Chapter – 3
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3.1Introduction

Methodology is an important part of the research and it is used to know what are the methods applied for the analysis of the study. The following research methodology is adopted to fulfil the major objective of this study is i.e. to investigate the income and expenditure pattern of cultivators in Haryana over the period of 2002-03 to 2013-14.

3.2 Research design

The study is descriptive cum causal in nature that provides insights into, and an understanding of the various concepts related to analyze the income and consumption pattern of cultivators by their source of income, to estimate the income elasticity of demand for commodities and to enquire into the socio-economic factors responsible for the perceived changes in variables over time. These are following variables like; income, expenditure, food and non-food are used for fulfil the objectives of this study.

3.3 Data description and model formulation

The study is based on secondary data. There is no comprehensive source of entire data used in this study. The data used in this study was obtained from Directorate of Economics and Statistical Analysis, Government of Haryana.

In the present study simple regression method is used. Two linear simple regression methods are formulated on the basis of review literature. Model 1 focuses on analyzing the growth rate of income and expenditure pattern of cultivators in Haryana (3.7.1). Model 2 is annual growth rate (3.7.2) is used to check the socio-economic factors response for the perceived changes in variable over time. Model 3, percentage is used to

see the variation between three time periods (3.7.3). Model 4 Engel curve is used to see the relationship between income and expenditure (3.7.4). Model 5 is built to check the income elasticity of demand (3.7.5) for commodities with the help of double-log method.

3.4 Source of the data

This study is based on secondary data. The major source of data for the present study is based on the 'family budget of cultivators in Haryana' published annually by Directorate of Economic and Statistical Organisation, Planning Department and Government of Haryana. The source provides farm level information regarding expenditure on various items of consumption and size of families. For the main study i.e. "Economics of Farming in Haryana", 238 holdings were selected, two from the each block in all the districts of the State, keeping in view the size of holdings, willingness and capability of the cultivators in maintaining the day-to-day record of their income and domestic expenditure in the prescribed format, 119 out of 238 households, one from each block was selected for conducting the study on "Family Budget of Cultivators in Haryana". The results extracted in this study are purely indicative in nature because of the small sample size. The average number of members of per household is 7 and the total average number of household is 115. The total number of cultivators is classified into some categories according to the size of holdings is bleow-2.0, 2.0-4.0, 4.0-7.5, 7.5-10.0 and 10.0-above.

3.5 Method of data collection

The study is based on the data collected from the selected cultivators through District Statistical Agencies. Various farm operations were recorded by the selected cultivators in the registers especially prescribed/designed for this purpose. To ensure accuracy of data, the records were maintained by the farmers and supervised/checked by the staff of District Statistical Agencies as well as HQ Officers/Officials.

3.6 Sampling Design

Two cultivators from two different villages of each block were purposively selected depending on their co-operation, willingness and capability in maintaining the day-to-day records of farm operations. The particular holding was the ultimate unit of survey. As such, the results and conclusions arrived at in this report are based on the study of sample holdings and, therefore, cannot necessarily be taken to reflect the situation prevailing in the State as a whole.

3.7 Methods Analysis

As discussed in the review of literature different methods has been used to investigate the income and expenditure pattern of cultivator in Haryana. The present study, being a descriptive study, on the selection of methods made in such a way that the present study **"**An Analysis of Income and Expenditure Pattern of Cultivators in Haryana" might come out with a reliable, valid and sufficient conclusion. Descriptive studies are more than just a collection of data; they involve measurement, classification, analysis comparison and interpretation of the results.

3.7.1 Regression log-linear model

This analysis is used to determine relationships between a dependent variable and one or more independent or explanatory variables. A simple regression is concerned with the relationship between a dependent variable and a single independent variable. The relationship between income and time is analysed using a log-linear model. This methodology has been adopted to full fill the one of the objective which is of an analysis of income and expenditure pattern of cultivators. It can be written in mathematically as follows:

$Y_i = \alpha+\beta X_i+\epsilon_i$ (Simple regression) (3.1)

$Ln\ (Y_i) = \alpha+\beta X_i+\epsilon_i$ (Log-linear model) ..... (3.2)

Where the variables stand for-

Ln (Income) = $\alpha+\beta$(Time)+ϵ_i ..... (3.3)

α = intercept,

β = slope of the regression line (or the rate of change in X for a given change in Y),

X_i = independent variable (time)

Y_i= dependent variable (income)

Ln= natural log

ϵ_i = Error term

3.7.2 Annual Growth rate

Annual Growth rate is the rate of increase in size per unit time. Annual Growth rate is worked out by using the following formula:

AGR = (X2- X1)/ X1

Where

X1 = first value of variable X

X2 = second value of variable X

3.7.3 Percentage method

A percentage is defined as a number represented as a fraction of 100. It is used to compare things and also used in ratios. It is denoted by the symbol %. This methodology

has been utilised to full fill the one of my objective which is to enquire into the socio-economic factors responsible for the perceived changes in variables over time.

Mathematical formula of Percentage method can be written as follows:

Percentage = Required Value/total value*100

3.7.4 Engle curve method

It shows the relationship between income and expenditure or Engel curve shows that quantities of a good which the consumer will purchase at various income level, given his tastes, preferences and the price of the good in question. Engel in his "Law of Family Expenditure" analysed the relationship between quantity purchase and expenditure which is shown by an Engel expenditure curve and the relation between quantity purchased and income is shown by an Engel curve. Engel curves explain the change of expenditure for different goods as a function of income. In 1857 Ernest Engel attempted to investigate Engel curves and he studied how household expenditures on food vary with income. He found that food expenditures are an increasing function of income and of family size, but that food budget shares decrease with income. The study adopted a nonparametric approach to construct curves which are currently called regress grams. Since then much of the work on Engel curves involved use of parametric models.

For most of our analysis we will be concerned with assessing and generalizing the simple relationship between budget shares and total expenditure. A popular form that is consistent with household utility-maximizations provided by the Working-Leser specification (Working, 1943, Leser, 1963), which relates budget shares linearly to the logarithm of total household expenditure. In it is most austere form, this is expressed as:

$W_{ij}=\alpha_j+\beta_j \text{ in } (x_i) + \varepsilon_{ij}$.....……..... (3.4)

Where w_{ij} is the budget share of good *j* in household *i* (i.e., the ratio of expenditure on Good j to total household expenditure), x_i is total household expenditure, αj and βj are

Parameters to be estimated and ε_{ij} is an error term.

3.7.5 Double-log method (log-log method) regression model measure income elasticity of demand

This model is linear in the parameters α and β_1, linear in the logarithms of the variables y and x, and can be estimated by OLS regression. Because of this linearity, such models are called log-log, double-log or log linear models. This method has been utilised to meet the objective of this study which is to estimate the income elasticity of demand for commodities in Haryana.

If the assumptions of the classical linear regression model are fulfilled, the parameters of dependent variable can be estimated by the OLS method using a linear and double log specification, by letting

$Y_i=\alpha+\beta_1 X_i+u_i$ (linear model)..... (3.5)

$\text{Ln}(X_i) = \alpha_1+\beta_2 \text{Ln}(Y_i) +u_i$ (double-log model) .....…... (3.6)

In (3.4) and (3.5), Ln denotes natural logarithm. α's denote the constant of regression and β's represent the slope coefficients. The double log model coefficients have more relevant marginal effects interpretation (percentage change in income associated with a percentage change in expenditure), but there is loss of information as non-positive values (zero and negative values) are dropped. One attractive feature of the log-log model, which has made it popular in applied work, is that the slope coefficient β_2 measures the elasticity of X_i with respect to Y_i, that is, the percentage change in X_i for a given percentage changes in

Y_i. Thus, if X_i represents the quantity of a commodity demanded and Y_i its unit change in income, β_1 measures the income elasticity of demand, a parameter of considerable economic interest. If there is relationship between quantity demanded and income, then the double-log transformation will give the estimate of the income elasticity.

Two special features of the linear model may be noted: the model assumes that the elasticity coefficient between Y_i and X_i, β_1, remains constant throughout, hence the alternative name constant elasticity model. In other word the change in Y_i per unit change in X_i remain the same no matter at which in X_i we measure the elasticity. Another feature of the model is that although α and β_1 are unbiased estimates of α_1 and β_2. It may also be noted that alternative functional forms like transcendental logarithm (trans log) has been employed in the literature (Rao and Chotigeat, 1981), but the use of the simpler versions in this paper is motivated by a preference for parsimony as this is a baseline investigation. The study is of relationship between returns to cultivation per hectare and size-class of land cultivated in India (S. Gaurav& Mishra, 2011).