.	100	100	100	100	100	100	100	100

Source : NSS reports (various issues)

It may be observed in Kerala that in the end period consumption behaviour remains almost the same in both rural and urban areas. This convergence in consumption habits observed in Kerala is significantly different from that observed in all India.

Total cereals consumption in Kerala, measured in terms of kilograms, over the five years from 1972-73 to 1977-78 shows considerable increase. In 1972-73 total per capita monthly cereal consumption in both rural and urban areas of Kerala was 7.9 and 8.2 kgs respectively. Rice was the major component in it amounting to 7.4 and 7.2 kgs in rural and urban areas respectively. The importance of wheat in the consumption basket declined over the years. For instance, in 1972-73 it was Ø.5 kg (rural) and Ø.9 kg (urban) while in 1977-78 it declined to the extent of Ø.3 kg (rural) and Ø.4 kg (urban) in Kerala. It is evident from Table 4.3.5 that per capita consumption of rice, the staple food in Kerala, has increased over the years. In 1972-73 the rice consumption was 7.4 kg in rural areas and 7.2 kg in urban areas. But it increased in 1977-78 to 9.9 kg (rural) and 8.5 kg (urban). This implies that there is nearly 3Ø per cent increase in per capita rice consumption over the 5 year period under consideration.

The consumption of cereal substitutes in Kerala declined over the period under consideration. In Kerala, the most important cereal substitute is tapioca. Tapioca is mainly consumed by the lower income groups, and therefore, it is considered as an inferior commodity (George, 1987). The decline in the consumption of this item and the increase in the consumption of the cereal varieties in the food basket suggests that the real income of the people may have increased over this period.

Table 4.3.5

Per capita monthly intake of major food items in Kerala
Quantity (Ø.ØØ kg)

NSS Rounds	Years	Rice		Wheat		totalcereal		Cereal Sub.	
		rural	urban	rural	urban	rural	urban	rural	urban
27	(1972-73)	7.39	7.21	Ø.55	Ø.9Ø	7.97	8.17	6.18	3.24
28	(1973-74)	7.33	7.23	Ø.29	Ø.7Ø	7.69	7.93	6.99	3.64
32	(1977-78)	9.92	8.47	Ø.26	Ø.43	9.18	8.91	5.55	2.5

Source : Compiled from relevant NSS expenditure reports.

A study conducted by the U.S.Agency for International Development analysed the NSS data extensively and came to the conclusion that food consumption declined during 196Ø's and that during the post 197Øs period the overall decline in consumption was arrested and possibly reversed in urban areas (Evenson,1986). In Kerala it is found that this reverse trend is applicable in both rural and urban areas. Their study shows that total consumption by the poorest decile has risen slightly in both rural and urban areas since 197Ø. This is also true for second and third deciles.

In this section we have discussed the shifts in the expenditure share proportions over time. Now let us analyse in detail the sensitivity of consumption expenditure with respect to income changes.

IV

4.4. Empirical Estimation of Elasticities

The main focus of this section is to provide estimates of expenditure elasticities for different commodity groups using the family budget survey of the NSS. The grouping has been done in accordance with the Radhakrishna et al.,(1979) study in order to facilitate an easy comparison. This grouping also enables estimation more easy because in the grouping process some of the zero value cells may get eliminated. In this section, we estimate expenditure elasticities for each cross-section data separately.

For the estimation of elasticities we have considered three functional forms which we have discussed in section III. The expenditure elasticities estimated with respect to these functional forms, i.e., linear, quadratic and log linear, are given below.

4.4.1. Evaluation of Elasticities

Single equation functional forms, such as linear, quadratic and log linear, are based on several assumptions. First of all prices of the commodities are assumed to be constant over the period of estimation. Secondly, the tastes of the consumers are assumed to be remaining the same. Thirdly, cross price relationship among various commodities are considered to be minimal. All these assumptions are supposed to be holding good over the cross sectional data of different NSS rounds under consideration. We can fit any number of single equation functions with the variables for getting the parameter values. In all the three functions we will be assuming that the consumers are spending a fixed proportion of their budgetary expenditure on various commodity groups. Different single equation forms will give us different parameter values and thereby dissimilar elasticity values. Therefore, in order to avoid ambiguities about the best fitting functional form we have looked into the statistical acceptability of each equation.

(a). Expenditure Elasticities in Rural Areas

Table 4.4.1 gives the expenditure elasticities in the rural Kerala by following simple linear regression method of estimation. Almost all the regression equations reported R^2 value more than Ø.8 and F test and t tests also were significant. We have estimated expenditure elasticities separately for all the NSS cross-sections starting from 2Øth round onwards. In all NSS rounds item wise commodity elasticities remained almost the same without much variation. In the case of some commodity groups we have observed a marginal <u>decrease</u> in the expenditure elasticities. They are Cereal & cereal substitutes, Edible Oil, Meat, Fish & Eggs, Sugar and Other foods. The commodities which reported a marginal <u>increase</u> in expenditure elasticities are Milk & Milk products, Clothing and Other non food items. The differences in expenditure elasticities show the responsiveness with which the consumers react upon a unit change in total expenditure on a specific commodity group. Those commodities which reported elasticities less than one are considered as necessary items and those more than one are considered as luxuries.

In Table 4.4.2 a different set of expenditure elasticities are reported for rural Kerala based upon double log functional form estimation. For this function the statistical properties like high R^2 and t and F statistics are tested and found satisfactory. In the case of double log form elasticity value is directly derived from the equation, i.e., β co-efficient is the elasticity measure. We can observe certain differences in the elasticity measurements with respect to the same commodity group over the various NSS rounds. Expenditure elasticities for some commodity groups <u>have started declining</u> marginally over time. The commodity groups which follow this pattern are : cereal & substitutes, milk & products, edible oil, sugar and other foods. The commodities which showed relatively <u>increasing</u> elasticities are meat,fish & eggs, clothing, fuel & light and other non food items.

Table 4.4.3 gives the expenditure elasticities obtained by using the same set of data following the quadratic function. In this function though the regression equations reported a R^2 above Ø.8, elasticities are not found consistent for different NSS cross-sections.

Among the expenditure elasticity estimates reported in the tables 4.4.1, 4.4.2 and 4.4.3, we found that the most reliable estimate among these are the double log form. We found that in double log function regression results showed more reliable results, besides almost all regression results reported R^2 more than Ø.9. Moreover, this method straight away gives the necessary elasticity measures from the regression results. As a whole in the rural areas we found only three commodity groups as necessaries, ie, less responsive to income changes. They are cereal & substitutes, sugar and fuel & light. Remaining six items are found as either moderate luxury items or luxuries.

(b). Expenditure Elasticities in Urban Areas

With urban sector data also we applied the three functional forms separately for getting the expenditure elasticiy values (see Tables 4.4.4, 4.4.5 and 4.4.6). The responsiveness with respect to budget (income) changes in cereals and cereal substitutes are very minimal though it showed a tendency to increase over time. Milk and milk products remained as luxury in urban areas also. Edible oil, according to expenditure elasticity estimates using simple linear equation is a necessary item. But according to double log and quadratic regression estimations it is a moderately luxurious item. Unlike in rural areas meat, fish & eggs reported less elasticity in urban areas. This can be interpreted as the people in urban areas are less responsive to the budget changes as far as this item is concerned. That means this commodity group has become a part of the nececessary food basket in urban Kerala. In urban areas sugar is more sensitive to income changes compared to rural areas. Except in simple linear regression equations, in all other equations it is near around unity. Other food item group is a moderate luxury according to linear and double log functions. But the elasticity for other food item group estimates are found to be necessary according to quadratic equations. As far as clothing is concerned, there is not much change in elasticities compared to rural areas. Clothing item is very much sensitive to budget changes in urban areas also. Fuel & light reported less than unity under all the three functional forms. Other non food commodity group reported more than unity elasticity in linear and double log functional forms. But in the quadratic function it reported a less than unity elasticity. Since the elasticities in double log functions are uniform throughout the years, we can consider this item as a luxurious one.

At the end of this analysis we found that four items in urban areas are necessaries, they are : cereals & substitutes, meat,fish & eggs, sugar and fuel & light. Rest five commodity groups are considered as either moderate luxury or luxurious items. In Table 4.4.7 we have reported averages of the elasticities that we obtained from the three functional forms. In our analysis of elasticity estimation we never came across an inferior item. This is partly due to the fact that we have grouped several items together for estimation convenience. For example tapioca, which is the main cereal substitute in Kerala, is found as an inferior commodity according to George, (1987). In our analysis expenditure elasticities reported similar pattern both in rural and urban areas except in the case of Meat, fish & eggs. This item is a moderate luxury in rural areas but it showed as a necessary item in urban areas. The relative sensitivity differs from rural to urban areas. Details regarding the regression results are given in Appendix III.

Table 4.4.1

Expenditure Elasticities for Consumer items based on Different Functional Forms for the Rural Sector of Kerala

Function : $p_i q_i = \alpha + \beta\, \mu$ Elasticity = $\beta(\mu/p_i q_i)$

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.55	1.14	0.99	0.92	0.85	0.98	1.43	0.48	1.39
21	0.58	1.35	0.95	0.83	0.73	0.96	1.59	0.46	1.39
22	0.55	1.23	0.88	0.82	0.68	0.84	1.84	0.57	0.94
23	0.46	1.22	0.91	0.93	0.76	0.81	1.09	0.46	1.69
24	0.56	1.59	1.07	0.94	0.80	0.92	1.81	0.62	1.41
25	0.58	1.62	1.12	0.96	0.90	0.90	1.76	0.65	1.39
27	0.53	1.14	0.94	0.96	0.84	0.76	1.33	0.54	1.37
28	0.64	1.27	1.02	1.07	0.83	0.95	1.32	0.59	1.26
32	0.49	1.09	0.84	0.79	0.72	0.74	1.58	0.67	1.40
38	0.47	1.16	0.78	0.85	0.66	0.79	1.71	0.47	1.52

Table 4.4.2

Function : $\ln p_i q_i = \alpha + \beta \ln \mu$ Elasticity = β

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.61	1.72	1.01	0.96	0.91	1.01	1.69	0.54	1.34
21	0.68	2.08	1.14	0.93	0.82	0.99-	2.10	0.53	1.47
22	0.82	2.17	1.29	1.02	0.84	1.01	2.33	0.59	1.19
23	0.68	1.45	0.99	1.14	1.07	0.96	1.97	0.59	1.42
24	0.67	2.24	1.12	0.97	0.85	1.00	2.32	0.64	1.47
25	0.69	2.22	1.21	1.02	0.95	1.02	2.09	0.67	1.34
27	0.68	1.78	1.09	0.99	0.93	0.92	1.82	0.59	1.35
28	0.73	1.63	1.23	1.04	0.91	0.96	2.06	0.65	1.29
32	0.65	1.36	1.10	0.90	0.85	0.91	2.07	0.73	1.34
38	0.54	1.54	0.87	0.97	0.75	0.93	2.36	0.57	1.43

Table 4.4.3

Function : $p_i q_i = \alpha + \beta\, \mu + \gamma\, \mu^2$ Elasticity = $(\beta\, \mu + 2\gamma\, \mu^2)/Y$

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.74	1.69	0.88	0.86	0.85	0.82	1.06	0.75	0.89
21	0.77	1.19	1.05	1.01	0.97	0.73	1.15	0.64	0.88
22	0.82	1.57	0.97	0.81	0.78	0.73	0.63	0.45	0.93
23	0.93	1.28	0.94	1.17	0.91	0.91	1.04	0.69	0.68
24	0.76	1.19	0.89	0.80	0.85	0.85	0.97	0.64	0.89
25	0.75	1.17	1.02	0.89	0.83	0.89	0.62	0.64	0.81
27	0.71	1.19	0.84	0.73	0.76	0.94	1.08	0.59	0.67
28	0.83	1.14	1.19	0.59	0.83	0.73	1.14	0.54	0.62
32	0.65	1.21	1.02	0.93	0.89	0.92	1.76	0.76	0.72
38	0.71	1.36	1.00	1.02	0.79	1.02	1.21	0.59	0.82

Source : Computed from the parameter values reported in appendix III

Table 4.4.4

Expenditure Elasticities for consumer items based on Different Functional Forms for the Urban Sector of Kerala

Function : $p_i q_i = \alpha + \beta \mu$ Elasticity = $\beta(\mu/p_i q_i)$

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.28	1.22	0.88	0.47	0.55	1.27	1.31	0.52	1.47
21	0.23	1.27	0.76	0.61	0.46	1.03	1.95	0.45	1.61
22	0.43	1.66	0.91	0.80	0.82	0.99	1.35	0.63	1.36
23	0.39	1.65	0.94	0.80	0.85	1.11	1.99	0.53	1.41
24	0.39	1.49	1.03	0.77	0.83	0.96	1.91	0.52	1.62
25	0.39	1.56	0.98	0.73	0.86	1.02	1.63	0.59	1.49
27	0.36	1.17	0.93	0.88	0.74	0.91	1.58	0.57	1.29
28	0.53	1.37	1.05	0.80	0.84	0.96	1.32	0.77	1.31
32	0.39	1.08	0.99	0.76	0.69	0.90	1.51	0.79	1.29
38	0.43	1.30	0.81	0.89	0.59	0.97	1.96	0.57	1.43

Table 4.4.5

Function : $\ln p_i q_i = \alpha + \beta \ln \mu$ Elasticity = β

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.34	2.07	1.16	0.61	0.78	1.12	1.32	0.64	1.47
21	0.30	1.60	0.95	0.82	0.71	1.05	2.39	0.62	1.56
22	0.49	1.94	1.05	0.78	0.97	1.03	1.92	0.71	1.31
23	0.47	2.10	1.05	0.81	0.86	1.14	1.75	0.66	1.42
24	0.48	2.01	1.21	0.84	0.85	0.97	1.83	0.66	1.54
25	0.51	1.53	1.14	0.89	1.06	1.06	1.96	0.73	1.45
27	0.53	1.96	1.20	0.99	0.89	0.99	1.85	0.64	1.36
28	0.54	2.42	1.14	0.84	0.87	1.01	1.37	0.77	1.42
32	0.58	1.61	1.19	0.83	1.01	0.89	2.02	0.77	1.45
38	0.55	1.67	0.88	0.98	0.70	1.08	2.18	0.61	1.38

Table 4.4.6

Function : $p_i q_i = \alpha + \beta \mu + \Gamma \mu^2$ Elasticity = $(\beta \mu + 2\Gamma \mu^2)/p_i q_i$

NSS Rounds	Cere-al&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
20	0.66	2.02	1.75	0.97	1.13	0.67	0.69	0.95	0.85
21	0.64	1.47	1.15	0.92	0.97	0.87	0.59	0.86	0.67
22	0.84	1.18	1.19	0.83	1.17	0.74	1.71	0.77	0.78
23	0.78	1.20	1.09	0.86	0.99	0.85	0.61	0.76	0.90
24	0.84	1.55	1.28	0.83	1.25	0.88	0.96	0.66	0.86
25	0.78	1.08	1.28	1.03	1.09	0.81	1.24	0.81	0.76
27	0.69	1.34	1.03	0.76	0.86	0.87	0.36	0.69	0.73
28	0.69	1.05	0.99	0.92	0.99	0.86	0.81	0.56	0.72
32	0.72	1.41	0.91	0.85	0.98	0.78	0.71	0.63	0.79
38	0.79	1.15	0.91	1.03	0.65	1.04	0.87	0.68	0.99

Source : Computed from the parameter values reported in appendix III

Table 4.4.7

Expenditure Elasticities for Consumer items (Averages of all NSS Rounds) based on Different Functional Forms for both Rural and Urban Sector of Kerala

Rural

Functions	Cereal&sb	Milk & M.Pdts	Edible Oil	Meat,Fish & Eggs	Sugar	Other Foods	Clothing	Fuel & Lighting	Other Non food
1*	0.54	1.28	0.95	0.91	0.78	0.87	1.55	0.55	1.38
	(.05)	(.17)	(.09)	(.08)	(.08)	(.08)	(.24)	(.08)	(.18)
2**	0.78	1.29	0.98	0.88	0.85	0.85	0.97	0.63	0.79
	(.07)	(.18)	(.09)	(.16)	(.06)	(.09)	(.21)	(.08)	(.10)
3***	0.68	1.82	1.11	0.99	0.88	0.97	2.08	0.61	1.36
	(.07)	(.32)	(.12)	(.06)	(.08)	(.04)	(.21)	(.06)	(.08)
Urban									
1*	.38	1.37	.93	.75	.73	1.01	1.55	.59	1.43
	(.08)	(.19)	(.09)	(.12)	(.14)	(.10)	(.32)	(.10)	(.11)
2**	.74	1.35	1.16	.90	1.01	.84	.86	.74	.81
	(.07)	(.28)	(.24)	(.09)	(.16)	(.09)	(.36)	(.11)	(.09)
3***	.49	1.89	1.09	.84	.87	1.03	1.86	.68	1.44
	(.07)	(.27)	(.11)	(.10)	(.11)	(.07)	(.31)	(.06)	(.07)

Note :1. * Linear Equation
2. ** Quadratic Equation
3. *** Double Log Equation
4. Figures in the brackets are the standard deviations of the elasticities over the period.

Source : Averages of the values reported in tables 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5, 4.4.6 for three functional forms.

V

4.5. A Comparison at National and International level

The formulation of Engel's law marks the beginning of an important branch of econometrics which developed a sound theoretical and statistical basis for consumption research by the second half of the 20th century (Houthakkar, 1957). The empirical study on consumption had an international flavour from an early date. Engel himself had no hesitation in applying an inference drawn from Belgian data to his own country. Allen Bowley's "Family Expenditure" (1935) marked the turning point in this respect, and it is noteworthy that it again deals with data from various countries. The international comparison of expenditure patterns has recently acquired a new practical interest. Here for the comparison purpose we have used the results of those studies which used budget enquiries conducted after 1950, employ total expenditure as the principal explanatory variable, estimate full logarithmic type of Engel curves by the method of least squares and use household budget data.

The main interest of this section is to examine the question to what extend expenditure elasticities for various items follow meaningful and predictable behaviour by level of per capita total expenditure in different countries. Before going for a detailed analysis at international level, let us consider the expenditure elasticities of different consumer items in Kerala and all India as observed in Radhakrishna et.al, 1979. In Table 4.5.1 averages of elasticity estimates obtained from different NSS rounds are given. From this table we can observe the changes in expenditure elasticities, if any, in Kerala from the NSS rounds 2nd to 22nd and 20th to 38th. It also help us to examine the inter temporal variations in elasticities for Kerala and to compare it with similar all India estimates.

Table 4.5.1

Comparison of Engel Elasticities on a National Level
(Double log function)

Expenditure Groups	NSS 2nd to 22nd Rounds				Rounds 20to38th	
	Kerala **		All India **		Kerala ***	
	Rural	Urban	Rural	Urban	Rural	Urban
1. Cereals	0.539	0.397	0.527	0.297	0.675[1]	0.487[1]
2. Pulses	1.712	1.459	0.828	0.568	---	---
3. Milk&Milk Pdts	2.779	1.825	1.894	1.392	1.819	1.891
4. Edible Oil	0.980	0.791	0.989	0.827	1.105	1.097
5. Meat,Fish&Egg	0.865	0.759	1.284	1.129	0.994	0.839
6. Sugar	1.311	0.922	1.961	1.081	0.888	0.870
7. Other Foods	0.954	1.147	1.060	1.139	0.971	1.034
8. Clothing	2.274	3.450	2.049	1.908	2.081	1.859
9. Fuel&Light	0.548	0.725	0.671	0.721	0.610	0.681
10.Other nonfood	2.211	1.551	1.980	1.539	1.364	1.436

Note : 1. Includes cereals and cereal substitutes.
2. Elasticities of Pulses are not estimated for Kerala for the NSS rounds 20th to 38th.

Source : ** Income elasticity estimates from NSS 2nd round to 22nd round, Radhakrishna, et al., 1979.
*** Averages of the expenditure elasticities obtained from NSS 20th round to 38th round.

The magnitude of the elasticities for cereals are found very close in rural areas of Kerala and all India. Moreover, it has the lowest value except for the rural part of Kerala during the second period. This may be due to the inclusion of pulses in the cereal group during the second period. During the first period (2nd to 22nd rounds) pulses were a luxurious item but a necessity in all India. But the opposite is true in the case of meat, fish and egg. This is true for both rural and urban consumption behaviour. In the case of clothing, the elasticities have reduced from period I to period II in Kerala. Moreover, the elasticities are very close between Kerala and all India. It is interesting to note that the rural - urban difference in the income elasticities is much less in Kerala than in all India.

From the above table we would be able to make an analysis of the expenditure trends in Kerala over time. It is evident from the table that consumption pattern changed to a certain extent for edible oil because this item turned out to be a luxurious item in Kerala during the second period i.e., 20th to 38th rounds. Sugar became a necessary item of the consumption basket during the second half while it was a moderate luxury during the first half of this period. In the case of other commodity groups there is not much difference in expenditure elasticities.

It is well known that within a country people tend to spend a smaller proportion of their incomes on food as their income rise. Gupta (1973) verified the above argument on an international level by examining the results and ascertained that it is still valid. He observed that Rural India and Egypt spend nearly 70 per cent of their incomes on food as against less than 50 per cent in the advanced countries. In the United States, the figure is nearly 33 per cent. In table 4.5.2 elasticity of food expenditure observed in some of the countries are reported.

Table 4.5.2

Food Expenditure Elasticity for different countries.

Country	Elasticity of food Expenditure
India (rural)	Ø.85
India (Urban)	Ø.75
UAR (Egypt)	Ø.92
West Pakistan (rural)	1.ØØ
Bangla Desh	Ø.63 to Ø.79
Ghana	Ø.98
Nigeria	Ø.48 to Ø.62
S.Rodesia	Ø.63
Israel	Ø.52
Japan	Ø.6Ø
Ceylon	Ø.82
Canada	Ø.438
U.S.A	Ø.2 to Ø.4

Source : Gupta,1983.p.143

Table 4.5.3 presents expenditure elasticities for all cereals observed in different countries. These elasticities are computed from the household budget data. Cross-section expenditure elasticities show that, in general, high income countries have low values of elasticities for cereal expenditure implying low priority for the consumption of cereals in high income families. Conversely, low income countries show high values indicating that cereal consumption occupies an important place in the overall consumption of poor people. It is interesting to note that in all India expenditure elasticities for cereals in rural areas shows values twice as that in urban areas. Here it is to be noted that in all high per capita income countries expenditure elasticity for cereals are well below .25. This suggests that expenditure on cereals declines rapidly as standard of life increases.

Table 4.5.3
Cereals expenditure elasticity for different countries

Sl.No	Country	Elasticity
1	India (rural)	Ø.32
2	India (urban)	Ø.63
3	Bengla Desh	Ø.44
4	East Pakistan	Ø.29 #
5	Egypt	Ø.59
6	Ceylon	Ø.48
7	Japan (rural)	Ø.19
8	Japan (urban)	Ø.16
9	U.K	Ø.23 *
1Ø	Italy	Ø.21 *
11	Denmark	Ø.11 *

Note : # including bread
* including pulses
Sources : Gupta, 1983

In Table 4.5.4 expenditure elasticities for different countries are reported. Expenditure elasticity for rice in the USA shows that the increases in income tends to reduce the consumption of rice. Studies of time series of national average per capita shows that in USA the demand for rice is not a function of income (Gupta, 1983).

Table 4.5.4

Rice expenditure elasticity for different countries.

Sl.No	Country	Elasticity
1	India (rural)	Ø.63
2	India (urban)	Ø.23
3	Ceylon	Ø.52
4	China (Taiwan)	Ø.Ø6
5	Bengla Desh	Ø.Ø3 to Ø.28
6	Ghana (Accra)	1.49
7	Iran	Ø.51
8	Japan (rural)	Ø.25
9	Japan (urban)	Ø.Ø9
1Ø	U.S.A	-Ø.6Ø

Source : Gupta,1983, pp.147

Table 4.5.5 gives Houthakkar's international comparison of elasticities. Because of data limitations Houthakkar restricted the investigation to four major items of expenditure, namely, food (excluding alcoholic beverages), housing (including fuel & light), clothing (including footwear), and all other items. The principal criterion by which the similarity of expenditure patterns in different countries was judged was the elasticity of particular items of expenditure with respect to total expenditure.

Table 4.5.5 shows that the food expenditure elasticities reported here from all the countries are less than one. This confirms the validity of Engel's law[2]. The elasticities for clothing are, with one exception, greater than unity. In the technical sense of the term clothing is, therefore, a luxury, though a moderate one. No particular pattern is apparent in the elasticities for different countries, and here again prices may have been an important determinant. For housing the elasticities are mostly below one. It appears that on the whole, housing is a necessity in the technical sense. The elasticities for miscellaneous expenditures are all well above one.

Houthakker's study shows that the values of elasticity co-efficients for expenditure on total food, cereals, wheat and rice, are high for countries with low incomes, and low for high income countries. Finally, it is seen that the elasticity for cereal expenditure declines rapidly with the increase in incomes, suggests the increasing importance of non-cereal foods with rising incomes.

Table 4.5.5
Elasticities of four commodity groups with respect to total expenditure for different countries.

Sl.No. Country	Food	Clothing	Housing	Miscellaneous
1. Australia	Ø.39Ø	1.Ø25	1.18Ø	1.323
2. Brazil	Ø.8Ø2	1.332	1.227	1.174
3. Canada	Ø.867	1.25Ø	Ø.777	1.Ø85
4. Ceylon	Ø.856	1.1Ø8	1.118	1.29Ø
5. China, Peiping	Ø.651	1.328	Ø.94Ø	1.489
6. Cuba	Ø.7Ø4	1.1Ø4	1.16Ø	1.292
7. France	Ø.581	1.4Ø4	Ø.781	1.621
8. Germany 1951	Ø.579	1.436	Ø.681	1.552
9. Ghana, Accra	Ø.952	Ø.967	Ø.635	1.365
1Ø. Guatemala City	Ø.75Ø	1.3Ø8	1.Ø29	1.548
11. India Punjab	Ø.943	1.161	Ø.764	1.394
12. Italy	Ø.615	1.219	-----	-----
13. Philippines	Ø.81Ø	1.141	Ø.874	1.312
14. Sweden	Ø.843	1.139	Ø.749	1.261
15. U.S.195Ø	Ø.816	1.336	Ø.731	1.222
16. Kerala(India) #	Ø.581	1.97Ø	Ø.645*	1.4ØØ**

Note : # computed from NSS consumer expenditure data
* fuel and light
** Other non food
1. Elasticity of Housing and Miscellaneous for Italy are not available.

Source : H.S. Houthakkar(1957), Econometrica, Vol 25.

It is observed from the above comparisons of expenditure elasticities that, in general, there is a tendency for the elasticity co-efficients for expenditure on various food items to decrease with a rise in the level of real incomes. This tendency is stronger in the case of broad commodity groups like total cereals or total food. Further, deviations from this tendency results from a number of factors such as habits and customs of the people. These conclusions, based on a number of studies, are in accord with those of Houthakkar (1957), Goreux (1959), Gupta (1973) and our own data analysis.

4.6. Conclusion

In this study we have analysed the difference in rural urban consumption pattern in Kerala over a period of time. In Kerala it is found that the rural urban difference in consumption pattern is fading away in the latter period. The differences in consumption pattern observed in both rural and urban India .s are significantly different even in the latter period also. It is evident from 38th NSS round that consumerism is fast spreading in Kerala at a fast pace though the per capita income is still lying below the all India average. In the latter period nearly 40 per cent of expenditure shares were devoted for non food consumption in both rural urban Kerala and urban India.

For the sensitivity analysis we have used the functional forms which are considered as linear or be reducible to the linear form by appropriate transformations of the variables. As a whole in rural Kerala we found that only three commodity groups as necessaries they are cereal & substitutes, sugar and fuel & light. Remaining six items are found as either moderate luxury items or luxuries. In the case of urban Kerala we found that four items are necessaries, they are : cereals & substitutes, meat,fish & eggs, sugar and fuel & light. Remaining five commodity groups are considered as luxuries.

Recently there have been renewed interest in Engel functional specification, partly because of the fact that Almost Ideal Demand System by Deaton and Muellbaur (1980) collapses to the Working-Leser model (Leser 1963) in cross section. During such a course of development in the measurement of consumer behaviour, several models based fully on the theory have been used. These models are called system methods of demand estimation which satisfy most of the restrictions of the demand theory. In the next chapter a discussion on the procedure for recovering the own and cross price elasticities from Engel functions are given.

Notes

Section II

1. Then the income elasticities are in a certain sense just partial elasticities which are in the case of a positive correlation of income and additional variables lower than those computed here.

2. See for example Prais and Houthakkar(1955,p.13) Thatcher (1976, p. 227), or Hildenbrand (1983a, p.1001). Also Lydall (1976,p.17) points out that the standard distribution of earnings is 'approximately lognormal'. for a detailed treatise on the properties of the lognormal distribution see, for example, Aitchison and Brown (1957).

Section III

1. Here it should be noted that the data available from various NSS Rounds are not strictly comparable.

2. Consumer expenditure on broad groups of items and their percentage to total consumer expenditure : for the four NSS Rounds,22,27,32 and 38. These four annual surveys were carried out, during July 1967-June 1968, October 1972-September 1973, July 1977-June 1978 and January-December 1983 respectively. The last three surveys were in the NSS quinquennial survey programme while the NSS 22nd round has been selected from the earlier annual NSS survey programme to demonstrate the change in consumer expenditure pattern at the end of successive quinquennial.

CHAPTER V

ESTIMATION : PRICE ELASTICITIES

5.1. Introduction

In this chapter we have estimated the price elasticities from only two cross sections data. This type of an estimation procedure for price elasticities has been first developed by Iyengar and Jain (1969) followed by Pollak and Wales (1978). The present method used here for estimating price elasticities can be considered as a distant variant of these models. In section II a brief review of Iyengar and Jain, and Pollak and Wales methods are given. Section III develops the method which we have used for the estimation of the price elasticity using only two cross-section data. Section IV evaluates and interprets the elasticities obtained from such an estimation.

II

5.2. Theoretical Formulation

5.2.1. Iyengar and Jain Method

The pioneering work in the area of estimating price elasticities from limited number of cross section data had been introduced by Iyengar and Jain (1969). They obtained sensible estimates of price elasticities for two commodity groups such as food and non food from the NSS data for two time periods, assuming the indirect addilog model. Let us briefly review their methodology. The indirect addilog specification for two commodities is given by,

$$e_i(t) = \frac{A_i [e_0(t)]^{\beta_{i0}+1} [p_1(t)]^{\beta_{i1}} [p_2(t)]^{\beta_{i2}}}{\Sigma A_i [e_0(t)]^{\beta_{i0}} [p_1(t)]^{\beta_{i1}} [p_2(t)]^{\beta_{i2}}} \quad \text{------(5.1)}$$

$i=1,2$

where $e_i(t)$ denotes expenditure on group i during period t, $e_0(t)$ the corresponding total expenditure, $p_1(t)$, $p_2(t)$ the group prices, and A_i's and β_{ij}'s are parameters to be estimated. The following equation is obtained:

$$\frac{e_2(2)/e_1(2)}{e_2(1)/e_1(1)} = \left[\frac{e_0(2)}{e_0(1)}\right]^{B_0} \left[\frac{p_1(2)}{p_1(1)}\right]^{B_1} \left[\frac{p_2(2)}{p_2(1)}\right]^{B_2} \quad \text{---- (5.2)}$$

where, $B_i = \beta_{2i} - \beta_{1i}$, $i=0,1,2$, satisfy the constraint $\Sigma B_i = 0$. This equation was fitted after logarithmic transformation, using the expenditure elasticities for rural areas of West Bengal during 1952-53 and 1957-58, along with the corresponding price indices, $p_1(2)/p_1(1)$ and $p_2(2)/p_2(1)$, estimated by Iyengar, Chatterjee and Sarkar (1964) from the prices implicit in the household budgets. Data for 20 fractile groups were used for estimating the parameter values. Actually, ratios to 5 point moving averages of the fractile group estimates were used (Bhatacharya, 1977).

Later on Pollak and Wales (1978) developed a theoretically consistent model to estimate price elasticities using only cross section data.

5.2.2. Pollak and Wales Method

Pollak and Wales (1978) made a pioneering work to combine budget data from two time periods to estimate theoretically consistant complete demand systems. They made it clear that it was wrong to conjuncture that it would not be possible to estimate complete systems of demand unless budget studies were available for a large number of periods, since each budget study corresponded to a single price situation. In order to prove this proposition they used budget study data from two periods to estimate a pair of related demand systems, the LES and QES (Quadratic Expenditure Systems). The LES is given by,

$$P_i q_i = P_i b_i + a_i (\mu - \Sigma P_k b_k) \quad \text{------} \ (5.3)$$

$$\text{where} \quad \Sigma a_k = 1 \qquad i=1,\ldots\ldots,n$$

The LES has 2n - 1 independent parameters (viz,(n-1) a's and n b's) and is generated by the indirect utility function,

$$\phi(P,\mu) = - \frac{\pi P_k^{a_k}}{\mu - \Sigma P_k b_k} \quad \text{---------} \ (5.4)$$

This type of a demand equation shows that the households first purchase "necessary" quantities of each good (b's) and then divide the remaining expenditure among goods in fixed proportions (a's). In LES the "marginal budget shares" are independent of prices and are equal to the a's. In LES the household budget data for a single period identify the a's. If one of the b's is known a priori, the budget data for a single period is enough to identify not only the a's but also the remaining (n-1) b's. In this method data from each period identify the corresponding income consumption curve and the intersection of the two linear income consumption curves uniquely determining the point (b1,....,bn).

5.3. Method for Recovering Price Elasticities from Engel Function

Assume that the demand function follows LES;

$$p_i q_i = p_i b_i + a_i (\mu - \Sigma p_k b_k) \text{ -------------- } (5.5)$$

where $\Sigma a_k = 1$, $i=1,2,\ldots\ldots n$

The system can be used for estimating the elasticities if the 2n parameters, ('n' a's and 'n' b's) are known. From additivity one 'a' is redundant. In other words, one of the a's can be calculated if (n-1) a's are known from the restriction $\Sigma a_k=1$. (n-1) a's can be estimated from one cross-section data using Engel function. Let it be '$\hat{a}_i$'. If one more cross-section is available, the remaining 'n' b's can be found as follows:

If we fit this equation for two time periods, viz, period Ø and period 1, then the equation can be written as follows. The equation for the period zero is:

$$p_{i\emptyset} q_{i\emptyset} = E_{i\emptyset} = p_{i\emptyset} b_i + \hat{a}_i (\mu_\emptyset - \Sigma p_{k\emptyset} b_k) \text{ ------- } (5.6)$$

For period 1,

$$p_{i1} q_{i1} = E_{i1} = p_{i1} b_i + \hat{a}_i (\mu_1 - \Sigma p_{k1} b_k) \text{ ------- } (5.7)$$

Subtracting equation (5.6) from equation (5.7), we get

$$E_{i1} - E_{i\emptyset} = b_i (p_{i1} - p_{i\emptyset}) + \hat{a}_i (\mu_1 - \mu_\emptyset) + \hat{a}_i (-\Sigma p_{i1} b_k + \Sigma p_{i\emptyset} b_k)$$

$$\triangle E_i = b_i \triangle p_i + \hat{a}_i \triangle \mu - \hat{a}_i \Sigma b_k \triangle p_k \text{ ------------- } (5.8)$$

where $\triangle E_i = p_{i1} q_{i1} - p_{i\emptyset} q_{i\emptyset}$, $\triangle p_i = p_{i1} - p_{i\emptyset}$, $\triangle \mu = \mu_1 - \mu_\emptyset$

where $\hat{a}_i (-\Sigma p_{i1} b_k + \Sigma p_{i\emptyset} b_k) = [\ \hat{a}_i (-\Sigma((p_{i1} - p_{i\emptyset}) b_k)\ ]$

In the n commodity case we can expand it as:

$$\left.\begin{array}{l}\triangle E_1 - \hat{a}_1 \triangle \mu = b_1 \triangle p_1 - \hat{a}_1 (b_1 \triangle p_1 - \ldots - b_n \triangle p_n \\ \triangle E_2 - \hat{a}_2 \triangle \mu = b_2 \triangle p_1 - \hat{a}_2 (b_1 \triangle p_1 - \ldots - b_n \triangle p_n \\ \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \\ \triangle E_n - \hat{a}_n \triangle \mu = b_n \triangle p_1 - \hat{a}_n (b_1 \triangle p_1 - \ldots - b_n \triangle p_n\end{array}\right] \text{-(5.9)}$$

We can express these equations in matrix notation as;

$$\begin{bmatrix} y_1 \\ y_2 \\ \ldots \\ y_n \end{bmatrix} = \begin{bmatrix} (1-\hat{a}_1)\triangle p_1 & -\hat{a}_1\triangle p_2 & \ldots\ldots & -\hat{a}_1\triangle p_n \\ -\hat{a}_2\triangle p_1 & (1-\hat{a}_2)\triangle p_2 & \ldots\ldots & -\hat{a}_2\triangle p_n \\ \ldots & \ldots & \ldots & \ldots \\ -\hat{a}_n\triangle p_1 & -\hat{a}_n\triangle p_2 & \ldots\ldots & (1-\hat{a}_n)\triangle p_n \end{bmatrix} \begin{bmatrix} b_1 \\ b_2 \\ \ldots \\ b_n \end{bmatrix} \text{-- (5.10)}$$

where $y_i = \triangle E_i - \hat{a}_i \triangle\mu$

and $\hat{a}_n = 1 - \sum_{i=1}^{n-1} \hat{a}_i$

Since all the values of $\hat{a}$'s are known from Engel function,

$$Y = X \cdot b$$

Premultiply by X^{-1},

$$b = X^{-1} Y$$

After estimating the parameter b's we can estimate the price elasticities using the formula given below. The formula for price elasticities are obtained by differentiating the equation (5.5) as follows;

$$p_i \frac{\delta q_i}{\delta p_i} + q_i = b_i - a_i b_i$$

$$= b_i (1 - a_i)$$

$$p_i \frac{\delta q_i}{\delta p_i} \frac{p_i}{q_i} \frac{q_i}{p_i} + q_i = b_i (1 - a_i)$$

$$q_i \ (e_{ii} + 1) = b_i (1 - a_i)$$

$$e_{ii} + 1 = \frac{b_i}{q_i} (1 - a_i)$$

$$e_{ii} = \left[\frac{b_i}{q_i} (1 - a_i) - 1 \right]$$

$i=1,\ldots\ldots n$

Following the same procedure we can derive cross price elasticities also, i.e.,

$$p_i \frac{\delta q_i}{\delta p_j} = -a_i b_j$$

$$p_i \frac{\delta q_i}{\delta p_j} \frac{p_j}{q_i} \frac{q_i}{p_j} = -a_i b_j$$

$$\therefore \quad e_{ij} \frac{p_i q_i}{p_j} = -a_i b_j$$

$$e_{ij} = \left[-a_i b_j \frac{p_j}{p_i q_i} \right]$$

where $i=1,2,\ldots\ldots,n$

$j=1,2,\ldots\ldots,n$ and $i \neq j$

IV

5.4. Empirical Estimation of Elasticities

Here we use the above method to estimate the effect of price on the demand for the nine commodity groups for Kerala. In order to understand the stability of the price elasticities, we have estimated it for two time periods; viz 1965/66 - 1973/74 and 1973/74 - 1983.

A discussion of the variables and parameters used in the analysis are listed below;

$\Delta p_i q_i$ = difference in total expenditure between 1965/66 and 1973/74.

Δp_i = difference in price indices between 1965/66 and 1973/74.

$\triangle\mu$ = differences in average total expenditure between 1965/66 and 1973/74.

$\hat{a}_i = \frac{a_{i0} + a_{i1}}{2}$,averages of the co-efficients a_i for 1965/66 and for 1973/74. The estimates are given in appendix III.

The $\hat{a}_i$'s for the 9th commodity is obtained from

$$\hat{a}_9 = (1 - \sum_{i=1}^{8} \hat{a}_i).$$

Similarly we have estimated for the second period from the cross section data of 1973/74 and 1983.

Substituting the above values in (5.10) and inverting the matrix, we get the values of 'b'. The price elasticities obtained from b's and a's are reported in table 5.4.1. Since we are using the mean of a's for the estimates, the corresponding expenditure elasticities are also computed in order to understand the sensitivity of the estimates (see foot note 2). From Table 5.4.1 we have seen that over the years own price elasticity of cereals and cereal substitutes increased from almost an inelastic position to the level of moderately elastic one in both rural and urban areas of Kerala. In other words, the responsiveness of the consumers with respect to the price changes for cereals and cereal substitutes are less than proportional, though it reports an increasing trend over time. Among the food items, Milk and milk products seem to be more responsive to price changes both in rural and urban areas. Another point to be noted is that the elasticity has declined in the rural areas and increased in the urban areas, although the difference is not much. This may be due to the relatively more dependence of the urban consumers on the market compared to the rural people. In the case of Edible Oil, the price responsiveness has declined drastically over the years.

Another interesting finding is that the consumption pattern of Meat,fish & eggs during the period 1 declined in rural areas over time. While in the urban areas it became more responsive to price changes (though at a marginal rate). In rural areas, initially it was highly price responsive and over time it became a necessary part of the consumption basket. In urban areas, during the first period it was reported as an almost inelastic commodity. Later on, it became more susceptible to price changes even then it was well below one. As a whole we may say that meat, fish and eggs became less price responsive over time in rural areas. This may be due to the fact that most of the Keralites are non-vegetarians and, hence, this item forms a necessary part of the consumption basket. Therefore, even if there is changes in prices people are not at all moving to substitute items. Own price responsiveness of sugar is always less than unity though we observe a marginal increase in elasticities over time. Price elasticity of other food items group shows a decline over the years, which means consumers are becoming less responsive to price changes. In this group we have included all Other food items which are not included in the specific food classification.

Table 5.4.1

Own Price Elasticity

Commodities groups	Rural		Urban	
	Period1	Period2	Period1	Period2
Cereal & Substitutes	-Ø.379	-Ø.9Ø8	-Ø.136	-Ø.775
Milk & products	-1.713	-1.174	-1.311	-1.738
Edible oil	-1.168	-Ø.396	-1.149	-Ø.655
Meat,fish & egg	-1.187	-Ø.651	-Ø.3Ø9	-Ø.543
Sugar	-Ø.851	-Ø.991	-Ø.6Ø3	-Ø.972
Other food	-1.Ø19	-Ø.726	-1.221	-1.ØØ7
Clothing	-1.546	-1.678	-Ø.289	-Ø.752
Fuel & light	-Ø.456	-Ø.557	-Ø.549	-Ø.669
Other Non food	-1.785	-1.332	-1.453	-1.287

Note : period 1 corresponds to the years 1965/66 and 1973/74

period 2 corresponds to the years 1973/74 and 1983.

Source : Selected NSS Rounds (various issues)

The effect of price change on Clothing is more sensitive in rural areas than in urban areas. In fact, in the second period, the highest elasticity is for clothing in the rural areas. This indicates that the increase in Clothing price affects the rural people the most. Responsiveness of Fuel and light to price changes are not at all significant in both areas as this item is deemed to be a necessary part of the consumption basket. It means whatever the price increase consumers are bound to consume sufficient quantities of this item. It may also due to the non availability of cheap substitutes. Other non-food items report high price elasticity in both rural and urban areas. But a marginal decline is observed over the periods.

Table 5.4.1 also brings out the changes in consumption pattern taking place in both rural and urban areas which in turn tend to suggest the economic transformation that has taken place in Kerala. To illustrate, during 1965-66 to 1973-74 there were six items having own elasticity more than one in rural areas and their number declined to three in the second period (1973-74 to 1983). On the other hand, in the urban areas, the reduction is only one, from 4 to 3, during the second period. If such a change can be treated as an indicator of the economic transformation, our study tends to suggest that such transformation is more in rural than in the urban areas. Another point is that the number of price elastic commodities has become more or less the same in the rural and urban areas during the second period. This can be due to the fact that the difference between rural and urban is getting reduced over the period.

In Table 5.4.2 and 5.4.3 we have reported the complete price elasticities, both own and cross for rural and urban areas. The cross price elasticities are insignificant for most of the commodities.

V

5.5. Conclusion

In this section we have recovered the price elasticities from Engel curves using only two cross section data. The resulting estimates show the following. Own price elasticities for the two time periods show almost the same trends in most of

Table 5.4.2

Own and Cross Price Elasticities from two Cross-section data. Considering 20th and 28th NSS round data for the <u>Rural</u> Areas

Commodity Groups	1	2	3	4	5	6	7	8	9
1	-0.3799	-0.0127	0.00179	-0.00454	-0.00172	0.00224	0.01298	-0.01581	0.11511
2	-0.45916	-1.713	0.00538	-0.01359	-0.00514	0.00669	0.03887	-0.04733	0.34463
3	-0.3214	-0.02662	-1.1683	-0.009517	-0.0036	0.00468	0.02721	-0.03313	0.24123
4	-0.33185	-0.02748	0.00389	-1.1868	-0.0037	0.00484	0.02809	-0.03421	0.24906
5	-0.24856	-0.02058	0.00291	-0.00736	-0.8513	0.00363	0.02104	-0.02562	0.18655
6	-0.30183	-0.02499	0.00354	-0.00894	-0.00338	-1.0189	0.02555	-0.03112	0.22654
7	-0.49844	-0.04128	0.00584	-0.01475	-0.00558	0.00727	-1.5463	-0.05138	0.37411
8	-0.14818	-0.01227	0.00174	-0.00438	-0.00166	0.00216	0.01254	-0.4557	0.11122
9	-0.62393	-0.05167	0.00732	-0.01847	-0.00699	0.0091	0.05282	-0.06432	-1.7848

Own and Cross Price Elasticities from two Cross-section data Considering 28th and 38th NSS round data for the <u>Rural</u> Areas

Commodity Groups	1	2	3	4	5	6	7	8	9
1	-0.908	-0.00388	-0.0087	-0.0115	-0.00326	-0.0366	-0.0244	-0.01419	-0.0728
2	-0.0445	-1.174	-0.0285	-0.0272	-0.0077	-0.0863	-0.0577	-0.0335	-0.1717
3	-0.0269	-0.00553	-0.396	-0.01643	-0.00465	-0.0521	-0.0348	-0.0202	-0.1036
4	-0.0321	-0.0066	-0.0148	-0.651	-0.0056	-0.0622	-0.0416	-0.0241	-0.1238
5	-0.0249	-0.0051	-0.0115	-0.0152	-0.991	-0.0483	-0.0672	-0.0187	0.09603
6	-0.0271	-0.0056	-0.0125	-0.0166	-0.0047	-0.726	-0.0351	-0.0204	-0.1046
7	-0.0585	-0.01202	-0.0269	-0.0358	-0.0101	- .1134	-1.678	-0.044	-0.2256
8	-0.0167	-0.0034	-0.0077	-0.0101	-0.0029	-0.0323	-0.0216	-0.557	-0.0643
9	-0.0579	-0.0119	-0.0267	-0.0354	- 0.01	-0.0023	-0.0749	-0.0435	-1.332

Source : Computed from the relevant NSS Rounds.

Table 5.4.3

Own and Cross Price Elasticities from two Cross-section data Considering 20th and 28th NSS round data for the Urban Areas

Commodity Groups	1	2	3	4	5	6	7	8	9
1	-0.1363	-0.00615	-0.00135	-0.0123	-0.00434	-0.02114	-0.01027	-0.00883	-0.08227
2	-0.43739	-1.311	-0.00568	-0.0517	-0.01829	-0.08915	-0.04332	-0.03725	-0.34687
3	-0.31286	-0.01856	-1.149	-0.0369	-0.01308	-0.06376	-0.03098	-0.02664	-0.24812
4	-0.17541	-0.01041	-0.00228	-0.3086	-0.00734	-0.03575	-0.01737	-0.01494	-0.13911
5	-0.18901	-0.01121	-0.00246	-0.02234	-0.6032	-0.03852	-0.01872	-0.01609	-0.14989
6	-0.34451	-0.02044	-0.00447	-0.04073	-0.01441	-1.221	-0.03412	-0.02934	-0.27321
7	-0.43501	-0.0258	-0.00565	-0.05142	-0.01819	-0.08866	-0.2893	-0.03704	-0.34498
8	-0.18332	-0.01087	-0.00238	-0.02167	-0.00766	-0.03736	-0.01815	-0.5497	-0.14538
9	-0.51665	-0.03065	0.006716	-0.06107	-0.02161	-0.1053	-0.05116	-0.04399	-1.4526

Own and Cross Price Elasticities from two Cross-section data Considering 28th and 38th NSS round data for the Urban Areas

Commodity Groups	1	2	3	4	5	6	7	8	9
1	-0.775	-0.02088	-0.00482	-0.01669	0.00029	-0.00092	-0.00936	-0.00959	-0.05678
2	-0.08747	-1.738	-0.01377	-0.04768	0.00083	-0.00262	-0.02676	-0.02741	-0.16217
3	-0.0457	-0.03666	-0.655	-0.02931	0.00051	-0.00161	-0.01644	-0.01684	-0.09967
4	-0.01213	-0.03272	-0.00756	-0.543	0.00046	-0.00144	-0.01468	-0.01504	-0.08898
5	-0.04508	-0.03074	-0.0071	-0.02457	-0.972	-0.00135	-0.01379	-0.01412	-0.08358
6	-0.06053	-0.04127	-0.00953	-0.033	0.00057	-1.007	-0.01852	-0.01896	-0.11223
7	-0.08769	-0.05979	-0.01381	-0.04781	0.00083	-0.00263	-0.752	-0.02747	-0.16258
8	-0.04001	-0.02729	-0.0063	-0.02182	0.00038	-0.00119	-0.01224	-0.669	-0.07419
9	-0.09052	-0.06173	-0.01426	-0.04935	0.02711	-0.00261	-0.02769	-0.16783	-1.287

Source : Computed from the relevant NSS rounds.

the commodities. Some differences of elasticities are visible in the case of some of the commodities in the rural and urban areas. Our procedure is found theoretically consistent since it satisfies both raw restraint and column restraints. It is found that the price responsiveness reduced in the second period particularly in the rural areas. While the reduction took place in the urban areas with respect to price responsiveness was relatively low. This can be inferred that the consumption pattern is converging to a similar pattern in both rural and urban areas. The presence of significant price effects on budget share in the nine commodity classification for many items individually and the reflection of zero price effects on commodity groups points to the price variable as an effective policy instrument for the Government.

Notes

1. Our basic intention behind this type of a time period selection is to evaluate the impact of exogenous variables, if any, on consumer behaviour of the people. According to several studies (viz. P.R.Gopinathan Nair, 1986) it is evident that after mid 1970's the inflow of foreign remittances (mainly from the Middle East) influenced almost all the sectors of the states' economy, including consumer habits.

2. In Table 1 given below income elasticities are given for two representative periods. Here we have noticed that cereal and cereal substitutes expenditure elasticity showed an increasing trend over the years in both rural and urban areas. As income increases people start spending relatively more on cereal items. Since we clubbed together the consumption of both cereal and substitutes it is difficult to say which one contributes more to this positive change. But we may say that the contribution of substitutes in the food basket is only a negligible quantity and, therefore, relatively more money has been apportioned for cereal items over time.

This Table presents a comparative picture of rural-rural shifts in expenditure elasticities over the years. Our estimates show that the expenditure elasticities declined over the years except in the case of cereal & cereal substitutes and fuel & light. This reflects the relative responsiveness of income shifts (in the present analysis expenditure is regarded as a proxy for income) upon the consumer items declined over the years. The expenditure elasticities are well above unity for milk & milk products, clothing and other non food items indicate that they are luxurious (conspicuous) consumption items.

Table 1
Income Elasticities for two representative periods.

Commodity groups	Rural		Urban	
	20-28	28-38	20-28	28-38
Cereal & substitutes	.51	.55	.35	.50
Milk & products	1.69	1.29	1.55	1.49
Edible oil	1.09	.79	.88	.79
Meat,fish & egg	.99	.93	.58	.79
Sugar	.92	.72	.79	.76
Other food	.99	.79	1.14	.98
Clothing	1.79	1.69	1.37	1.39
Fuel & light	.46	.48	.69	.61
Other Non food	1.97	1.68	1.76	1.45

Source : NSSO rounds (relevant issues).

An analysis of the urban-urban elasticity difference over the two periods indicates that a similar shift in consumer habits is taking place there also. The only difference is that the degree of change varies from one item to another. For example, in the case of cereal and cereal substitutes in the early 1970's the expenditure elasticity was very low i.e., 0.35, while in the late 1970's there occurred 0.15 increase in the expenditure elasticity. Those three items which revealed more than one expenditure elasticity in rural areas continued to follow the same pattern in the urban areas also. From the expenditure elasticity estimates we can deduce that the changes that are taking place over time in consumption styles are distributed almost equally in both rural and urban areas of Kerala. This is mainly because the consumer habits among the people are changing almost evenly irrespective of rural urban difference. This is not true in the case of other states. Several non-economic factors also contribute to these changes such as, locational factors, mobility of the people, literacy, etc. are the catalysts in this direction.

CHAPTER VI

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

In this study we have analysed the consumption pattern of Kerala using the data given by National Sample Survey. The time period selected for this study is in accordance with the availability of NSS data rounds between 1965/66 to 1983. This study analyses the consumption pattern in Kerala over this period and compares it with the consumption pattern of all India. Share analysis is used for identifying the broad pattern of consumption behaviour and elasticity estimates for analysing the responsiveness of commodity groups to income and price changes. For the estimation of price elasticities we have developed a method which enable us to recover price elasticities from Engel functions.

6.1. Summary of the Findings

From the expenditure share analysis it is found that the consumption patterns in Kerala differs significantly from that of all India. We found that during the final period of our study there have not been much relationship between per capita income and per capita expenditure in Kerala unlike all India. Moreover, per capita consumption expenditure in Kerala started overtaking all India average consumption expenditure. There was not much difference in the case of per capita income between Kerala and all India because it was remaining below the all India average throughout the study period. Consumption expenditure during the NSS 22nd and 38th rounds shows that the proportion of expenditure on food items have decreased while that on non-food items increased. Between 1967-68 and 1983, the share of total expenditure on food items declined from 74.13 per cent to 61.67 per cent. In the urban areas it declined by nearly 12 per cent. In 1967-68 the proportion of food consumption expenditure on total expenditure was 70.98 per cent, whereas in 1983 it was 59.38 per cent. This shows that in urban area also there is considerable shift in the consumption preferences among the people. In 1983, more than 40 per cent of the per capita monthly expenditure share was for non-food items including luxurious items. In rural areas also the expenditure on non-food items were nearly 38 per cent of the total expenditure. This points towards the disappearance of the rural-urban difference in Kerala.

While the, consumer behaviour in urban areas of Kerala and all India remained almost the same there are striking differences in the consumption pattern of rural areas of Kerala and all India Between 22nd and 38th NSS rounds, in all India, the proportion of food consumption in rural areas declined from 77.5 per cent to 65.6 per cent whereas in urban areas it declined from 66.5 per cent to 59.1 per cent. In Kerala, one may find that the rural urban difference in the consumption pattern is not so glaring as that observed in all India. If we look at the absolute values we may find that the average food and non food consumption in Kerala below the all India average till 1973/74 but it started overtaking the all India average from 1977/78 onwards. The share analysis give us only the general trends in consumption behaviour but it does not say anything about the sensitivity of commodities to income and price changes. In order to analyse these effects we have estimated income and price elasticities.

For the estimation of income (expenditure) elasticities we have used three functional forms such as linear, log linear and quadratic. On the basis of R^2 values and Standard Deviations of elasticities obtained across ten NSS rounds we found the log linear functions as the best fitting model. By observing the magnitude of the income elasticities we can classify commodity groups into luxury and necessary items. It is found that the elasticity estimates of the commodities remained almost the same for both rural and urban areas of Kerala. The magnitude of the elasticities are not significantly different for most of the commodities. Clothing followed by milk and milk products were the most sensitive items in the rural areas. In the case of urban areas it was milk and milk products followed by clothing were the most sensitive items. Comparing the estimates with all India, it is found that the elasticities are significantly different only for two items viz., edible oil and meat,fish and eggs. Edible oil is a luxury in Kerala whereas it is a necessary item in all India. The second item meat, fish and eggs a necessary item in Kerala while it is a luxury in All India. An international comparison of elasticity estimates are found very similar to the elasticities from developing countries but not to that of developed countries.

The price elasticities obtained from our recovery method are compared for the two time periods for identifying the changes in consumption pattern across the two sectors over time. As far as price responses are concerned, the own price elasticity of cereals and cereal substitutes increased over the years. This implies that the consumers became more prone to market fluctuations. Milk and milk products reported own price elasticity more than unity in both rural and urban areas of Kerala. The own price responsiveness of Meat, fish and eggs in rural areas showed a decline, while that of urban areas increased. Responsiveness of edible oil to price changes has significantly decreased in both areas over time. Sugar is found to be having inelastic demand during this period while other food items were more responsive. Clothing marked a distinct type of price responsiveness in both areas over time. The estimated elasticity was more than one in rural areas, whereas, it was less than one in urban areas. This implies that rural cloth consumption depends very much on the price changes. Fuel and light item is found relatively less price responsive. Other non-food group in both the time periods are reported more than one price response. Moreover, we found that the consumer behavioural transition is more in rural areas compared to urban areas. It is observed that price response has reduced in the rural areas over time. That is to say in the initial period there were six commodity groups having price elasticities more than one while it reduced to three in the second period. Likewise the elasticities in the urban area also reduced from four to three. From this we may infer that the price responsiveness are moving to a similar pattern in both rural and urban areas of Kerala.

6.2. Some Concluding Observations

Most of the demand models which have been used in the empirical analysis are based on either directly or indirectly additive theories. Direct additivity, which has been assumed by the linear expenditure system, played an important role in the analysis of the price elasticities. Indirect additivity is also a restrictive type of assumption which relates to the functional form of utility defined in the dual space, i.e., utility defined over prices and money income (consumer budget). This latter assumption, like the former, implies a relationship between price and income elasticities.

This predominance of additivity is based upon powerful practical considerations. If demand analysis has to begin from a utility function, it must be given a precise functional form. In most cases, only a small number of parameters can be estimated; the general theory of demand leaves too much to be specified and direct and indirect additivity are the only obvious assumptions strong enough to yield models of general applicability. The way in which additivity is usually stated as a restricting behaviour is exactly the type of empirical constraint which is needed to measure the responses which are of major interest, the income and own price elasticities.

The results presented in this study have clearly revealed many of the limitations of models based on directly additive utility functions. The belief that maximization of an additive utility function yields sensible global demand functions has been found to be untenable, this does not mean that the theory is incapable of generating empirically useful restrictions on consumption behaviour. Independent of the aggregation problem, the theory will be inapplicable unless there exists some non-additive demand systems suitable for empirical analysis.

A number of non-additive flexible utility functions have been suggested and estimated in the recent literature. These functional forms are found to be capable of giving very reliable parameter values. Since our objective in this study is to estimate price and income elasticities using very few sample observation we have used the additive models only.

6.3. Areas for Further Research

Expenditure pattern of different income classes would differ from item to item. If the elasticities are estimated for different income levels, we may be able to identify the responsiveness of different income classes for different income and price levels over time. Therefore, it is of much use to identify the income and price elasticities of each consumer item for every income classes. This type of analysis would be helpful in identifying the responsiveness of Government policy changes on different income classes of the society. Instead of using the additive restrictive models it would be of much use if it is possible to use the flexible functional forms for estimating the elasticities. This would give more reliable results for analysing consumer behaviour.

Statistical reliability of the new method need to be investigated. For this, econometric estimation versus recoverability theory should be undertaken.

APPENDIX I A

We can summarize the regularity conditions for direct utility function as :

(R-1) continuity, positive monotonicity, and quasi-concavity.

The indirect utility function V(P/y) satisfies :

(R-2) continuity, negative monotonicity, and quasi-convexity.

The cost function satisfies: (R-3p) continuity, positve monotonicity, positive linear homogenity, and concavity in P. If, in addition, C is jointly continuous in (u,P) and increasing in u, we say that C satisfies: (R-3) continuity in (u,P), strict positive monotonicity in u, and (R-3p).

The transformation function F(u,X) satisfies the properties pertaining to X:

(R-4x) continuity, positive monotonicity, positive linear homogeneity, and concavity in X.

If, in addition, F is jointly continuous in (u,X) and decreasing in u, we say that F satifies

(R-4) continuity in (u,X), strict negative monotonicity in u, and (R-4x).

APPENDIX IB

Fundamental Matrix Equation

When a demand system is derived from a specific utility function, the model is rich in parametric restrictions. In order to present these restrictions first consider the derivative of the budget constraint with respect to p and μ, respectively:

$$p'\frac{\delta q}{\delta p'} = -q \quad \text{----------(1)}$$ and

$$p'\frac{\delta q}{\delta \mu} = 1 \quad \text{-----------(2)}$$

Further consider the first order conditions of $q = q(p,\mu)$ with respect to p and to μ.

$$H\frac{\delta q}{\delta p'} = \tau I + p\frac{\delta \tau}{\delta p'} \quad \text{----- (3)}$$

and $$H\frac{\delta q}{\delta \mu} = \frac{\delta \tau}{\delta \mu} p \quad \text{----------- (4)}$$

Fundamental matrix equation of consumer demand theory can then be formed by combining (1), (2), (3) and (4).

$$\begin{bmatrix} H & p \\ p' & \emptyset \end{bmatrix} \begin{bmatrix} (\delta q/\delta \mu) \\ -(\delta \tau/\delta \mu) \end{bmatrix} \begin{bmatrix} (\delta q/\delta p') \\ -(\delta \tau/\delta p') \end{bmatrix} = \begin{bmatrix} \emptyset & \tau I \\ 1 & -q' \end{bmatrix} \quad \text{---(5)}$$

The soluction of (5) gives the Slutsky's equation

$$\frac{\delta q}{\delta p'} = \tau H^{-1} - \frac{\tau}{(\delta \tau/\delta \mu)} \frac{\delta q}{\delta \mu}\frac{\delta q'}{\delta \mu} - \frac{\delta q}{\delta \mu} q' \quad \text{------(6)}$$

which shows that the effect of a change in price can be decomposed into two effects; the first is a substitution effect and the second is an income effect;

$$\frac{\delta q}{\delta p'} = K - \frac{\delta q}{\delta \mu} q' \quad \text{-------(7)}$$

where

$$K = \tau H^{-1} - \frac{\tau}{\delta \tau/\delta \mu} \frac{\delta q}{\delta \mu}\frac{\delta q'}{\delta \mu} \quad \text{------ (8)}$$

is the substitution effect. The substitution effect can be further decomposed into the specific substitution effect τH^{-1} and the general substitution effect. It also follows from the solution of (5) that

$$\frac{\delta q}{\delta \mu} = \frac{\delta \tau}{\delta \mu} H^{-1} p \quad \text{--------(9)}$$

APPENDIX II A

Consumption Expenditure Data of RURAL Kerala : NSS Rounds 20th to 38th

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nss Round 20 Year 1965/66									
0-8	4.67	0.15	0.26	0.49	0.25	1.72	0.19	0.97	1.4
8-11	4.6	0.11	0.2	0.43	0.25	1.68	0.07	0.97	1.19
11-13	5.72	0.1	0.24	0.52	0.26	2.15	0.2	1.04	1.74
13-15	6.77	0.2	0.29	0.69	0.3	2.85	0.26	1.13	1.79
15-18	7.25	0.32	0.35	0.86	0.42	3.58	0.28	1.3	2.2
18-21	8.11	0.47	0.43	0.75	0.46	4.15	0.4	1.22	3.62
21-24	9.43	0.52	0.53	1.06	0.55	3.98	0.9	1.43	4.1
24-28	10.19	1.01	0.61	1.36	0.6	4.48	1.26	1.57	4.75
28-34	10.89	1.15	0.69	1.48	0.78	6.93	1.24	1.95	5.21
34-43	13.29	2.5	0.98	2.12	0.95	7.61	1.62	1.97	7.41
43-55	11.56	4.4	1.33	2.31	1.33	9.89	3.94	3.08	11.82
55-75	17.41	3.33	1.43	2.96	1.24	12.12	2.29	2.69	18.93
75+	21.91	3.82	2.58	4.77	2.19	21.78	7.63	3.12	34.97
All Class average	8.34	0.79	0.5	1.05	0.52	4.31	0.79	1.42	4.06

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nssround 21 Year 1966/67									
0-8	3.4	0	0.08	0.29	0.19	1.37	0.01	0.73	0.83
8-11	4.46	0.03	0.14	0.44	0.34	2.01	0.05	0.97	1.1
11-13	5.9	0.09	0.23	0.72	0.32	2.12	0.18	0.97	1.31
13-15	6.59	0.13	0.28	0.65	0.38	3.15	0.09	0.96	2.02
15-18	7.52	0.33	0.3	0.81	0.45	3.43	0.25	1.07	2.21
18-21	8.49	0.74	0.41	0.9	0.59	4.3	0.43	1.21	2.59
21-24	9.94	0.52	0.53	0.97	0.49	5	0.39	1.33	3.25
24-28	10.48	0.81	0.59	1.22	0.52	5.87	0.33	1.46	4.35
28-34	11.65	0.93	0.76	1.48	0.79	6.54	1.17	1.77	5.69
34-43	13.9	2.14	0.93	1.72	0.96	7.39	1.69	1.84	7.08
43-55	15.1	2.19	1.27	2.55	1.48	8.98	2.42	2.3	11.16
55-75	19.77	2.47	1.32	3.41	1.47	11.57	3.45	2.46	16.21
75+	20.03	4.8	1.92	3.08	1.5	21.8	5.82	2.49	30.11
All Class Average	9.56	0.84	0.55	1.17	0.62	5.16	0.77	1.37	4.52

Nss Round 22 Year 1967/68

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	3.16	0.01	0.05	0.31	0.27	1.13	0.08	0.94	0.88
8-11	4.55	0.06	0.15	0.38	0.3	2.22	0.02	1.02	1.07
11-13	5.55	0.12	0.21	0.47	0.4	2.35	0.05	1.11	1.8
13-15	6.12	0.37	0.31	0.65	0.5	3.01	0.13	1.02	1.89
15-18	8.24	0.37	0.28	0.69	0.43	3.1	0.19	1.24	2.1
18-21	8.85	0.31	0.37	0.98	0.57	4.18	0.24	1.33	2.67
21-24	9.89	0.36	0.42	0.95	0.71	4.93	0.32	1.33	3.52
24-28	11.68	0.47	0.52	1.12	0.65	4.99	0.78	1.61	4.18
28-34	13.97	0.91	0.64	1.49	0.97	6.09	0.95	1.8	4.74
34-43	14.1	1.01	0.76	1.66	0.82	7.6	1.9	1.86	6.31
43-55	17.92	2.62	1.13	1.79	1.26	8.6	1.76	2.5	8.46
55-75	22.22	4.96	1.43	2.81	1.75	11.37	3.45	2.57	10.94
75+	27.09	4.91	2.28	4.6	2.37	22.18	14.34	5.02	19.38
All Class Average	11.39	0.93	0.57	1.23	0.77	5.57	1.13	1.64	4.45

Nss Round 23 Year 1968/69

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	3.49	0.13	0.14	0.29	0.08	1.09	0.02	0.74	1.02
8-11	3.98	0.01	0.17	0.66	0.4	2.14	0	1	1.47
11-13	5.65	0.27	0.22	0.37	0.26	2.55	0.09	0.86	1.62
13-15	5.8	0.23	0.26	0.59	0.31	3.14	0.41	1.14	1.98
15-18	7.35	0.18	0.35	0.84	0.43	3.46	0.26	1.14	2.53
18-21	8.98	0.34	0.36	0.91	0.68	3.76	0.51	1.21	2.79
21-24	9.82	0.61	0.42	1.16	0.75	3.99	0.6	1.41	3.59
24-28	10.77	0.73	0.49	1.28	0.62	5.8	0.79	1.52	3.83
28-34	11.42	1.21	0.6	1.38	0.81	6.04	1.79	2.08	5.67
34-43	14.19	1.34	0.65	1.95	0.85	8.07	1.67	2.04	7.01
43-55	18.66	2.44	0.99	2.83	1.42	8.4	1.99	2.36	9.91
55-75	21.23	3.04	1.32	4.58	1.48	12.55	1.55	2.72	16.88
75+	25.93	7.39	2.94	7.91	3.18	25.81	6.21	4.34	91.08
All Class Average	11.75	1.29	0.67	1.83	0.87	6.69	1.27	1.78	10.03

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food

Nss Round 24 Year 1969/70

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	3.91	0.14	0.13	0.37	0.18	1.14	0	0.57	0.86
8-11	4.87	0.05	0.19	0.49	0.3	1.8	0.04	0.88	1.21
11-13	5.67	0.08	0.25	0.68	0.34	2.51	0.12	1.09	0.92
13-15	6.83	0.07	0.23	0.73	0.32	3.06	0.04	1.05	1.68
15-18	7.36	0.17	0.32	0.95	0.44	3.81	0.18	1.23	2.33
18-21	8.59	0.36	0.35	1.09	0.41	4.17	0.28	1.35	2.87
21-24	9.4	0.39	0.43	1.23	0.49	4.93	0.37	1.46	3.65
24-28	10.4	0.67	0.56	1.3	0.61	5.76	0.68	1.67	4.23
28-34	12.15	1.06	0.73	1.62	0.7	6.85	0.85	1.75	5.42
34-43	13.62	1.57	0.95	1.99	0.83	9.33	1.25	2.12	6.72
43-55	16.04	2.49	0.94	2.35	1.04	9.94	2.35	2.37	10.37
55-75	19.54	3.68	1.48	3.29	1.53	12.36	3.49	2.91	15.57
75+	22.47	7.08	2.68	5.7	1.97	22.81	9.15	4.34	34.3
All Class Average	11.16	1.17	0.68	1.62	0.69	6.74	1.15	1.76	6.1

Nss Round 25 Year 1970/71

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	3.44	0	0.07	0.4	0.19	1.29	0	0.56	0.74
8-11	4.76	0.02	0.21	0.42	0.24	1.69	0.01	0.83	1.3
11-13	5.77	0.12	0.17	0.65	0.35	2.15	0.16	1.12	1.53
13-15	6.71	0.13	0.26	0.73	0.37	2.88	0.18	1.05	1.85
15-18	8.33	0.35	0.3	0.78	0.4	3.16	0.2	1.12	2.07
18-21	8.57	0.31	0.35	0.9	0.51	4.37	0.37	1.3	2.92
21-24	9.88	0.44	0.46	1.06	0.52	5	0.44	1.46	3.27
24-28	11.14	0.74	0.57	1.2	0.59	5.85	0.62	1.53	3.68
28-34	12.33	0.98	0.67	1.42	0.86	6.64	0.8	1.78	5.29
34-43	14.34	1.35	0.84	1.84	0.91	8.32	1.6	2.16	6.48
43-55	16.84	2.39	1.2	2.34	1.07	9.78	2.71	2.32	9.78
55-75	19.6	4.2	1.83	3.5	1.65	12.8	0.86	2.9	13.49
75+	25.52	8.04	2.93	5.51	2.63	21.56	9.48	4.67	35.04
All Class Average	12.82	1.59	0.84	1.76	0.88	7.47	1.68	1.92	7.16

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nss Round 27 Year 1972/73									
0-13	5.45	0.04	0.15	0.55	0.25	1.98	0.1	1.13	1.45
13-15	6.76	0.13	0.19	0.56	0.33	2.52	0.14	1.35	1.98
15-18	7.62	0.12	0.23	0.75	0.41	3.42	0.16	1.56	2.37
18-21	9.02	0.25	0.31	0.83	0.56	3.8	0.32	1.71	2.71
21-24	10.21	0.31	0.36	0.97	0.6	4.62	0.28	1.85	3.3
24-28	11.84	0.44	0.45	1.07	0.7	5.2	0.43	1.91	3.91
28-34	13.87	0.58	0.57	1.33	0.8	6.16	0.8	2.11	4.68
34-43	16.3	1.07	0.72	1.75	0.94	7.59	1.32	2.36	6.25
43-55	19.66	1.56	0.96	2.19	1.22	9.39	2.05	2.69	9.06
55-75	24.34	3.02	1.28	2.93	1.56	11.55	3.1	3.29	12.36
75-100	27.86	4.7	1.92	3.96	2.22	16.21	4.97	4.1	19.96
100-150	33.91	8.99	2.62	6.56	3.22	22.65	8.2	5.73	30.89
150-200	35.6	8.9	2.64	5.63	2.96	30.84	10.98	4.98	56.78
200+	54.58	17.11	6.11	15.66	6.8	41.49	30.64	9.18	154.79
All Class Average	16.37	1.52	0.82	1.92	1.05	8.03	1.78	2.48	8.22
Nss Round 28 Year 1973/74									
0-13	5.54	0	0	0.79	0.33	2.71	0	1.5	1.21
13-15	6.83	0	0	0.83	0.25	1.68	0	1.75	2.75
15-18	7.98	0.21	0.23	0.74	0.42	4.06	0.06	1.36	1.89
18-21	9.34	0.27	0.27	1.14	0.41	3.93	0.13	1.56	2.7
21-24	11.88	0.2	0.25	1.08	0.54	3.8	0.27	1.72	2.79
24-28	12.93	0.32	0.29	1.13	0.53	4.52	0.18	1.71	4.47
28-34	14.43	0.61	0.41	1.34	0.75	5.7	0.59	2.22	4.73
34-43	17.97	0.71	0.77	1.56	0.86	7.5	0.8	2.43	5.41
43-55	22.21	1.39	0.9	2.07	1.09	9.46	1.25	2.77	7.16
55-75	26.65	2.11	1.4	3.14	1.37	11.86	3.54	3.4	9.97
75-100	32.38	3.74	2.08	3.28	2.15	15.89	4.13	4.08	18.97
100-150	38.56	4.74	2.66	5.55	2.52	23.56	12.63	5.18	24.89
150-200	56.39	11.67	4.51	9.81	3.28	30.35	9.23	5.86	44.49
200+	57.85	11.96	4.57	16.17	4.72	52.18	19.37	9.3	86.36
All Class Average	22.39	1.82	1.12	2.52	1.23	10.52	2.63	2.97	9.61

Nss Round 32 Year 1977/78

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-10	2.59	0.03	0.17	0.43	0.09	1.91	0	0.43	0.58
10-15	5.35	0.4	0.19	1.04	0.31	2.67	0.03	1.13	2.13
15-20	7.59	0.42	0.24	0.92	0.4	3.61	0.38	1.68	2.68
20-30	11.02	0.35	0.47	1.38	0.74	5.36	0.38	2.22	3.85
30-35	12.97	0.64	0.69	1.89	0.84	6.75	0.74	2.68	5.45
35-40	14.67	0.92	0.81	2.21	0.87	7.85	1.15	2.87	6.3
40-50	16.9	1.08	0.94	2.45	1.03	9.56	1.53	3.29	8.13
50-60	19.1	1.69	1.27	3.02	1.22	11.91	2.22	3.83	10.63
60-70	21.74	2.36	1.43	3.7	1.33	13.6	3.7	4.26	13.2
70-80	23.6	3.24	1.67	4.14	1.6	15.46	4.41	4.54	16.04
80-100	25.64	4.65	2.06	5.08	1.81	18	5.77	5.14	20.74
100-150	30.37	6.62	2.74	6.99	2.46	23.4	9.98	6.03	31.97
150-200	34.92	9.36	3.06	9.12	3.23	31.26	15.75	9.11	53.46
200+	40.85	13.05	5.08	12.69	4.34	41.37	46.12	12.57	141.47
All Class Average	20.96	3.07	1.58	4	1.51	14.3	5.38	4.4	19.11

Nss Round 38 Year 1983

Income Classes	Cereal& Subst.	Milk&M. Prodcuts	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-30	11.41	0.37	0.56	1.04	0.69	3.52	0	4.44	3.53
30-40	14.34	0.5	0.58	2.41	1.41	7.64	0	4.17	4.51
40-50	19.58	0.76	1.26	2.78	1.24	8.68	0.31	4.23	6.97
50-60	24.05	1.04	1.82	3.62	1.52	10.32	0.37	4.72	8.46
60-70	25.9	1.42	1.93	4.05	1.63	12.68	0.84	5.68	11.12
70-85	30.14	1.7	2.48	4.7	1.91	15.42	1.58	6.3	13.59
85-100	33.67	2.63	2.77	6.04	2.17	19.44	1.98	7.04	16.59
100-125	38.08	4.11	3.32	7.29	2.55	23.34	3.7	7.82	21.69
125-150	42.63	5.81	4.11	8.92	3.04	27.74	6.9	8.8	29.47
150-200	48.2	8.33	4.83	11.51	3.46	35.71	9.64	9.92	40.57
200-250	53.59	12.42	6.23	13.99	4.37	44.94	18.63	11.43	55.32
250-300	57.47	15.58	7.66	18.67	5.15	53.97	29.09	12.18	73.84
300+	72.57	22.48	10.35	26.33	7.27	72.41	65.06	16.89	244.11
All Class Average	40.04	5.97	3.96	8.97	2.94	30.58	9.27	8.45	38.18

APPENDIX II B

Consumption Expenditure of URBAN Kerala   NSS Rounds 20th to 38th

Nss Round 20   Year 1965/66

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	2.44	0	0.11	0.51	0.3	0.71	0.67	0.62	0.99
8-11	4.9	0.05	0.19	0.87	0.25	1.76	0	0.89	1.08
11-13	5.13	0.05	0.31	0.78	0.28	2.22	0.24	1.04	1.9
13-15	6.06	0.13	0.28	1.03	0.37	2.67	0.59	0.92	1.88
15-18	6.7	0.36	0.34	0.85	0.46	3.41	0.34	1.26	2.79
18-21	7.54	0.49	0.47	0.93	0.53	3.9	0.75	1.3	3.57
21-24	8.59	0.87	0.7	1.42	0.62	4.57	0.8	1.46	3.62
24-28	8.99	0.94	0.78	1.3	0.77	6.49	0.27	1.52	4.14
28-34	9.04	1.86	0.85	1.48	0.81	6.12	1.89	2	6.17
34-43	9.68	2.6	0.97	1.39	1.15	6.52	1.53	1.93	11.36
43-55	11.3	2.07	2.57	3.72	1.42	8.48	1.2	2.88	14.28
55-75	12.36	10.09	4.1	2.66	1.76	13.75	2.77	4.26	15.83
75+	10.01	4.36	1.7	2.19	1.19	36.16	6.78	2.79	48.18
All Class Average	7.53	1.02	0.67	1.23	0.62	5.48	0.97	1.49	5.92

Nss Round 21   Year 1966/67

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
0-8	3.64	0	0.03	0.54	0.42	1.22	0	0.65	0.91
8-11	4.88	0.18	0.2	0.48	0.31	2.01	0.01	0.75	1.04
11-13	5.6	0	0.32	0.72	0.4	2.38	0.03	0.96	1.76
13-15	5.54	0.32	0.41	0.76	0.48	3.19	0.07	1.2	2.07
15-18	6.76	0.34	0.33	1.01	0.5	3.54	0.21	1.19	2.3
18-21	8.12	0.51	0.43	1.22	0.6	4.49	0.03	1.55	2.56
21-24	9.53	0.68	0.5	1.24	0.72	4.68	0.3	1.33	3.7
24-28	10.4	0.46	0.54	1.68	0.74	5.65	0.63	1.42	4.5
28-34	10.42	1.02	0.79	1.33	0.92	6.88	0.7	1.93	5.89
34-43	11.92	1.97	0.87	2.43	1.33	8.36	1.18	2.32	7.81
43-55	12.2	2.92	1.36	2.52	1.36	10.51	1.15	2.9	13.65
55-75	12.74	5.11	1.73	3.12	1.8	15.05	1.31	3.42	17.37
75+	11.75	7.85	2.14	4.22	1.61	33.82	10.32	3.44	67.82
All Class Average	9.15	1.72	0.7	1.67	0.87	8.02	1.27	1.81	10.18

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nss Round 22 Year 1967/68									
0-8	2.47	0	0	0.12	0	1.14	0	0.6	0.49
8-11	4.1	0.18	0.08	0.44	0.18	2.66	0	0.83	1.09
11-13	4.79	0	0.31	0.72	0.69	2.62	0	0.88	1.83
13-15	5.88	0.22	0.26	1.04	0.41	2.78	0.21	1.18	2.31
15-18	6.99	0.44	0.45	0.87	0.55	3.61	0.09	1.11	2.4
18-21	7.72	0.41	0.4	0.89	0.64	5.05	0.45	1.33	2.85
21-24	8.95	0.35	0.53	1.03	0.76	4.98	0.28	1.62	3.69
24-28	9.72	0.68	0.56	1.36	0.9	6.46	0.67	1.81	3.88
28-34	10.56	0.9	0.75	1.59	1.19	7.33	1.12	2.47	4.74
34-43	13.17	1.34	1.06	1.97	1.18	8.59	1.3	2.14	7.48
43-55	13.33	3.87	1.44	1.5	1.69	12.96	2.68	2.7	8.94
55-75	16.73	5.11	1.74	3.32	2.92	11.36	4.89	3.56	14
75+	14.73	9.94	2.16	4.23	2.57	29.57	4.38	4.54	34.38
All Class Average	10.12	1.82	0.82	1.6	1.12	8.27	1.26	2.04	7.22
Nss Round 23 Year 1968/69									
0-8	3.94	0	0.12	0.4	0.2	0.87	0	1.12	0.88
8-11	4.32	0	0.17	0.79	0.24	2.18	0.01	0.63	0.96
11-13	5.93	0.07	0.24	1.17	0.52	1.95	0.16	0.98	1.63
13-15	7.19	0.25	0.29	0.75	0.41	2.6	0	0.99	1.98
15-18	7.51	0.31	0.3	1.02	0.51	3.75	0.15	1.1	1.99
18-21	7.94	0.42	0.37	0.97	0.62	4.56	0.34	1.25	2.81
21-24	9.7	0.58	0.45	1.37	0.63	4.69	0.83	1.46	3.21
24-28	8.33	0.49	0.52	1.64	0.81	5.23	0.7	1.73	4.97
28-34	11.21	1.48	0.63	1.47	0.85	8.1	0.4	2.05	5.04
34-43	13.21	1.49	0.94	2.05	1.01	9.27	0.43	2.53	7.97
43-55	13.4	3.08	1.08	3.59	1.54	10.24	1.87	2.52	9.43
55-75	18.51	4.66	1.65	3.31	2.28	14.78	2.15	3.24	16.28
75+	13.85	9.29	1.98	5.27	2.61	30.77	10.1	3.57	35.99
All Class Average	10.77	2.1	0.78	2.14	1.09	9.18	1.66	2.02	8.64

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food

Nss Round 24 Year 1969/70

0-8	3.85	0	0.12	0.6	0	1.38	0	1.13	0.56
8-11	4.92	0	0.16	0.6	0.18	1.85	0.06	1.31	1.17
11-13	4.36	0.11	0.11	1.18	0.08	2.56	0	1.35	1.5
13-15	6.07	0.15	0.24	0.98	0.47	2.98	0.19	1.32	1.56
15-18	7.66	0.14	0.27	1.04	0.41	3.66	0.24	1.26	2.51
18-21	8.66	0.68	0.5	1.31	0.49	4.02	0.13	1.32	2.5
21-24	9.53	0.65	0.56	1.22	0.61	4.81	0.17	1.61	4.28
24-28	10.48	0.59	0.61	1.22	0.57	6.36	0.34	1.8	4.94
28-34	11.51	1.4	0.89	1.86	0.86	6.59	0.34	2.05	6.25
34-43	14.16	1.81	1.02	2.05	0.9	7.85	0.94	2.22	6.8
43-55	15.88	3.79	1.7	2.33	1.42	10.23	1.19	2.95	11.48
55-75	17.62	6.12	2.11	4	1.86	13.41	2.18	3.73	17.73
75+	16.39	9.59	3.14	5.6	2.2	27.02	7.38	4.7	57.69
All Class Average	11.89	2.57	1.13	2.22	0.97	9.86	1.43	2.33	12.48

Nss Round 25 Year 1970/71

0-8	3.31	0	0	0.19	0.17	1.43	0	0.51	2.09
8-11	5.49	0.41	0.22	0.39	3.15	1.87	0.13	0.74	0.9
11-13	4.8	0	0.14	0.61	0.16	2.97	0.16	1.2	1.65
13-15	6.21	0.28	0.28	0.93	0.39	3.26	0.14	1.02	2.01
15-18	7.18	0.21	0.27	0.95	0.42	3.22	0.22	1.21	2.64
18-21	7.73	0.41	0.4	1.05	0.48	5.22	0.34	1.23	2.66
21-24	8.74	0.76	0.4	1.28	0.68	5.2	0.64	1.65	3.47
24-28	9.6	0.76	0.61	1.31	0.61	6.22	0.62	1.81	4.57
28-34	11.26	1.01	0.85	1.69	0.9	6.87	1.21	2.04	5.21
34-43	13.03	1.77	1.09	1.93	1.04	9.63	1.46	2.29	6.46
43-55	14.07	2.36	1.45	2.5	1.47	10.94	3.42	2.72	10.32
55-75	16.66	3.89	1.94	3.38	1.78	13.63	4.71	3.48	15.02
75+	16.58	9.79	2.71	4.35	2.66	32.76	10.95	4.52	47.95
All Class Average	11.91	2.59	1.16	2.14	1.18	11.19	2.92	2.42	11.03

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nss Round 27 Year 1972/73									
0-13	4.82	0.03	0.11	0.46	0.26	2.26	0.13	1.11	1.77
13-15	6.93	0.09	0.17	0.5	0.48	2.67	0.12	1.39	1.52
15-18	7.09	0.17	0.21	0.93	0.56	3.58	0.23	1.51	2.44
18-21	9.11	0.14	0.3	1.12	0.57	4.21	0.11	1.63	2.47
21-24	10.18	0.36	0.4	1	0.68	4.52	0.18	1.86	3.47
24-28	11.2	0.45	0.48	1.49	0.76	5.75	0.22	2.02	3.72
28-34	12.23	0.71	0.61	1.62	1.01	7.11	0.75	2.12	4.9
34-43	15.03	0.99	0.76	2.04	1.18	8.38	0.94	2.36	6.52
43-55	17.92	1.83	1.04	2.74	1.39	10.21	1.32	3	9
55-75	21.13	3.43	1.42	3.32	1.98	13.09	2.41	3.65	13.09
75-100	22.05	6.05	2.23	4.55	2.75	17.73	5.56	4.57	22.08
100-150	26.28	9.61	2.76	5.8	3.35	25.57	5.12	5.49	36.6
150-200	23.87	14.17	4.03	7.57	3.69	41.33	10.5	7.08	56.5
200+	28.1	16.3	5.25	13.31	5.61	54.15	36.52	8.65	117.94
All Class Average	16.52	3.06	1.25	2.96	1.64	12.36	2.83	3.15	14.5
Nss Round 28 Year 1973/74									
0-13	0	0	0	0	0	0	0	0	0
13-15	9.8	0	0.2	0	0	0.6	0	1.2	1.2
15-18	6	0	0	1.17	0	5.5	0	1.5	2
18-21	7.82	0	0.09	1.14	0.45	5.27	0	1.64	2.5
21-24	10.48	0.1	0.56	1.58	0.66	5.24	0.23	1.63	2.55
24-28	12.29	0.02	0.39	1.44	0.53	5.36	1.18	1.31	3.67
28-34	14.12	0.49	0.6	1.4	0.91	6.52	0.53	2.15	4.19
34-43	15.56	1.06	0.69	2.18	1.02	8.23	1.44	2.63	5.39
43-55	21.06	1.47	1.12	2.24	1.2	9.55	1.15	2.77	8.03
55-75	20.63	2.83	1.59	3.8	1.79	15.07	2.18	3.54	11.74
75-100	27.74	4.09	2.64	4.7	2.71	17.39	2.83	4.4	16.58
100-150	27.16	11.9	3.52	5.94	3.08	26.37	2.45	5.9	33.56
150-200	33.28	11.63	3.97	7.4	3.11	44.04	11.01	5.43	49.65
200+	45.36	23.94	7.15	10.4	5.27	59.24	15.27	13.21	102.5
All Class Average	20.98	3.93	1.72	3.42	1.72	14.97	2.55	3.6	16.04

Income Classes	Cereal &Subst.	Milk&M. Products	Edible Oil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
Nss Round 32	Year 1977/78								
0-10	2.96	0.27	0.18	0.45	0.22	2.66	0	0.11	0.39
10-15	3.81	0.23	0.19	1.14	0.08	5.21	0.03	1.33	0.89
15-20	7.09	0.16	0.24	1.21	0.49	4.84	0.13	1.49	2.09
20-30	9.64	0.32	0.4	1.77	0.59	5.76	0.5	2.26	4.08
30-35	12.17	0.57	0.52	2.38	0.86	7.71	0.97	2.88	4.87
35-40	14.4	0.71	0.9	2.23	1.08	8.91	0.48	3.23	5.64
40-50	15.27	0.93	0.94	3	1.01	10.79	1.25	3.48	8.18
50-60	17.97	1.64	1.25	3.45	1.34	12.62	1.97	3.98	10.63
60-70	20.01	2.14	1.5	4.18	1.57	15.4	2.73	4.59	13.15
70-80	20.44	3.29	1.78	3.99	1.72	16.32	4.36	4.92	18.84
80-100	24.46	5.19	2.47	5.63	1.99	18.79	4.67	5.98	21.51
100-150	26.31	8.27	3.25	6.98	2.97	27.38	9.14	6.75	32.56
150-200	30.74	14.17	5.03	10.47	4.16	37.3	11.77	10.61	51.41
200-300	29.77	19.34	5.62	11.57	4.25	55.43	27.95	9.64	87.28
300+	36.38	20.19	10.69	17.9	5.51	90.19	62.84	23.25	179.84
All Class Average	19.45	4.35	2.04	4.77	1.81	18.55	5.75	5.2	22.18
Nss Round 38	Year 1983								
0-30	11.72	0	0.46	0.77	1.64	4.55	0	3.35	3.33
30-40	14.97	0.64	1.13	2.02	0.89	5.07	0.63	4.18	6.14
40-50	16.46	0.49	1.67	3.81	1.57	9.8	0.23	5.2	6.93
50-60	21.44	1.61	1.66	4.17	1.54	12	0.21	5.02	7.18
60-70	24.04	1.09	2.21	4.28	1.79	13.60	1.31	5.83	11.13
70-85	26.69	1.89	2.51	5.15	2.05	16.88	1.54	6.41	14.32
85-100	30.78	2.74	3.21	7.08	2.27	18.56	1.98	7.51	19.18
100-125	35.59	4.76	3.63	8.26	2.78	24.67	3.21	8.18	21.2
125-150	40.27	6.57	4.87	10.06	3.16	30.25	5.46	9.37	28.89
150-200	41.93	9.03	5.13	12.14	3.64	38.52	10.43	10.99	42.59
200-250	48.85	15.29	6.59	14.77	4.49	46.89	16.86	13.03	62.46
250-300	52.12	18.41	7.03	21.27	3.95	69.08	14.85	14.32	84.64
300+	58.05	29.81	12.1	29.16	7.13	101.98	70.69	20.26	206.58
All Class Average	30.5	9.02	5.04	11.62	3.39	37.09	14.35	10.23	50.5

APPENDIX III

REGRESSION RESULTS

Functional forms

1. Linear $p_i q_i = \alpha + \beta \mu$

2. Log linear $\ln p_i q_i = \alpha + \beta \ln \mu$

3. Quadratic $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Table 3.1.1

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1965/66 NSS Round 20

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	4.07499 (7.992)	.17606 (15.118)	.94991
2	Milk & Products	-.31824 (-.977)	.04962 (6.670)	.78373
3	Edible Oil	.05773 (-1.091)	.02383 (19.724)	.97000
4	Meat,Fish,Egg	.00266 (.035)	.04414 (25.333)	.98162
5	Sugar	.05348 (1.029)	.01984 (16.721)	.95870
6	Other Food	-.41570 (-.925)	.19725 (19.223)	.96846
7	Clothing	-.85154 (-2.261)	.07001 (8.139)	.84464
8	Fuel&Light	.83379 (6.288)	.02591 (8.555)	.85747
9	Other Nonfood	-3.85524 (-3.714)	.33331 (14.058)	.94248
Urban				
1	Cereal & Sub.	5.50258 (6.450)	.06808 (3.651)	.50677
2	Milk & Products	-.60641 (-.726)	.06928 (3.795)	.52757
3	Edible Oil	.05003 (.140)	.02775 (3.564)	.49374
4	Meat,Fish,Egg	.72956 (2.546)	.02104 (3.359)	.46152
5	Sugar	.30670 (2.402)	.01292 (4.629)	.62996
6	Other Food	-2.77603 (-2.058)	.28983 (9.829)	.88848
7	Clothing	-.57412 (-1.929)	.05518 (8.484)	.85539
8	Fuel&Light	.77487 (2.978)	.02792 (4.910)	.65815
9	Other Nonfood	-5.29647 (-3.019)	.40284 (10.504)	.90109

Table 3.1.1

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1965/66 NSS Round 20

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	4.07499	.17606	.94991
		(7.992)	(15.118)	
2	Milk & Products	-.31824	.04962	.78373
		(-.977)	(6.670)	
3	Edible Oil	.05773	.02383	.97000
		(-1.091)	(19.724)	
4	Meat,Fish,Egg	.00266	.04414	.98162
		(.035)	(25.333)	
5	Sugar	.05348	.01984	.95870
		(1.029)	(16.721)	
6	Other Food	-.41570	.19725	.96846
		(-.925)	(19.223)	
7	Clothing	-.85154	.07001	.84464
		(-2.261)	(8.139)	
8	Fuel&Light	.83379	.02591	.85747
		(6.288)	(8.555)	
9	Other Nonfood	-3.85524	.33331	.94248
		(-3.714)	(14.058)	
Urban				
1	Cereal & Sub.	5.50258	.06808	.50677
		(6.450)	(3.651)	
2	Milk & Products	-.60641	.06928	.52757
		(-.726)	(3.795)	
3	Edible Oil	.05003	.02775	.49374
		(.140)	(3.564)	
4	Meat,Fish,Egg	.72956	.02104	.46152
		(2.546)	(3.359)	
5	Sugar	.30670	.01292	.62996
		(2.402)	(4.629)	
6	Other Food	-2.77603	.28983	.88848
		(-2.058)	(9.829)	
7	Clothing	-.57412	.05518	.85539
		(-1.929)	(8.484)	
8	Fuel&Light	.77487	.02792	.65815
		(2.978)	(4.910)	
9	Other Nonfood	-5.29647	.40284	.90109
		(-3.019)	(10.504)	

Table 3.1.2

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1966/67 NSS Round 21

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	3.78382	.20166	.94166
		(6.259)	(13.953)	
2	Milk & Products	-.57383	.05186	.92848
		(-.3.313)	(12.522)	
3	Edible Oil	-.02798	.02090	.97141
		(-.647)	(20.216)	
4	Meat,Fish,Egg	.12783	.03797	.94401
		(1.147)	(14.259)	
5	Sugar	.14465	.01741	.90121
		(2.088)	(10.510)	
6	Other Food	-.37627	.20253	.91267
		(-.499)	(11.244)	
7	Clothing	-.93699	.06519	.94961
		(-5.178)	(15.070)	
8	Fuel&Light	.94673	.02257	.91261
		(8.891)	(11.239)	
9	Other Nonfood	-3.59267	.30834	.91841
		(-3.249)	(11.665)	
Urban				
1	Cereal & Sub.	6.53615	.05847	.42710
		(6.814)	(3.154)	
2	Milk & Products	-.64955	.06272	.96689
		(-3.752)	(18.745)	
3	Edible Oil	.13338	.01622	.89769
		(1.638)	(10.310)	
4	Meat,Fish,Egg	.54714	.02901	.90141
		(3.835)	(10.522)	
5	Sugar	.43448	.01136	.68114
		(3.816)	(5.161)	
6	Other Food	-.94787	.23383	.99067
		(-2.798)	(35.709)	
7	Clothing	-1.37897	.06940	.84629
		(-3.145)	(8.190)	
8	Fuel&Light	.91487	.02288	.75795
		(4.799)	(6.211)	
9	Other Nonfood	-7.51298	.46939	.92218
		(-3.702)	(11.967)	

Table 3.1..3

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1967/68 NSS Round 22

Equation No	Item	α	β	R^2
<u>Rural</u>				
1	Cereal & Sub.	4.22539 (4.898)	.20957 (11.646)	.91816
2	Milk & Products	-.54900 (-2.014)	.05029 (8.847)	.86557
3	Edible Oil	-.02997 (-1.373)	.01904 (41.804)	.99318
4	Meat,Fish,Egg	.06992 (1.406)	.03618 (34.889)	.99023
5	Sugar	.17557 (3.835)	.01856 (19.443)	.96915
6	Other Food	.19082 (.678)	.16881 (28.747)	.98567
7	Clothing	-2.11674 (-3.388)	.11015 (8.453)	.85447
8	Fuel&Light	.59626 (7.201)	.03322 (19.233)	.96850
9	Other Nonfood	-.49080 (-5.013)	.15827 (77.500)	.99801
<u>Urban</u>				
1	Cereal & Sub.	4.75481 (4.677)	.12530 (5.619)	.71812
2	Milk & Products	-1.50784 (-5.319)	.09408 (15.129)	.94998
3	Edible Oil	-.00752 (-.118)	.02150 (15.367)	.95144
4	Meat,Fish,Egg	.16971 (1.297)	.03688 (12.851)	.93187
5	Sugar	.10210 (.703)	.02700 (8.475)	.85512
6	Other Food	-.78374 (-.857)	.23890 (11.909)	.92147
7	Clothing	-.61782 (-2.395)	.05268 (9.309)	.87712
8	Fuel&Light	.58003 (5.290)	.03766 (15.958	.95316
9	Other Nonfood	-3.43595 (-3.053)	.29015 (11.752)	.91953

Table 3.1..4

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1968/69 NSS Round 23

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	5.77493	.13889	.79160
		(4.828)	(6.825)	
2	Milk & Products	-.42742	.04517	.99244
		(-6.393)	(39.706)	
3	Edible Oil	-.01117	.01686	.99765
		(-.604)	(71.349)	
4	Meat,Fish,Egg	.00791	.04742	.97229
		(.058)	(20.542)	
5	Sugar	.15623	.01777	.96816
		(2.860)	(19.129)	
6	Other Food	.86303	.14541	.99163
		(3.809)	(37.716)	
7	Clothing	-.21591	.03597	.94151
		(-1.423)	(13.934)	
8	Fuel&Light	.87973	.02140	.93143
		(8.957)	(12.807)	
9	Other Nonfood	-9.43133	.52326	.92484
		(-3.739)	(12.193)	
Urban				
1	Cereal & Sub.	5.57958	.11450	.64453
		(5.077)	(4.771)	
2	Milk & Products	-1.33803	.08617	.96245
		(-5.957)	(17.567)	
3	Edible Oil	-.00272	.01892	.97604
		(-.070)	(22.132)	
4	Meat,Fish,Egg	.24315	.04501	.94336
		(1.672)	(14.173)	
5	Sugar	.08059	.02439	.95788
		(1.195)	(16.550)	
6	Other Food	-1.50925	.25866	.96173
		(-2.217)	(17.395)	
7	Clothing	-1.51537	.08034	.78339
		(-2.745)	(6.663)	
8	Fuel&Light	.75961	.02899	.88698
		(5.582)	(9.756	
9	Other Nonfood	-3.77115	.31003	.94074
		(-3.676)	(13.839)	

Table 3.1.5

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1969/70 NSS Round 24

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	4.27918	.18709	.93903
		(6.896)	(13.631)	
2	Milk & Products	-.99900	.06761	.97040
		(-6.491)	(19.860)	
3	Edible Oil	-.11388	.02354	.97473
		(-2.305)	(21.536)	
4	Meat,Fish,Egg	-.03152	.04874	.98449
		(.395)	(27.616)	
5	Sugar	.08536	.01767	.99070
		(3.822)	(35.772)	
6	Other Food	-.03650	.19527	.97669
		(-.093)	(22.444)	
7	Clothing	-1.41275	.08159	.90652
		(-4.149)	(10.834)	
8	Fuel&Light	.57485	.03363	.98438
		(10.407)	(27.520)	
9	Other Nonfood	-3.66533	.30248	.94031
		(-3.695)	(13.786)	
Urban				
1	Cereal & Sub.	5.96541	.11184	.64317
		(5.095)	(4.757)	
2	Milk & Products	-1.11455	.08255	.97272
		(-5.615)	(20.711)	
3	Edible Oil	-.07468	.02590	.96769
		(-1.099)	(18.986)	
4	Meat,Fish,Egg	.34308	.04080	.96898
		(3.276)	(19.388)	
5	Sugar	.09766	.01834	.89089
		(1.064)	(9.949)	
6	Other Food	-.13127	.19725	.99280
		(-.544)	(40.679)	
7	Clothing	-1.02246	.05526	.91108
		(-4.135)	(11.129)	
8	Fuel&Light	.92143	.03086	.95469
		(9.554)	(15.932)	
9	Other Nonfood	-6.47040	.42423	.92176
		(-3.655)	(11.932)	

Table 3.1.6

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1970/71 NSS Round 25

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	4.16940	.20207	.94969
		(6.746)	(15.084)	
2	Milk & Products	-1.14355	.07371	.96536
		(-6.159)	(18.315)	
3	Edible Oil	-.17539	.02637	.99455
		(-6.745)	(46.786)	
4	Meat,Fish,Egg	-.08208	.04739	.99522
		(-1.876)	(49.969)	
5	Sugar	.00903	.02210	.99051
		(.314)	(35.414)	
6	Other Food	-.11504	.18245	.99202
		(-.528)	(38.630)	
7	Clothing	-1.24577	.07304	.75077
		(-2.253)	(6.095)	
8	Fuel&Light	.51038	.03511	.98399
		(8.561)	(27.173)	
9	Other Nonfood	-3.56193	.29051	.92294
		(-3.197)	(12.030)	
Urban				
1	Cereal & Sub.	5.50248	.11132	.73653
		(5.869)	(5.878)	
2	Milk & Products	-1.13365	.07624	.96271
		(-5.296)	(17.630)	
3	Edible Oil	-.04200	.02285	.95899
		(-.623)	(16.780)	
4	Meat,Fish,Egg	.33600	.03393	.94062
		(2.766)	(13.823)	
5	Sugar	.06321	.02114	.96579
		(1.114)	(18.432)	
6	Other Food	-.77269	.23732	.97339
		(-1.380)	(20.974)	
7	Clothing	-1.38639	.08808	.97152
		(-6.444)	(20.257)	
8	Fuel&Light	.69818	.03215	.93598
		(5.828)	(13.284)	
9	Other Nonfood	-4.81457	.35104	.91686
		(-3.199)	(11.547)	

Table 3.1.7

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1972/73   NSS Round 27

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	8.02535 (6.442)	.14803 (14.195)	.93911
2	Milk & Products	-.91213 (-3.974)	.05393 (28.073)	.98375
3	Edible Oil	-.05637 (-.618)	.01735 (22.710)	.97537
4	Meat,Fish,Egg	-.21191 (-.653)	.04289 (15.781)	.95020
5	Sugar	.11189 (1.018)	.01888 (20.514)	.96996
6	Other Food	1.81913 (3.041)	.12761 (25.482)	.98034
7	Clothing	-2.45883 (-4.186)	.09522 (16.364)	.96641
8	Fuel&Light	1.26684 (7.804)	.02357 (17.344)	.95844
9	Other Nonfood	-11.74209 (-2.771)	.42691 (12.034)	.91710
Urban				
1	Cereal & Sub.	9.16352 (6.330)	.08255 (6.254)	.74565
2	Milk & Products	-1.18993 (-3.718)	.06686 (22.909)	.97578
3	Edible Oil	-.05434 (-1.016)	.01934 (39.650)	.99179
4	Meat,Fish,Egg	.05194 (.284)	.04306 (25.801)	.98082
5	Sugar	.30151 (3.313)	.01888 (22.751)	.97545
6	Other Food	-.16133 (-.313)	.19101 (40.602)	.99217
7	Clothing	-1.48526 (-2.182)	.10633 (7.301)	.80091
8	Fuel&Light	1.19571 (10.081)	.02797 (25.862)	.98091
9	Other Nonfood	-8.84362 (-2.966)	.38220 (14.057)	.93798

Table 3.1.8

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1973/74 NSS Round 28

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	6.56312	.22057	.95783
		(4.859)	(17.212)	
2	Milk & Products	-1.11951	.05162	.94500
		(-3.082)	(14.978)	
3	Edible Oil	-.17622	.02004	.97071
		(-1.734)	(20.782)	
4	Meat,Fish,Egg	-.62458	.05525	.93783
		(-1.506)	(14.039)	
5	Sugar	.10782	.01705	.98891
		(2.043)	(34.063)	
6	Other Food	-.66455	.17959	.97034
		(-.725)	(20.647)	
7	Clothing	-1.72360	.07348	.92046
		(-2.738)	(12.306)	
8	Fuel&Light	1.07645	.02867	.97227
		(7.613)	(21.372)	
9	Other Nonfood	-6.08713	.29178	.91186
		(-2.304)	(11.640)	
Urban				
1	Cereal & Sub.	7.18228	.14329	.88469
		(4.664)	(10.037)	
2	Milk & Products	-2.27374	.08570	.95490
		(-4.088)	(16.620)	
3	Edible Oil	-.29885	.02538	.97753
		(-2.598)	(23.803)	
4	Meat,Fish,Egg	.29854	.03727	.97470
		(1.664)	(22.402)	
5	Sugar	.07574	.01870	.94025
		(.539)	(14.338)	
6	Other Food	-1.18301	.21381	.98437
		(-1.469)	(28.634)	
7	Clothing	-1.33403	.05413	.88891
		(-2.342)	(10.248)	
8	Fuel&Light	.45512	.03891	.89340
		(1.137)	(10.486)	
9	Other Nonfood	-8.22622	.34097	.93033
		(-2.955)	(13.213)	

Table 3.1.9

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1977/78 NSS Round 32

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	8.89708	.12137	.84504
		(5.276)	(8.479)	
2	Milk & Products	-.63067	.04560	.98341
		(-3.260)	(27.775)	
3	Edible Oil	.12306	.01692	.97895
		(1.520)	(24.611)	
4	Meat,Fish,Egg	.50655	.04078	.98724
		(3.345)	(31.730)	
5	Sugar	.29465	.01373	.97621
		(4.212)	(23.120)	
6	Other Food	2.61494	.13272	.97356
		(3.662)	(21.900)	
7	Clothing	-4.83173	.13586	.89929
		(-3.266)	(10.820)	
8	Fuel&Light	1.12242	.03746	.97374
		(5.589)	(21.978)	
9	Other Nonfood	-12.20984	.41452	.91169
		(-2.907)	(11.628)	
Urban				
1	Cereal & Sub.	10.32941	.07317	.73721
		(5.697)	(6.346)	
2	Milk & Products	-.89495	.05707	.93742
		(-1.448)	(14.516)	
3	Edible Oil	-.18046	.02366	.97661
		(-1.174)	(24.197)	
4	Meat,Fish,Egg	.86302	.03983	.97906
		(3.528)	(25.603)	
5	Sugar	.45849	.01317	.92537
		(2.926)	(13.214)	
6	Other Food	.36029	.19719	.99186
		(-.480)	(41.304)	
7	Clothing	-5.51968	.13291	.90784
		(-3.113)	(11.786)	
8	Fuel&Light	.81178	.04543	.91527
		(1.402)	(12.338)	
9	Other Nonfood	-11.76934	.38815	.94944
		(-3.133)	(16.246)	

Table 3.1.10

Estimated Parameters For Linear Functions

Equation : $p_i q_i = \alpha + \beta\mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1983 NSS Round 38

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	17.88782 (6.630)	.11980 (9.119)	.87256
2	Milk & Products	-1.46828 (-2.938)	.04822 (19.814)	.97027
3	Edible Oil	.58881 (2.320)	.02017 (16.316)	.95671
4	Meat,Fish,Egg	.67766 (1.496)	.05138 (23.291)	.97832
5	Sugar	.81288 (6.562)	.01295 (21.467)	.97457
6	Other Food	3.94718 (2.202)	.14256 (16.332)	.95679
7	Clothing	-8.97687 (-5.364)	.12767 (15.668)	.95321
8	Fuel&Light	3.93192 (12.107)	.02631 (16.637)	.95830
9	Other Nonfood	-26.12627 (-3.159)	.43564 (10.817)	.90626
Urban				
1	Cereal & Sub.	17.73203 (6.342)	.09686 (7.050)	.80232
2	Milk & Products	-2.63807 (-5.556)	.06375 (27.321)	.98416
3	Edible Oil	.57346 (3.044)	.02253 (24.334)	.98010
4	Meat,Fish,Egg	.61161 (1.093)	.05789 (21.050)	.97357
5	Sugar	1.04688 (6.957)	.01173 (15.856)	.95427
6	Other Food	-.66251 (-.487)	.20165 (30.182)	.98698
7	Clothing	-11.16667 (-3.202)	.14125 (8.243)	.84801
8	Fuel&Light	3.53076 (10.998)	.03411 (21.620)	.97492
9	Other Nonfood	-20.04278 (-4.018)	.39024 (15.918)	.95461

Table 3.2.1

Estimated Parameters For Double Log Functions

Equation : $Ln\ p_i q_i = \alpha + \beta\ Ln\ \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1965/66 NSS Round 20

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.21229 (1.786)	.61192 (17.228)	.96101
2	Milk & Products	-6.02060 (-11.024)	1.71520 (10.509)	.90118
3	Edible Oil	-3.86291 (-18.341)	1.00783 (16.012)	.95512
4	Meat,Fish,Egg	-2.99701 (16.928)	.96451 (18.292)	.96528
5	Sugar	-3.52484 (21.348)	.91260 (18.495)	.96601
6	Other Food	-1.72065 (-11.272)	1.00504 (22.032)	.97538
7	Clothing	-5.84926 (-10.136)	1.68777 (9.786)	.88761
8	Fuel&Light	-1.29844 ( )	.53836 ( )	.93278
9	Other Nonfood	-2.87985 (-11.887)	1.33710 (18.468)	.96592
Urban				
1	Cereal & Sub.	.94518 (4.361)	.34217 (5.560)	.74944
2	Milk & Products	-7.23134 (-6.775)	2.06669 (6.818)	.81977
3	Edible Oil	4.20594 (6.659)	1.15800 (6.456)	.80271
4	Meat,Fish,Egg	-1.75094 (-3.945)	.60998 (4.839)	.69155
5	Sugar	-3.02147 (-7.836)	.78393 (7.159)	.83403
6	Other Food	-2.08138 (-6.469)	1.12150 (12.274)	.93736
7	Clothing	-4.63257 (-5.530)	1.32107 (5.553)	.74900
8	Fuel&Light	-1.64620 (-5.462)	.63683 (7.440)	.84461
9	Other Nonfood	-3.26682 (-11.786)	1.46500 (18.611)	.97186

Table 3.2.2

Estimated Parameters For Double Log Functions

Equation : $Ln\ p_i q_i = \alpha + \beta\ Ln\ \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1966/67 · NSS Round 21

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.03166 (.275)	.67987 (20.172)	.97362
2	Milk & Products	-7.49085 (-9.450)	2.07741 (8.957)	.87808
3	Edible Oil	-4.41603 (-20.288)	1.13920 (17.888)	.96666
4	Meat,Fish,Egg	-2.91709 (17.364)	.93177 (18.956)	.97022
5	Sugar	-3.16838 (-14.657)	.82115 (12.983)	.93840
6	Other Food	1.64801 (-8.063)	.99507 (16.639)	.96166
7	Clothing	-7.61645 (-13.914)	2.10120 (13.119)	.93960
8	Fuel&Light	-1.38728 (-13.266)	.52910 (17.293)	.96441
9	Other Nonfood	-3.46124 (-21.570)	1.47335 (31.380)	.98894
Urban				
1	Cereal & Sub.	.89232 (3.288)	.37809 (4.932)	.69990
2	Milk & Products	-5.53672 (-12.010)	1.60456 (12.320)	.93781
3	Edible Oil	-3.70197 (-14.606)	.94948 (13.260)	.94590
4	Meat,Fish,Egg	-2.43643 (-9.323)	.82385 (11.158)	.92510
5	Sugar	-2.64967 (-9.206)	.70768 (8.703)	.88199
6	Other Food	-1.75750 (-18.814)	1.04570 (39.623)	.99367
7	Clothing	-9.31494 (-7.599)	2.38732 (6.894)	.82310
8	Fuel&Light	-1.58657 (-6.921)	.61962 (9.567)	.90053
9	Other Nonfood	-3.67485 (-20.119)	1.55509 (30.136)	.98910

Table 3.2.3

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1967/68 NSS Round 22

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	-.38655	.82066	.97597
		(-3.111)	(22.097)	
2	Milk & Products	-7.87673	2.16790	.89613
		(-11.104)	(10.224)	
3	Edible Oil	-5.03679	1.28783	.94138
		(-16.271)	(13.918)	
4	Meat,Fish,Egg	-3.28955	1.01704	.98069
		(23.885)	(24.705)	
5	Sugar	-3.12716	.84308	.96368
		(-19.813)	(17.870)	
6	Other Food	-1.74468	1.00951	.97057
		(-10.289)	(19.917)	
7	Clothing	-8.44672	2.33101	.91399
		(-12.279)	(11.337)	
8	Fuel&Light	-1.48619	.59730	.90783
		(-8.120)	(10.918)	
9	Other Nonfood	-2.60790	1.18700	.98917
		(-21.752)	(33.122)	
Urban				
1	Cereal & Sub.	.55405	.49924	.88032
		(2.526)	(8.197)	
2	Milk & Products	-6.79533	1.93750	.95988
		(-14.321)	(14.709)	
3	Edible Oil	-4.01059	1.05072	.95973
		(-15.555)	(14.679)	
4	Meat,Fish,Egg	-2.34408	.78196	.86957
		(-6.500)	(7.810)	
5	Sugar	-3.39183	.97165	.94450
		(-12.033)	(12.416)	
6	Other Food	-1.65500	1.02760	.94270
		(-5.459)	(12.209)	
7	Clothing	-7.02819	1.92363	.86486
		(-7.764)	(7.655)	
8	Fuel&Light	-1.80183	.70699	.95137
		(-9.415)	(13.306)	
9	Other Nonfood	-2.92078	1.31210	.97019
		(-10.594)	(17.143)	

Table 3.2.4

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1968/69 NSS Round 23

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.01984	.68215	.94275
		(.113)	(13.496)	
2	Milk & Products	-5.22814	1.44930	.94186
		(-13.891)	(13.386)	
3	Edible Oil	-4.00521	.98555	.99508
		(-55.149)	(47.174)	
4	Meat,Fish,Egg	-3.60476	1.13976	.97459
		(-18.710)	(20.564)	
5	Sugar	-4.07166	1.06835	.89301
		(-10.62)	(9.634)	
6	Other Food	-1.59479	.95645	.97187
		(-9.363)	(19.520)	
7	Clothing	-6.12869	1.66644	.81375
		(-7.410)	(7.004)	
8	Fuel&Light	-1.55993	.59780	.97455
		(-15.424)	(20.547)	
9	Other Nonfood	-3.21275	1.42032	.97574
		(-13.701)	(21.056)	
Urban				
1	Cereal & Sub.	.67405	.47122	.81075
		(2.504)	(6.289)	
2	Milk & Products	-7.46306	2.10327	.94965
		(-12.906)	(13.067)	
3	Edible Oil	-4.14880	1.04755	.98923
		(-31.720)	(28.774)	
4	Meat,Fish,Egg	-2.25705	.81368	.88101
		(-6.350)	(8.224)	
5	Sugar	-3.08129	.85981	.94873
		(-12.911)	(12.944)	
6	Other Food	-2.08108	1.13939	.96964
		(-8.633)	(16.982)	
7	Clothing	-6.52960	1.75054	.81347
		(-6.587)	(6.344)	
8	Fuel&Light	-1.69839	.65699	.95397
		(-9.854)	(13.695)	
9	Other Nonfood	-3.30387	1.42357	.98319
		(-14.836)	(22.966)	

Table 3.2.5

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1969/70 NSS Round 24

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.07935	.66740	.98487
		(.926)	(26.776)	
2	Milk & Products	-8.18105	2.23919	.96474
		(-18.463)	(17.378)	
3	Edible Oil	-4.37258	1.12014	.98314
		(-28.771)	(25.345)	
4	Meat,Fish,Egg	-2.93310	.97059	.98843
		(-26.955)	(30.673)	
5	Sugar	-3.35165	.85268	.98225
		(-28.227	(24.694)	
6	Other Food	-1.63706	1.00112	.98186
		(-11.612)	(24.420)	
7	Clothing	-8.52809	2.31962	.94538
		(-14.790)	(13.834)	
8	Fuel&Light	-1.65382	.64207	.98629
		(-21.084)	(28.149)	
9	Other Nonfood	-3.48664	1.46704	.97973
		(-15.950)	(23.079)	
Urban				
1	Cereal & Sub.	.69551	.48151	.84100
		(2.778)	(6.972)	
2	Milk & Products	-7.04613	2.00746	.90863
		(-9.211)	(9.513)	
3	Edible Oil	-4.54122	1.21233	.95285
		(-13.974)	(13.523)	
4	Meat,Fish,Egg	-2.38744	.83717	.95840
		(-11.355)	(14.434)	
5	Sugar	-3.22178	.84980	.94007
		(-12.471)	(11.924)	
6	Other Food	-1.51834	.96880	.98949
		(-12.594)	(29.130)	
7	Clothing	-7.13496	1.82781	.91871
		(-10.913)	(10.135)	
8	Fuel&Light	-1.61671	.65838	.97192
		(-11.976)	(17.679)	
9	Other Nonfood	-3.63441	1.53660	.97851
		(-13.223)	(20.266)	

Table 3.2.6

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1970/71 NSS Round 25

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.03666	.69076	.98139
		(.371)	(24.103)	
2	Milk & Products	-8.04503	2.21845	.92160
		(-12.020)	(11.415)	
3	Edible Oil	-4.65429	1.20727	.98638
		(-31.611)	(28.238)	
4	Meat,Fish,Egg	-3.18493	1.01942	.98902
		(-28.564)	(31.486)	
5	Sugar	-3.61863	.95046	.98392
		(-28.705)	(25.965)	
6	Other Food	-1.76838	1.02484	.98160
		(-12.148)	(24.245)	
7	Clothing	-7.79492	2.09568	.77336
		(-6.705)	(6.208)	
8	Fuel&Light	-1.76112	.66910	.97583
		(-16.124)	(21.096)	
9	Other Nonfood	-3.07115	1.34440	.98652
		(-18.834)	(28.393)	
Urban				
1	Cereal & Sub.	.53663	.50793	.93087
		(3.486)	(11.648)	
2	Milk & Products	-5.30048	1.53013	.90757
		(-9.774)	(9.959)	
3	Edible Oil	-4.35377	1.14126	.96267
		(-17.389)	(16.089)	
4	Meat,Fish,Egg	-2.68244	.88818	.93764
		(-10.526)	(12.302)	
5	Sugar	-3.99313	1.06387	.93603
		(-12.906)	(12.137)	
6	Other Food	-1.76060	1.05546	.97436
		(-9.224)	(19.519)	
7	Clothing	-6.94432	1.96081	.97390
		(-19.406)	(19.342)	
8	Fuel&Light	-1.92543	.72770	.97548
		(-14.969)	(19.970)	
9	Other Nonfood	-3.39707	1.44824	.98012
		(-14.770)	(22.226)	

Table 3.2.7

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1972/73 NSS Round 27

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.14405 (1.246)	.67753 (23.358)	.97669
2	Milk & Products	-6.95690 (-16.779)	1.78461 (17.150)	.95753
3	Edible Oil	-4.52704 (-32.269)	1.09264 (31.032)	.98667
4	Meat,Fish,Egg	-3.19564 (-25.154)	.99079 (31.074)	.98670
5	Sugar	-3.54744 (-25.981)	.92777 (27.073)	.98255
6	Other Food	-1.46691 (-15.461)	.91521 (38.435)	.99127
7	Clothing	-6.82285 (-30.249)	1.81528 (32.067)	.98750
8	Fuel&Light	-1.30585 (-14.252)	.58659 (25.508)	.98038
9	Other Nonfood	-3.11745 (-20.033)	1.34502 (34.438)	.98915
Urban				
1	Cereal & Sub.	.54399 (2.827)	.53399 (10.957)	.90155
2	Milk & Products	-7.59615 (-15.761)	1.96406 (16.169)	.95246
3	Edible Oil	-4.90596 (-24.304)	1.20185 (23.623)	.97720
4	Meat,Fish,Egg	-3.10995 (-17.876)	.99881 (22.763)	.97548
5	Sugar	-3.25760 (-20.428)	.89354 (22.232)	.97432
6	Other Food	-1.64441 (-20.410)	.99448 (48.973)	.99461
7	Clothing	-7.18943 (-16.628)	1.84956 (16.972)	.95668
8	Fuel&Light	-1.46180 (-28.324)	.63940 (49.155)	.99465
9	Other Nonfood	-3.16356 (-22.311)	1.36115 (38.087)	.99111

Table 3.2.8

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1973/74 NSS Round 28

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.09217	.72929	.98582
		(.845)	(27.675)	
2	Milk & Products	-6.40621	1.63382	.97919
		(-21.577)	(22.774)	
3	Edible Oil	-5.11428	1.23157	.97827
		(-22.351)	(22.274)	
4	Meat,Fish,Egg	-3.30797	1.03626	.96271
		(-13.022)	(16.882)	
5	Sugar	-3.56328	.90934	.99046
		(-32.012)	(33.809)	
6	Other Food	-1.60342	.96046	.98256
		(-10.051)	(24.917)	
7	Clothing	-8.16407	2.05942	.95434
		(-14.556)	(15.196)	
8	Fuel&Light	-1.56764	.65139	.98386
		(-15.068)	(25.911)	
9	Other Nonfood	-3.07530	1.29740	.97826
		(-12.757)	(22.273)	
Urban				
1	Cereal & Sub.	.73506	.53698	.95857
		(4.558)	(14.465)	
2	Milk & Products	-9.91556	2.42276	.83109
		(-6.340)	(6.729)	
3	Edible Oil	-4.48027	1.13757	.96741
		(-14.846)	(16.375)	
4	Meat,Fish,Egg	-2.40327	.83844	.96835
		(-10.969)	(16.625)	
5	Sugar	-3.26273	.87126	.95448
		(-11.873)	(13.773)	
6	Other Food	-1.67756	1.00885	.98811
		(-10.473)	(27.361)	
7	Clothing	-5.19749	1.36787	.83930
		(-6.060)	(6.929)	
8	Fuel&Light	-2.06514	.77214	.92221
		(-6.389)	(10.378)	
9	Other Nonfood	-3.62304	1.42893	.99174
		(-19.193)	(32.883)	

Table 3.2.9

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1977/78 NSS Round 32

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.18695	.64963	.94538
		(.986)	(14.446)	
2	Milk & Products	-5.02749	1.35783	.94347
		(-12.461)	(14.188)	
3	Edible Oil	-4.44175	1.10085	.96920
		(-18.626)	(19.459)	
4	Meat,Fish,Egg	-2.59959	.90482	.98360
		(-18.294)	(26.842)	
5	Sugar	-3.31386	.84783	.98473
		(-25.803)	(27.834)	
6	Other Food	-1.35089	.90881	.98626
		(-10.355)	(29.365)	
7	Clothing	-7.82958	2.06552	.93082
		(-11.461)	(12.746)	
8	Fuel&Light	-1.70772	.73330	.98484
		(-15.432)	(27.935)	
9	Other Nonfood	-3.09612	1.34396	.98731
		(-16.708)	(30.574)	
Urban				
1	Cereal & Sub.	.31202	.58400	.85781
		(1.089)	(8.912)	
2	Milk & Products	-6.20853	1.61332	.95591
		(-14.804)	(16.819)	
3	Edible Oil	-4.78285	1.19140	.97804
		(-22.113)	(24.082)	
4	Meat,Fish,Egg	-2.19418	.83382	.98944
		(-21.013)	(34.911)	
5	Sugar	-4.03417	1.00977	.84463
		(-7.736)	(8.466)	
6	Other Food	-1.05856	.88513	.98097
		(-7.086)	(25.905)	
7	Clothing	-7.88910	2.01841	.94768
		(-13.747)	(15..377)	
8	Fuel&Light	-1.76705	.76518	.96620
		(-10.197)	(19.304)	
9	Other Nonfood	-3.63460	1.44633	.98815
		(-18.936)	(32.945)	

Table 3.2.10

Estimated Parameters For Double Log Functions

Equation : $\ln p_i q_i = \alpha + \beta \ln \mu$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1983 NSS Round 38

Equation No	Item	α	β	R^2
Rural				
1	Cereal & Sub.	.97257 (7.404)	.54155 (20.429)	.97655
2	Milk & Products	-6.16691 (-14.905)	1.54062 (18.452)	.97138
3	Edible Oil	-3.03599 (-17.469)	.87487 (24.944)	.98416
4	Meat,Fish,Egg	-2.69877 (-20.286)	.96742 (36.034)	.99235
5	Sugar	-2.66983 (-36.436)	.74694 (50.513)	.99609
6	Other Food	-1.41045 (-7.733)	.93375 (25.369)	.98468
7	Clothing	-10.23604 (-18.549)	2.36086 (21.199)	.97818
8	Fuel&Light	-.71910 (-7.781)	.56943 (30.533)	.98938
9	Other Nonfood	-3.72811 (-14.377)	1.42513 (27.233)	.98668
Urban				
1	Cereal & Sub.	-.80809 (-3.852)	.54938 (12.737)	.93613
2	Milk & Products	-6.71932 (-12.491)	1.67134 (15.111)	.95385
3	Edible Oil	-2.98496 (-17.465)	.87901 (25.014)	.98270
4	Meat,Fish,Egg	-2.63866 (-11.322)	.97518 (20.351)	.97407
5	Sugar	-2.44064 (-10.834)	.70211 (15.159)	.95413
6	Other Food	-2.02714 (-8.299)	1.07633 (21.431)	.97656
7	Clothing	-9.41425 (-9.674)	2.18481 (10.920)	.91489
8	Fuel&Light	-.80164 (-11.589)	.60575 (42.590)	.99397
9	Other Nonfood	-3.49389 (-16.331)	1.38322 (31.444)	.98899

Table 3.3.1

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1965/66 NSS Round 20

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	3.31605	.22320	-4.512E-04	.95042
		(3.768)	(4.836)	(-1.055)	
2	Milk & Products	-1.30192	.11072	-5.847E-04	.86022
		(-2.866)	(4.647)	(-2.650)	
3	Edible Oil	.06096	.01646	7.056E-05	.97451
		(.721)	(3.709)	(1.717)	
4	Meat,Fish,Egg	.12219	.03672	7.105E-05	.98202
		(.934)	(5.349)	(1.117)	
5	Sugar	.05668	.01964	1.898E-06	.95458
		(.600)	(3.962)	(.041)	
6	Other Food	.93510	.11334	8.029E-04	.97538
		(1.488)	(3.438)	(2.630)	
7	Clothing	-.04595	.01997	4.789E-04	.86445
		(-.075)	(.624)	(1.615)	
8	Fuel&Light	.39731	.05302	-2.595E-04	.92005
		(2.306)	(5.868)	(-3.100)	
9	Other Nonfood	.92075	.03663	2.839E-03	.99729
		(2.354)	(1.786)	(14.944)	
Urban					
1	Cereal & Sub.	1.93077	.27887	-1.844E-03	.92736
		(3.500)	(10.265)	(-8.043)	
2	Milk & Products	-2.37336	.17355	-9.124E-04	.59526
		(-1.822)	(2.706)	(-1.685)	
3	Edible Oil	-1.04565	.09241	-5.658E-04	.70349
		(-2.276)	(4.085)	(-2.963)	
4	Meat,Fish,Egg	-.16115	.07361	-4.599E-04	.69038
		(-.445)	(4.082)	(-3.022)	
5	Sugar	-.23047	.04462	-2.774E-04	.94881
		(-2.879)	(11.322)	(-8.338)	
6	Other Food	2.63741	-.02964	2.795E-03	.97493
		(2.447)	(-.558)	(6.239)	
7	Clothing	.44849	-5.166E-03	5.280E-04	.93376
		(1.321)	(-.309)	(3.744)	
8	Fuel&Light	-.15526	.08281	-4.803E-04	.86148
		(-.556)	(6.026)	(-4.141)	
9	Other Nonfood	1.40600	7.291E-03	3.461E-03	.96965
		(.858)	(.090)	(5.084)	

Table 3.3.2

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1966/67 NSS Round 21

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	1.05082 (2.048)	.38144 (13.155)	-1.889E-03 (-6.374)	.98733
2	Milk & Products	- .31165 (- .988)	.03461 (1.941)	1.812E-04 (.994)	.92841
3	Edible Oil	-.12210 (-1.639)	.02709 (6.434)	-6.504E-05 (-1.512)	.97440
4	Meat,Fish,Egg	-.21979 (-1.315)	.06084 (6.439)	-2.402E-04 (-2.488)	.96196
5	Sugar	-.09058 (-.925)	.03288 (5.944)	-1.625E-04 (-2.876)	.94052
6	Other Food	1.76522 (1.485)	.06167 (.918)	1.479E-03 (2.155)	.93441
7	Clothing	-.18364 (-.940)	.01564 (1.417)	5.206E-04 (4.617)	.98230
8	Fuel&Light	.35591 (5.732)	.04828 (13.756)	-2.701E-04 (-7.532)	.98559
9	Other Nonfood	1.27137 (1.229)	-.01162 (-.199)	3.361E-03 (5.626)	.97848
Urban					
1	Cereal & Sub.	2.75620 (4.112)	.25732 (8.855)	-1.376E-03 (-7.113)	.89601
2	Milk & Products	-1.02127 (-3.954)	.08227 (7.351)	-1.353E-04 (-1.816)	.97260
3	Edible Oil	-.18408 (-3.077)	.03292 (12.701)	-1.156E-04 (-6.695)	.97947
4	Meat,Fish,Egg	.01865 (.148)	.05681 (10.433)	-1.924E-04 (-5.305)	.97157
5	Sugar	-.03224 (- .530)	.03591 (13.616)	-1.699E-04 (-9.674)	.96614
6	Other Food	.40537 (1.844)	.16264 (17.072)	4.927E-04 (7.765)	.99854
7	Clothing	.38108 (1.381)	-.02319 (-1.940)	6.408E-04 (8.049)	.97739
8	Fuel&Light	.12824 (1.346)	.06427 (15.560)	-2.864E-04 (-10.412)	.97751
9	Other Nonfood	1.03239 (1.367)	.01984 (.606)	3.111E-03 (14.279)	.99600

Table 3.3.3

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1967/68 NSS Round 22

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	.67416	.40918	-1.592E-03	.98948
		(1.315)	(17.152)	(-8.691)	
2	Milk & Products	-1.02837	.07724	-2.149E-04	.87597
		(-2.371)	(3.826)	(-1.386)	
3	Edible Oil	-.09432	.02265	-2.885E-05	.99589
		(-3.361)	(17.345)	(-2.877)	
4	Meat,Fish,Egg	.07433	.03594	1.976E-06	.98926
		(.861)	(8.938)	(.064)	
5	Sugar	.07361	.02430	-4.570E-05	.97484
		(1.075)	(7.621)	(-1.867)	
6	Other Food	.88785	.12963	3.125E-04	.98927
		(2.200)	(6.901)	(2.167)	
7	Clothing	.50626	-.03728	1.176E-03	.98698
		(1.635)	(-2.587)	(10.626)	
8	Fuel&Light	.81859	.02072	9.966E-05	.97837
		(7.201)	(3.916)	(2.453)	
9	Other Nonfood	-.40212	.15328	3.975E-05	.99790
		(-2.416)	(19.786)	(.668)	
Urban					
1	Cereal & Sub.	.31516	.38834	-2.318E-03	.98049
		(.698)	(17.387)	(-12.205)	
2	Milk & Products	- .46491	.03229	5.445E-04	.98157
		(-1.601)	(2.247)	(4.456)	
3	Edible Oil	-.26102	.03652	-1.324E-04	.98803
		(-4.882)	(13.809)	(-5.885)	
4	Meat,Fish,Egg	.10521	.04070	-3.368E-05	.92595
		(.457)	(3.573)	(- .348)	
5	Sugar	-.34196	.05331	-2.318E-04	.91384
		(-1.809)	(5.699)	(-2.915)	
6	Other Food	1.54412	.10098	1.215E-03	.94112
		(1.155)	(1.527)	(2.161)	
7	Clothing	-1.15782	.08467	-2.819E-04	.89393
		(-2.861)	(4.230)	(-1.656)	
8	Fuel&Light	.24850	.05730	-1.731E-04	.97162
		(1.725)	(8.040)	(- 2.856)	
9	Other Nonfood	1.35007	6.589E-03	2.498E-03	.99013
		(2.029)	(.200)	(8.928)	

Table 3.3.4

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1968/69 NSS Round 23

Equation No	Item	α	β_1	β_2	R^2
<u>Rural</u>					
1	Cereal & Sub.	.67726	.38583	-1.382E-03	.99119
		(1.671)	(23.877)	(-15.821)	
2	Milk & Products	- .50652	.04900	-2.145E-05	.99230
		(-4.554)	(11.050)	(-.875)	
3	Edible Oil	-8.301E-03	.01781	-5.281E-06	.99768
		(- .365)	(19.648)	(-1.078)	
4	Meat,Fish,Egg	-.39446	.06691	-1.091E-04	.98371
		(-2.301)	(9.789)	(-2.952)	
5	Sugar	.04079	.02337	-3.130E-05	.97326
		(.494)	(7.104)	(-1.760)	
6	Other Food	.26329	.17446	-1.626E-04	.99421
		(.847)	(14.083)	(-2.428)	
7	Clothing	-.14345	-.03246	1.965E-05	.93644
		(-.550)	(3.123)	(.350)	
8	Fuel&Light	.51441	.03910	-9.907E-05	.97983
		(5.858)	(11.167)	(-5.233)	
9	Other Nonfood	1.50104	-6.313E-03	2.964E-03	.99955
		(4.642)	(-.490)	(42.525)	
<u>Urban</u>					
1	Cereal & Sub.	1.05326	.38139	-2.331E-03	.93715
		(1.353)	(9.961)	(- 7.226)	
2	Milk & Products	- .40670	.03126	4.797E-04	.99383
		(-2.652)	(4.144)	(7.547)	
3	Edible Oil	-.12527	.02614	-6.312E-05	.98643
		(-2.524)	(10.711)	(-3.069)	
4	Meat,Fish,Egg	.11194	.05275	-6.758E-05	.94021
		(.445)	(4.261)	(- .648)	
5	Sugar	-.08403	.03409	-8.479E-05	.96732
		(- .839)	(6.924)	(-2.043)	
6	Other Food	.83308	.12055	1.206E-03	.98256
		(1.076)	(3.165)	(3.759)	
7	Clothing	.75469	-.05351	1.169E-03	.96106
		(1.914)	(-2.759)	(7.155)	
8	Fuel&Light	.26291	.05828	-2.558E-04	.95763
		(1.873)	(8.442)	(- 4.398)	
9	Other Nonfood	.67295	.04799	2.289E-03	.99535
		(1.390)	(2.015)	(11.407)	

Table 3.3.5

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1969/70 NSS Round 24

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	1.52447	.35185	-1.467E-03	.99697
		(6.500)	(29.980)	(-14.541)	
2	Milk & Products	- .34198	.02831	-3.522E-04	.99619
		(-3.650)	(6.039)	(8.681)	
3	Edible Oil	.04510	.01403	8.523E-05	.98615
		(.727)	(4.518)	(3.173)	
4	Meat,Fish,Egg	.24429	.03224	1.478E-04	.99282
		(2.653)	(6.997)	(3.708)	
5	Sugar	.04105	.02032	-2.375E-05	.99172
		(1.149)	(11.363)	(-1.535)	
6	Other Food	.57825	.15850	3.296E-04	.97739
		(.880)	(4.822)	(1.159)	
7	Clothing	.08340	-7.892E-03	8.021E-04	.99336
		(.542)	(-1.025)	(12.038)	
8	Fuel&Light	.53634	.03593	-2.064E-05	.98323
		(5.524)	(7.395)	(- .491)	
9	Other Nonfood	.67499	.04288	2.327E-03	.99524
		(1.421)	(1.804)	(11.314)	
Urban					
1	Cereal & Sub.	.98856	.38200	-2.005E-03	.98531
		(2.529)	(21.817)	(-16.036)	
2	Milk & Products	-1.23756	.08923	-4.955E-05	.97061
		(-3.651)	(5.876)	(-.457)	
3	Edible Oil	-.31641	.03903	-9.737E-05	.98842
		(-4.729)	(13.019)	(-4.549)	
4	Meat,Fish,Egg	.21502	.04775	-5.158E-05	.96860
		(1.240)	(6.144)	(- .930)	
5	Sugar	-.25188	.03732	-1.408E-04	.97266
		(-3.332)	(11.018)	(-5.822)	
6	Other Food	.50418	.16276	2.559E-04	.99500
		(1.523)	(10.976)	(2.418)	
7	Clothing	.03522	-2.156E-03	4.260E-04	.99752
		(.519)	(- .709)	(19.632)	
8	Fuel&Light	.61907	.04727	-1.218E-04	.97625
		(5.389)	(9.185)	(- 3.315)	
9	Other Nonfood	1.05512	.01594	3.029E-03	.99668
		(1.752)	(.593)	(15.785)	

Table 3.3.6

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1970/71 NSS Round 25

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	1.68365	.34742	-1.250E-03	.98944
		(3.542)	(15.006)	(-6.511)	
2	Milk & Products	- .34656	.02711	-4.009E-04	.99701
		(-3.786)	(6.081)	(10.841)	
3	Edible Oil	.08890	.02131	4.351E-05	.99732
		(-2.906)	(14.304)	(3.520)	
4	Meat,Fish,Egg	.07637	.03812	7.971E-05	.99819
		(1.691)	(17.328)	(4.367)	
5	Sugar	.07860	.01803	3.499E-05	.99261
		(1.844)	(8.682)	(2.032)	
6	Other Food	.17046	.17921	2.787E-05	.99125
		(.445)	(9.608)	(.180)	
7	Clothing	.55933	- .03251	9.080E-04	.87204
		(.841)	(-1.004)	(3.380)	
8	Fuel&Light	.53796	.03350	1.387E-05	.98257
		(5.153)	(6.589)	(.329)	
9	Other Nonfood	1.16929	.01386	2.379E-03	.99170
		(1.905)	(.464)	(9.596)	
Urban					
1	Cereal & Sub.	1.52212	.32851	-1.629E-03	.98778
		(4.578)	(21.933)	(-15.070)	
2	Milk & Products	-.23936	.02744	3.662E-04	.99702
		(-2.402)	(6.112)	(11.295)	
3	Edible Oil	-.30970	.03746	-1.096E-04	.99269
		(-6.611)	(17.747)	(-7.193)	
4	Meat,Fish,Egg	-.15133	.06052	-1.995E-04	.99053
		(-1.894)	(16.813)	(-7.678)	
5	Sugar	-.15041	.03279	-8.747E-05	.99069
		(-3.084)	(14.926)	(-5.514)	
6	Other Food	1.05133	.13779	7.469E-04	.98722
		(1.645)	(4.786)	(3.593)	
7	Clothing	-.58610	.04438	3.276E-04	.99170
		(-3.065)	(5.152)	(5.268)	
8	Fuel&Light	.23011	.05769	-1.916E-04	.98670
		(2.559)	(14.243)	(- 6.553)	
9	Other Nonfood	1.59554	1.255E-03	2.625E-03	.99672
		(3.244)	(.057)	(16.407)	

Table 3.3.7

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1972/73   NSS Round 27

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	5.05199	.23441	-2.725E-04	.96776
		(4.020)	(8.878)	(-3.415)	
2	Milk & Products	-1.04744	.05786	-1.240E-05	.98283
		(-3.202)	(8.420)	(-.597)	
3	Edible Oil	.06298	.01388	1.094E-05	.97728
		(.518)	(5.437)	(1.418)	
4	Meat,Fish,Egg	.44864	.02370	6.054E-05	.96599
		(1.206)	(3.032)	(2.563)	
5	Sugar	.21924	.01576	9.839E-06	.97006
		(1.440)	(4.929)	(1.018)	
6	Other Food	-.04323	.18172	-1.707E-04	.99733
		(-.142)	(28.316)	(-8.802)	
7	Clothing	-1.32639	.06232	1.038E-04	.97566
		(-1.913)	(4.279)	(2.358)	
8	Fuel&Light	1.11441	.02799	-1.397E-05	.95828
		(4.942)	(5.909)	(-.976)	
9	Other Nonfood	2.23693	.02083	1.281E-03	.99848
		(2.786)	(1.235)	(25.134)	
Urban					
1	Cereal & Sub.	4.83871	.22068	-5.115E-04	.91914
		(4.141)	(7.959)	(- 5.172)	
2	Milk & Products	-1.79909	.08631	-7.205E-05	.98118
		(-4.454)	(9.006)	(-2.107)	
3	Edible Oil	-.18652	.02356	-1.563E-05	.99539
		(-3.250)	(17.299)	(-3.219)	
4	Meat,Fish,Egg	-.41757	.03138	4.325E-04	.98570
		(1.846)	(5.846)	(2.258)	
5	Sugar	.11982	.02468	-2.149E-05	.98169
		(1.065)	(9.245)	(-2.256)	
6	Other Food	.28627	.17671	5.294E-05	.99197
		(.383)	(9.955)	(.836)	
7	Clothing	1.64642	-.05757	6.069E-04	.96078
		(1.622)	(-2.391)	(7.065)	
8	Fuel&Light	.82032	.03996	-4.439E-05	.99573
		(10.220)	(20.982)	(- 6.535)	
9	Other Nonfood	1.49691	.0519303	1.223E-03	.99693
		(1.577)	(2.305)	(15.221)	

Table 3.3.8

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1973/74   NSS Round 28

Equation No	Item	α	β_1	β_2	R^2
<u>Rural</u>					
1	Cereal & Sub.	2.54340	.35529	-5.375E-04	.98306
		(2.018)	(11.085)	(-4.345)	
2	Milk & Products	- .76476	.03973	4.744E-05	.94408
		(-1.418)	(2.897)	(.896)	
3	Edible Oil	-.37942	.02685	-2.717E-05	.97716
		(-2.871)	(7.990)	(-2.095)	
4	Meat,Fish,Egg	.86130	5.448E-03	1.987E-04	.99426
		(4.642)	(1.155)	(10.912)	
5	Sugar	.10690	.01709	-1.236E-07	.98790
		(1.317)	(8.278)	(-.016)	
6	Other Food	1.97549	.09111	3.351E-04	.98678
		(2.192)	(3.976)	(3.991)	
7	Clothing	-1.07713	.05182	8.646E-05	.91976
		(-1.157)	(2.189)	(.946)	
8	Fuel&Light	1.26761	.02226	2.556E-05	.97369
		(6.252)	(4.317)	(1.284)	
9	Other Nonfood	3.12752	-.01705	1.232E-03	.98728
		(2.116)	(-.454)	(8.494)	
<u>Urban</u>					
1	Cereal & Sub.	4.53123	.22972	-3.321E-04	.90434
		(2.258)	(4.778)	(- 1.914)	
2	Milk & Products	-1.02056	.04573	1.455E-04	.97389
		(1.686)	(3.152)	(2.780)	
3	Edible Oil	-.20828	.02260	9.103E-06	.97906
		(-1.311)	(5.937)	(.662)	
4	Meat,Fish,Egg	-.02350	.04791	-4.200E-05	.97954
		(-.102)	(8.660)	(-2.103)	
5	Sugar	-.13548	.02562	-2.697E-05	.94793
		(-.721)	(5.692)	(-1.660)	
6	Other Food	.05306	.17542	1.321E-04	.98631
		(.049)	(6.794)	(1.418)	
7	Clothing	-5.844E-03	.01161	1.566E-04	.93324
		(-.009)	(.767)	(2.866)	
8	Fuel&Light	1.11137	.01787	7.716E-05	.91515
		(2.175)	(1.460)	(1.746)	
9	Other Nonfood	1.08221	.04224	1.104E-03	.99680
		(1.269)	(2.066)	(14.963)	

Table 3.3.9

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1977/78 NSS Round 32

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	3.16447	.27102	-4.928E-04	.96848
		(2.816)	(12.021)	(-6.928)	
2	Milk & Products	-1.01869	.05573	-3.336E-05	.98703
		(-4.030)	(10.991)	(-2.085)	
3	Edible Oil	-.15617	.02421	-2.400E-05	.99626
		(-3.095)	(23.911)	(-7.515)	
4	Meat,Fish,Egg	-.02865	.05475	-4.601E-05	.99832
		(-.353)	(33.638)	(-8.959)	
5	Sugar	.05978	.01986	-2.019E-05	.99465
		(1.220)	(20.193)	(-6.508)	
6	Other Food	.08489	.19877	-2.175E-04	.99666
		(.226)	(26.405)	(-9.158)	
7	Clothing	.56261	-4.964E-03	4.637E-04	.99298
		(.975)	(-.429)	(12.699)	
8	Fuel&Light	.74604	.04729	-3.236E-05	.97844
		(2.774)	(8.766)	(-1.901)	
9	Other Nonfood	3.15094	.01351	1.321E-03	.99439
		(2.014)	(.430)	(13.333)	
Urban					
1	Cereal & Sub.	5.12904	.18828	-2.838E-04	.89849
		(3.232)	(7.311)	(- 4.653)	
2	Milk & Products	-2.44425	.09136	-8.453E-05	.96550
		(-3.781)	(8.709)	(-3.404)	
3	Edible Oil	-.02103	.02013	8.699E-06	.97679
		(- .097)	(5.751)	(1.050)	
4	Meat,Fish,Egg	.44576	.04907	-2.276E-05	.98248
		(1.414)	(9.593)	(-1.880)	
5	Sugar	-.02855	.02395	-2.657E-05	.98023
		(-.251)	(12.989)	(-6.088)	
6	Other Food	2.61805	.14721	1.232E-04	.99742
		(4.398)	(15.238)	(5.386)	
7	Clothing	.66821	-4.061E-03	3.376E-04	.99523
		(1.176)	(-.441)	(15.471)	
8	Fuel&Light	1.58776	.02825	4.234E-05	.92110
		(2.018)	(2.213)	(1.400)	
9	Other Nonfood	1.09985	.10328	7.022E-04	.99549
		(.696)	(4.025)	(11.558)	

Table 3.3.10

Estimated Parameters For Quadratic Functions

Equation : $p_i q_i = \alpha + \beta_1 \mu + \beta_2 \mu^2$

Dependent Variable = Item expenditure

Independent Variable = Total expenditure

Sample period (Per capita/monthly) 1983 NSS Round 38

Equation No	Item	α	β_1	β_2	R^2
Rural					
1	Cereal & Sub.	8.19770	.25124	-2.487E-04	.97633
		(4.540)	(12.837)	(-7.016)	
2	Milk & Products	-2.80302	.06633	-3.425E-05	.98232
		(-4.684)	(10.224)	(2.915)	
3	Edible Oil	.33784	.03274	-2.378E-05	.99327
		(-2.174)	(19.431)	(-7.794)	
4	Meat,Fish,Egg	-.85801	.07221	-3.941E-05	.99380
		(-2.282)	(17.714)	(-5.338)	
5	Sugar	.38772	.01872	-1.091E-05	.99325
		(3.914)	(17.429)	(-5.610)	
6	Other Food	-2.93876	.23596	-1.767E-04	.99765
		(-4.531)	(33.564)	(-13.880)	
7	Clothing	-3.07446	.04761	1.515E-04	.98978
		(-2.532)	(3.617)	(6.354)	
8	Fuel&Light	2.80302	.04162	-2.896E-05	.98984
		(11.260)	(15.424)	(-5.928)	
9	Other Nonfood	6.03624	-6.225E-04	8.253E-04	.99734
		(2.791)	(-.027)	(19.443)	
Urban					
1	Cereal & Sub.	7.29733	.23982	-2.755E-04	.97705
		(4.929)	(14.787)	(- 9.207)	
2	Milk & Products	-3.19750	.07141	-1.477E-05	.98413
		(-4.328)	(8.825)	(- .989)	
3	Edible Oil	.13967	.02847	-1.145E-05	.98557
		(.560)	(10.421)	(2.272)	
4	Meat,Fish,Egg	-.92467	.07894	-4.056E-05	.98500
		(-1.411)	(10.994)	(-3.062)	
5	Sugar	.86786	.01418	-4.726E-06	.95427
		(3.710)	(5.553)	(-1.000)	
6	Other Food	-2.95669	.23309	-6.057E-05	.98830
		(-1.476)	(10.620)	(-1.496)	
7	Clothing	1.98715	- .03896	3.473E-04	.99559
		(1.191)	(-2.131)	(10.295)	
8	Fuel&Light	2.35068	.05028	-3.116E-05	.99635
		(12.344)	(24.101)	(-8.095)	
9	Other Nonfood	-.48561	.12229	5.164E-04	.99934
		(-.521)	(11.968)	(27.387)	

APPENDIX IV

WHOLE SALE PRICE INDICES

Year	Cereal & Sub.	Milk &Prdts	EdibleOil	Meat,fish &Eggs	Sugar	Other food	Clothing	Fuel &light	Other Non-food
65/66	74.6	65.7	64.9	82.1	77.6	71.1	75.3	77.2	68.6
66/67	88.4	73.4	84.4	98.8	82.8	82.7	80.4	83.2	80.2
67/68	110.4	85.1	78.6	98.6	93.3	97.8	81.1	88.0	79.5
68/69	97.2	90.5	70.0	97.5	100.8	92.5	85.0	92.2	83.0
69/70	100.7	94.0	88.8	93.3	99.9	97.5	90.7	96.1	92.9
70/71	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
72/73	119.5	103.6	99.4	116.3	152.7	113.3	112.7	110.1	107.5
73/74	141.9	133.4	147.9	142.1	157.1	136.6	134.8	130.6	146.6
77/78	170.4	157.0	175.9	196.6	159.4	173.6	172.8	234.2	178.0
1983*	266.35	240.2	283.4	354.7	280.7	317.9	241.2	477.3	294.4

Note : * Averages of the price indices for 82/83 and 83/84 have been taken.

Source: Whole Sale Price Statistics India 1947-48, Vol.1 (Annual Series), Chandhok (H.L)., Economic and Scientific Research Foundation. And R.B.I Report on Currency and Finance for the year 1983.

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