

A STUDY OF THE TIME ALLOCATION AND FULL
INCOME OF THE LAGUNA HOUSEHOLDS

by

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D E C L A R A T I O N

Except where otherwise indicated, this dissertation is my own work.

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ABSTRACT

In investigating the interrelationship of time allocation and full income of the Laguna farmers, this study follows the theory of the New Household Economics. The theory treats time, the only common resource available to all individuals, as an economic resource. Time, due to its scarcity and high value, is recognized as the critical factor in analyzing economic behaviour. The efforts, or lack of them, of individuals could only be analyzed through time. The hypothesis implicitly being postulated in this study is that the more effort an individual makes, the greater his/her income is expected to be.

Time not only is used as an accounting unit for full income computations but also is treated as a variable that explains income. An individual's income is defined in this study as the summation of the value of the different time classifications of an individual, i.e., market-production time, home-production time, and leisure. Full household income is nothing other than the total incomes of the various individual members plus non-labour income of the family.

The source of data used in this study is a multi-purpose survey conducted in Laguna, Philippines, employing both a recall-record and an intensive direct-observation method.

Least-squares theory regression analysis revealed that market time, home time, market wage rate, age and education of an individual are the variables that best explain his/her income. With respect to full household income, the important determinants were market wage rate, total expenditure, market time, age, net assets, education, family size and

home time, in that order.

The different behaviours of individuals, as reflected in their time use, are found to be influenced by their different attributes; that is, their ages, education/training, as well as market wage rates. Canonical correlation analysis was employed to find the inter-relationship between two sets of variables.

It is concluded that the longer time an individual devotes for productive activities, the higher his/her income is. The time a person devotes for different activities is dictated by his/her needs, training, and other personal attributes. This is taken to mean that one's efforts determine to a very large degree his/her position in society, income-wise.

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CHAPTER 1

INTRODUCTION

1.1 The Study

1.1.1 Relevance of the Study

The often neglected fact that agriculture may not necessarily be the only predominant activity in agrarian societies contributes in a way not only to the low family income but also the widening gap of income distribution within a given developing country. Even in an overwhelmingly rural country like the Philippines, where three quarters of the population lives in the rural area, a significant percentage of labour time is devoted to non-agricultural activities to satisfy a variety of needs such as clothing, shelter, entertainment and so forth.

A study undertaken by the World Bank in 1974 revealed that the incomes of families in the lowest 40 percentile in the Philippines were increasing very slowly - by less than one per cent a year in real terms. However, in the same study, an analysis of changes in the distribution of family expenditures suggested that the consumption of these same 40 per cent increased by more than two per cent a year in real terms (World Bank Report, 1974). This discrepancy between the two trends lends evidence to either or both of the following possible causes: (1) that incomes are frequently understated, and/or (2) the measurement of income is largely questionable.

Income data is expectedly deficient in the rural areas because of the traditional tendency to consider the non-agricultural activities as menial. In addition, most rural folks tend to understate the income

information not necessarily to avoid taxes but in the hope that a reported low income might warrant increased farm subsidies.

On the other hand, the errors in measurement are attributed to the complexity of the data to be collected. It is a difficult task to obtain reliable information relating to the volume and prices of the produce. Besides, analytical resources for converting defective raw materials into acceptably accurate and consistent estimates are scarce.

On top of these are the problems brought about by the demographic aspects of income and its distribution. A household is usually the unit used in income data. However, households differ substantially in size. That is, they differ by the number of members, and in the ages of members.¹ As such, the contributions of these members to the total household income vary. Also, incomes differ depending on the phase of lifetime span the household finds itself in.

The general feeling that there is a need to reexamine at the micro-level the reasons for the low family incomes and unequal distribution of incomes of the rural sector has been provoked by the issues discussed above. Thus, an attempt will be made in this study to measure the incomes of some farmers in Laguna with the main objective of finding their incomes' relationship to their time usage. In other words, the primary aim in doing this is to investigate the role that time usage plays in the attainment of higher incomes. Likewise, to the extent that income level could dictate the time usage of the household, the causal effect of income on time usage is also investigated. Undertaking such

1 This is primarily discussed in Simon Kuznets exploratory essay. Kuznets, Simon, 1975. 'Demographic Aspects of the Size Distribution of Income', Economic Development and Cultural Change, vol. 24, pp.1-2.

a study which allows for the inter-dependence between income level and time usage is made possible through the modern theory of the New Household Economics.

The New Household Economics has provided an avenue to better estimation and valuation of the incomes of households by its explicit recognition of time not only as a traditional economic constraint but also as an economic resource. It can be utilized in producing goods, i.e., by working either in the market or at home, or it can be consumed outright, i.e., as leisure. Time is mainly broken down into three main components. These are, namely: (i) market production time, (ii) home production time, and (iii) leisure.

In the past, income has mainly been associated with market production time, particularly wages from a day's labour or service, interest from capital ventures, and rent from other assets. The significance of home production has been relatively neglected, especially when the home product was not offered for sale in the market place and instead was directly consumed.

In this study, the modern theory of the New Household Economics necessitates a shift from the traditional view of income to the very useful new idea of full income. Full income is taken to be the value of time offered in the market, in home production, and in some formulations of leisure time of all the household members, plus the value of services from non-labour assets such as land, capital and durable household goods.

The full income of the household is regarded to be constrained by a time constraint, a goods constraint, and a production constraint. The time constraint determines how the household allocates its available time resources to market production, home production and leisure; while

the goods constraint is connected with how market goods are distributed. The production constraint indicates the technical information about the combination of the two other inputs, time and market goods. This study, however, shall be limited only to full income as constrained by time as no particular abstract goods, i.e., Z goods, are being dealt with.¹

This point shall be discussed further later when reviewing the basic theoretical model and concepts of this study.

1.1.2 The Study Objectives

The objectives of this study are numerous. The following objectives will be attempted:

- (a) to gain insights as to:
 - (i) the general characteristics of the households including their consumption and expenditure patterns,
 - (ii) the different time patterns of the households, and
 - (iii) the full income of the members, as derived through an alternative measurement process;
- (b) to identify the variables that best explain the households' time patterns; and
- (c) to look for possible and plausible explanations to the alternatively measured full income of the households.

This study is highly exploratory, especially with respect to objective (b) and, to an even greater degree, objective (c) mentioned above. This is true not only in regard to the variables used but also the econometric models postulated. This is further qualified in pertinent chapters herein.

To the extent that the full family income and time patterns

¹ In the modern theory of the New Household Economics, goods and services do not enter directly into a utility function. They are only inputs to the production of basic abstract goods with time inputs. These abstract goods are termed Z goods.

are interdependent, this study is a starting point to show the inter-relationship of income and time. Finally, it is hoped that the present study will add to empirical body of information relating to the theory of the New Household Economics. Although several empirical studies have been undertaken earlier, focus has been given mainly to issues on labour participation of women, demand for children, health and nutrition. Not much has been written on time allocation, and, so far, only one on its interrelationship with income.¹

1.1.3 The Scope of Study

This study consists of five chapters. Included in this introductory chapter is the theoretical background relating to the theory of the New Household Economics and the review of literature. Chapter 2 discusses the data and methodology employed in this study. An empirical analysis of time allocation and income will be undertaken in Chapter 3. This will mainly provide the answer to the first aim of the study; i.e., an objective presentation of the household characteristics, as well as the time and income patterns of the household. Results of the statistical analysis employed will be discussed more thoroughly in Chapter 4. It is here, therefore, that objectives ii and iii will be answered. Finally, the last chapter contains the summary, conclusions, and policy implications of the study.

1.2 The Theoretical Framework

1.2.1 Basic Concepts and Issues

The works of Reid (1934), Lancaster (1966) and Mincer (1962, 1963) and Becker's article (1965) have provided a unified framework for

1 A Professor of Marketing and Director, Bureau of Economic Research in Dacca University, Bangladesh, wrote an article on the use of time of individuals whereby he tried to find out how time usage relates to incomes. Farouk, A. 1976. Use of Time by Individuals - A Survey in Bangladesh, unpublished report.

the New Household Economics Theory. Becker came out with a revised theory of choice wherein goods and services do not directly provide utility. They are only inputs, together with time of the households, into the production of basic commodities, termed as Z goods, which are the real arguments in the household utility function.

Z goods are abstract goods composed of a number of attributes which are themselves produced within the household. A Z good can best be illustrated in Becker's following words:

" One such commodity is the seeing of a play, which depends on the inputs of actors, script, theatre and the playgoer's time; another is sleeping, which depends on the input of a bed, house (pills?) and time."¹

In mathematical notational form, the utility function is expressed as:

$$U = u(Z_i), \quad i = 1, 2, \dots, n \quad \dots(1.2.1)$$

where each of the Z_i 's is assumed to be produced by a production function; that is,

$$Z_i = f(x_i, t_{ij}, K, E) \quad \dots(1.2.2)$$

where

x_i - stands for the market-purchasable goods used in

Z_i production

t_{ij} - times spent by the j^{th} member for the i^{th} good

K - stands for household capital

E - stands for other environmental factors

The New Household Economics Theory is based on four elements.

The first involves a utility function with arguments which are not physical commodities but 'abstract' goods themselves produced within the

1 Becker, Gary S. 1965. 'A Theory of the Allocation of Time', Economic Journal, vol. 75, p.495.

household. The second involves a production function or functions and resources utilized in the processes. The third is the assumption that an external labour market environment provides the means for transforming household resources into market commodities. Finally, the fourth element in the theory relates to the resource constraints faced by the household in optimizing their production.¹

Although it is not easy to assess the simultaneous ramifications on the household behaviour if the four main elements of the New Household Economic Theory are taken together, the theory becomes questionable if each element is considered on its own without taking into consideration the interdependence among the four elements. For instance, the first element leads directly to the question of what determines the choices being maximised, and by whom. In other words, one is led directly to the question of technology and the composition of different types of market goods and services. The characteristic 'one-utility function' in contrast to a 'family utility' function necessitates accepting the phenomenon of altruism and love to exist within the household. The one-utility function is taken to mean that individuals do have their own independent utilities; however, the 'household management adopts certain distributional rules and procedures enabling it to act as one'.² Thus, the indifference curves of any one member are contaminated by that of the other, and everyone 'acts as if they have maximized a group preference function'.

The second element recognizes independent production processes

1 Nerlove, Marc 1974. 'Household and Economy: Toward a New Theory of Population and Economic Growth', Journal of Political Economy, vol. 82, no. 2,

2 Banskota, K. and Evenson, R. 1977. Home Production and the Economic Behaviour of Householder: Some Theoretical and Empirical Issues, unpublished report.

for each abstract good because of the varying market-purchasable commodities and time inputs used. Jointness of production, however, arises mainly because the inputs available to each household are subject to over-all constraints, and not necessarily to common overhead factors within the household (Nerlove 1974). The constraints have been mentioned earlier under the Relevance portion of this study.

The full income of a household consists of the summation of the various $\$$ goods it produces multiplied by the 'shadow' prices of these $\$$ goods. By shadow price is meant the cost involved in the actual production of the i^{th} $\$$ good. The full income of the household should be equal, as well, to the non-labour income of the household, plus a summation of the various time classifications of the different members multiplied by the appropriate wage rates. Thus, in notational form, we have

$$FY = \sum_{i=1}^n \Pi_i \$i = NY + \sum_{i=1}^n T_{ij} W_j, \quad \dots (1.2.3)$$

where

FY = full income of the household

Π_i = shadow price of the i^{th} good

$\$i$ = the i^{th} good

NY = Non-labour income of the household

T_{ij} = time for the production of the i^{th} good by the j^{th} member, and

W_j = the wage rate of the j^{th} member

The shadow price, being the combination of prices of market goods and the prices of time given in 1.2.3, is denoted in notational terms as:

$$\Pi_i = P_i X_i + \sum_{j=1}^n t_{ij} w_j \quad \dots (1.2.4)$$

where

P_i - is the price of the i^{th} commodity

X_i - is the quantity of the i^{th} commodity,

and t_{ij} and w_j are as mentioned above.

It could be noted from the above equation that the household can control the actual quantity of the market-purchasable goods as well as the time input in the ~~z~~ good production process. However, it can have no command at all on the prices of the market goods and in the wage rates.

1.2.2 The Time Allocation Model¹

The treatment of time as an economic resource in the New Household Economics Theory has provided a breakthrough in the analysis of human behaviour. Earlier, it has been mentioned that time is mainly classified into three components, i.e., market-production time, home-productive time and leisure. In this instance, leisure is simply the time not directly classified under the first two components, and is mainly the residual after the first two components have been subtracted from a total of 24 hours.

Time models in the past, have generally been denoted as follows:

$$t_{cj} = f(NY, W_m, E) \quad \dots (1.2.5)$$

where

t_{cj} - stands for time with c classification of
 j^{th} member

1 For more detailed illustrations, see Gronau's article on the theory. Gronau, Reuben 1976. 'Leisure Home Production and Work - The Theory of the Allocation of Time Revisited.'

NY - denotes non-labour income

W_m - market wages: i.e., the price of time

for market productive purposes, and

E - stands for all other factors including

education, age, family size, etc.

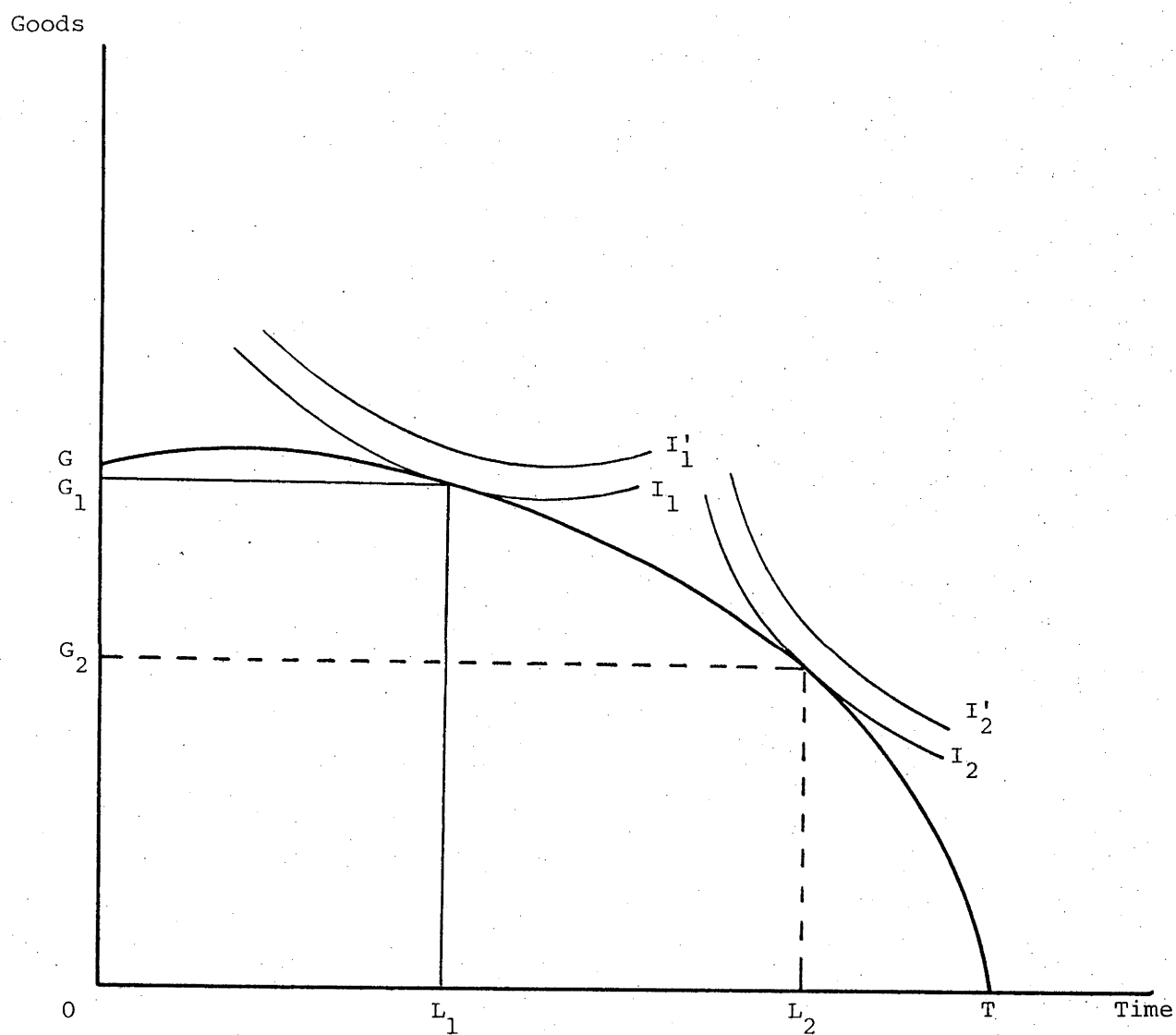
The effect of the general factors on the individual's allocation of time will become clearer by the illustrations set out in the succeeding figures.

Assume a single person household with a GT production possibility curve and a two-goods choice, i.e., leisure and home produced goods (Figure 1.1). Note that the production possibility curve is assumed non-linear because of two important factors: (i) different returns to scale, and (ii) the existence of factors of production that are specialized in the production of one commodity.¹ A person apportions his time depending on his personal choice as to the quantities he wants. This is reflected in his indifference curve. The individual's optimal combination of goods and time is determined by the point of tangency of the indifference curve and the production possibility curve. Thus, his/her optimal combination if his indifference curve is I_2 will be OG_2 of household goods and OL_2 amount of leisure. Likewise, should his/her indifference curve be I_1 , then the optimal combination will be OG_1 amount of home produced goods and only OL_1 of leisure. The less time for leisure, the more units of home produced goods can be made available, and vice-versa.

1 Heller, Robert H. 1973. International Trade-theory and Empirical Evidence, Prentice-Hall, Inc., New Jersey, p.43.

FIGURE 1.1

TIME ALLOCATION ASSUMING A TWO-GOODS CHOICE

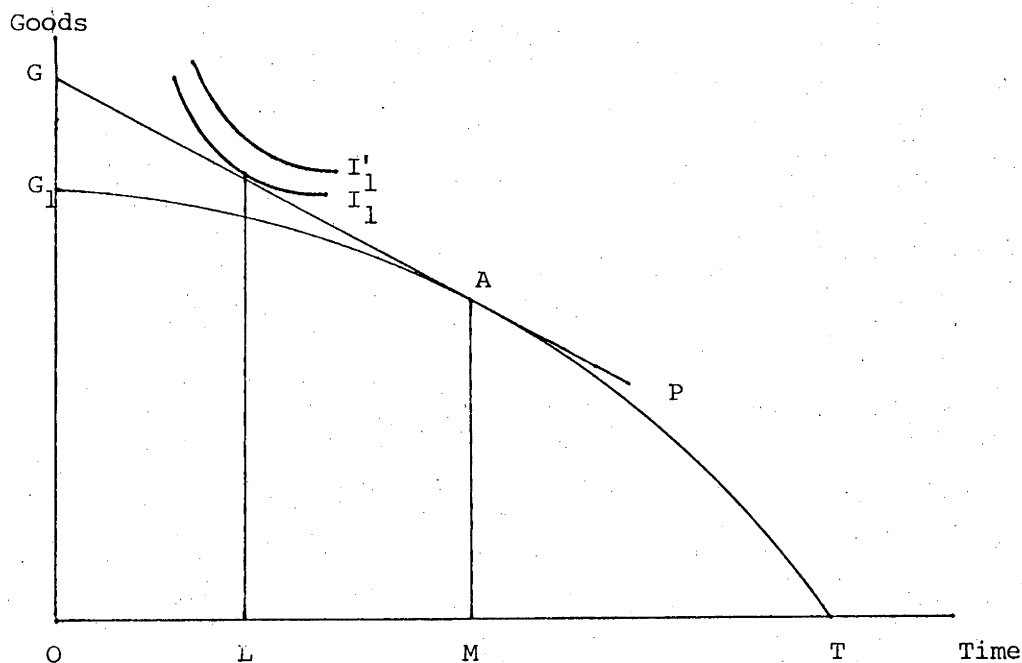


Note: GT - production possibility curve
 I_1, I_2 - are indifference curves

In Figure 1.2 a market-production time is introduced, through the inclusion of a wage rate line GP. The existence of a market where the person can sell his/her working time and buy goods will effect a change in his/her time allocation. The point of tangency of the curve G_1T and GP, i.e., point A, is the optimal time for home production. Consequently, an individual has an indifference curve showing his choice as to the quantities of leisure and market production times. This is denoted by I_1 . Thus reading off from the figures it could be seen that the time spent for leisure will be OL, time for market-production will be LM, and time for home production will be MT. It is clear that the time allocation of an individual is a matter of need as well as choice.

FIGURE 1.2

TIME ALLOCATION ASSUMING A WAGE RATE LINE



Note: GP - is price line

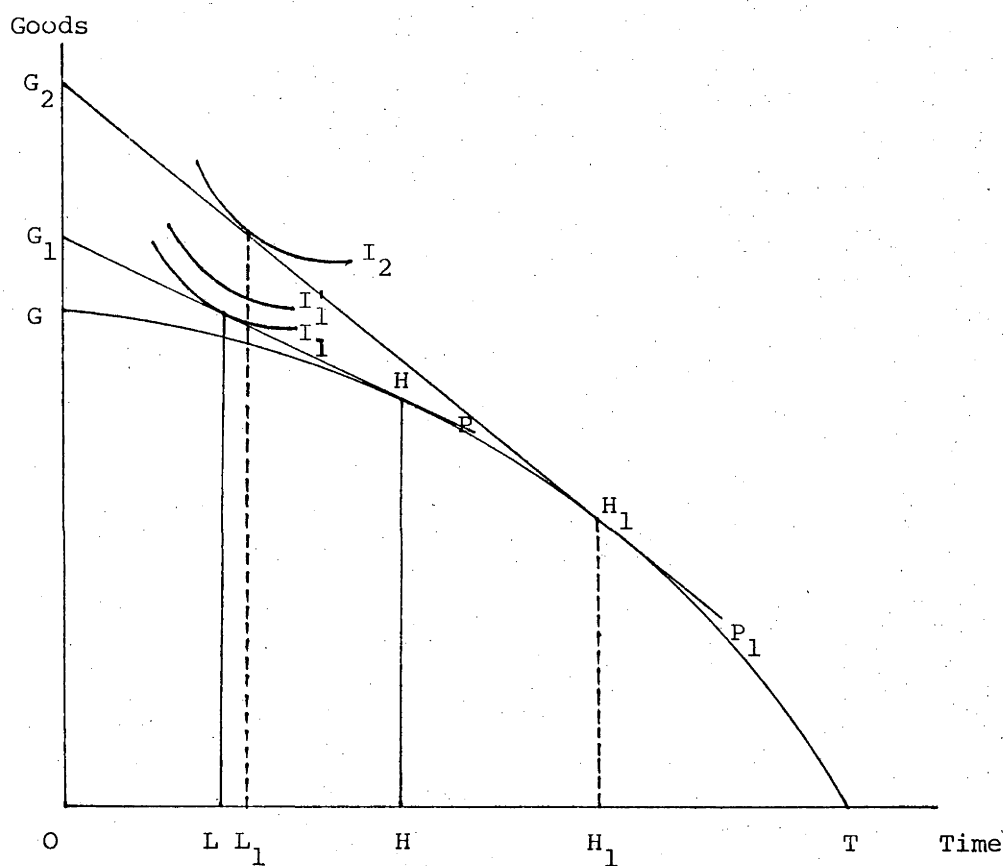
G_1T - is the production possibility curve

I_1, I'_1 - are indifference curves

The three figures that follow mainly demonstrate the effects on time allocation of an increase in real wage rates, an increase in non-labour income, and a change in productivity.

FIGURE 1.3

THE EFFECT OF INCREASE IN REAL WAGE RATES ON TIME ALLOCATION



Note: G_1P - old price line

G_2P_1 - price line after the increase in real wage rates

GT - production possibility curve

I_1, I'_1, I_2 - are indifference curves

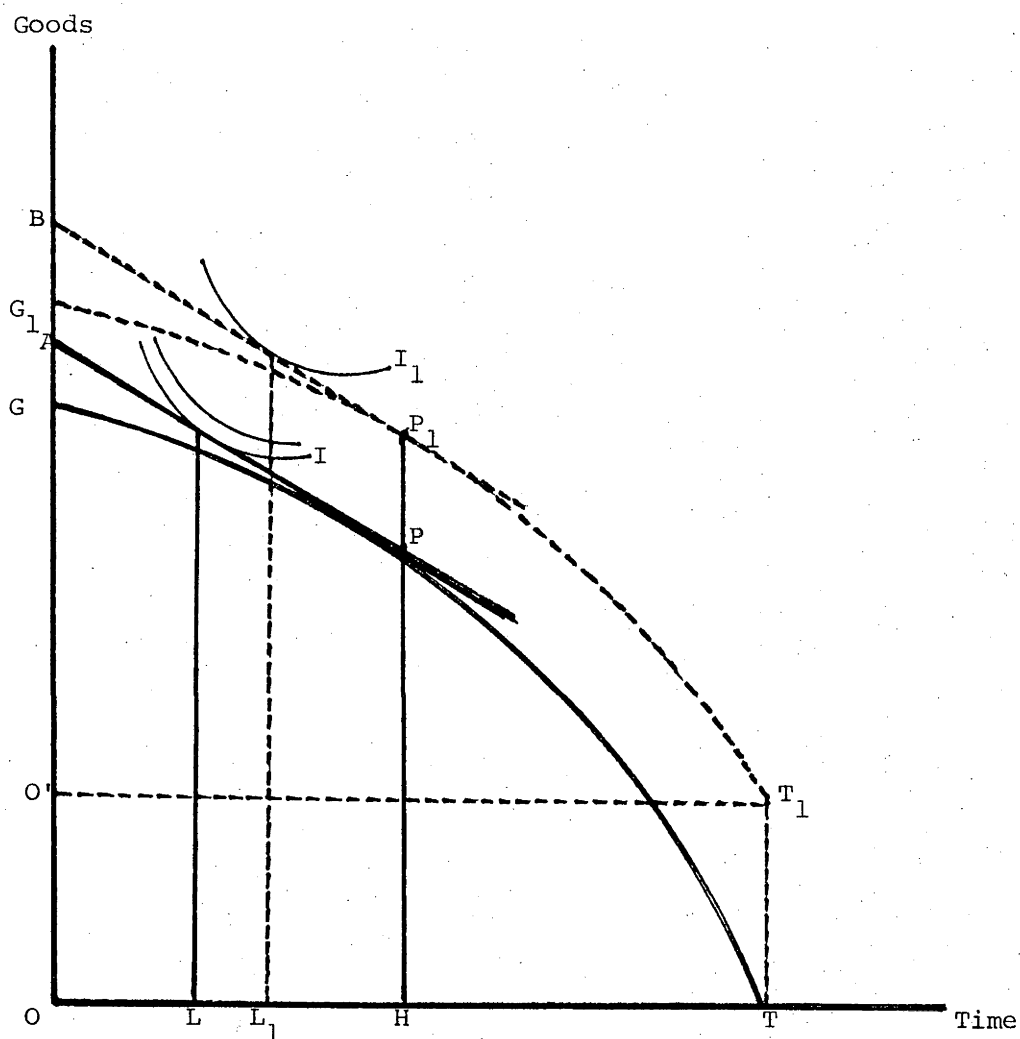
In Figure 1.3, an increase in the real wage rate is denoted by a different price line G_2P_1 . Assuming the person works in the market, a change in the wages affects both the rate of substitution between leisure and goods and the profitability of home production. The increase in wages decreases the price of goods in terms of time, hence making home production relatively less profitable. This encourages the substitution of goods for leisure. In turn, this tends to cut work at home from HT to H_1T . The effect on leisure is indeterminate. On the one hand, substitution effect tends to lower leisure, while the possible expansion effect tends to raise it on the other hand. The work in the market is dependent upon the reduction of work at home and the change in leisure time. If the magnitude of the reduction in work at home is greater than the increase in leisure (as is time in this particular graph), then the supply of work to the market increases. Note the effective increase from LH to L_1H_1 .

If, however, the person is not working in the first place, the increase in real wages may either lure him/her into the market, or may simply leave him/her unaffected.

The effect of non-labour income increase on time allocation is illustrated in Figure 1.4. The initial effect of an increase in non-labour income is to shift the production possibility curve from GT to G_1T_1 . Since the price line is assumed to be the same, there will be no change in home production time HT . The only change in time allocation will be an increase in leisure from OL to OL_1 , and hence, a decrease in market-production time from LH to L_1H .

FIGURE 1.4

THE EFFECT OF NON-LABOUR INCOME INCREASE TO TIME
ALLOCATION



Note: GT - production possibility curve

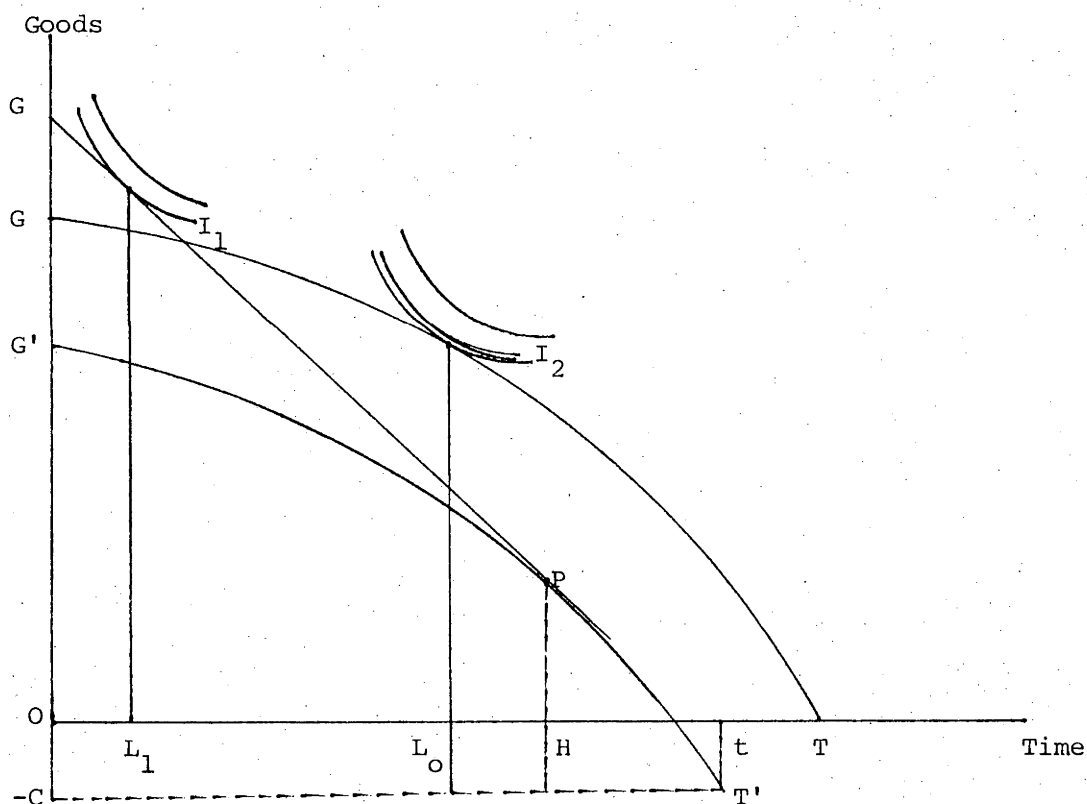
G_1T_1 - shift in production possibility curve due to increase in non-labour income

$AP = BP_1$ - equal price level (same slope)

I and I_1 - are indifference curves

In the earlier time models, i.e., $t_{cj} = f(NY_1^W E)$ in equation 1.2.5 above, E denoted other factors such as age, education and so forth. If this factor can be broadly termed as productivity, in the sense that they affect in one way or another the household's productivity, then its effect on time allocation can also be illustrated graphically. Figure 1.5 attempts this.

FIGURE 1.5
THE EFFECT OF PRODUCTIVITY CHANGE ON TIME
ALLOCATION



Note: OGT - production frontier

OG'T' - production frontier after a change in productivity

GP - price line

I_1, I_2 - indifference curves

The effect of a change in productivity would depend on the exact nature of the change. An increase in home productivity normally brings about increases in real income and leisure. However, the market and home work is influenced by the individual's decision of whether to stay out of the market or the home. Should the individual prefer to stay out of the market in favour of the home, he/she can choose any point on the production possibility curve GT. Should he/she decide to join the market labour force, his/her opportunity locus is changed to T'PG. This change is due to the costs involved in market work, both in money and time terms, e.g., transport costs in, and time allowed for, going to and coming from work, shown in the graph as O-C and Tt, respectively. The resultant modification of the budget and time constraints therefore changed the opportunity frontier from OGT to -CTPG. The higher the market-production participation rate is, the lower the leisure and home-production time will be. In the preceding figure, note the decrease from OL_0 to OL_1 and HT to HT' due to market participation. Nevertheless, note the higher level of goods that could possibly be obtained from such an action.

The effect on time allocation of a two-person household with both members inter-acting leads one to go into the process of specialization. The interactive effects are not easy to illustrate but will be discussed in greater detail later in this study.

1.3 Review of Literature

Prior to Becker's work in 1965 on time allocation, time had never been given a systematic treatment. He claimed that the allocation and efficiency of non-working time may be more important to economic welfare than that of working time. It was Gronau who divided the total time of a household into its three major components.

Although conclusions have been drawn on the importance of introducing time as an economic resource, especially in the case of

studies relating to the demand for children, labour force participation, and the like, very little has really been written on the process of time allocation itself and its mechanism.

Among a compiled study on the New Household Economics theory,¹ is an article on 'The Determinants of Time of the Laguna Households' by Elizabeth Quizon. Here, she attempted to describe the decision-making process within the household by identifying the determinants of the allocation of time among family members, particularly that of the husband and the wife. The results would have been very meaningful but for the fact that the time allocation of the other members, i.e., children, were not included. In the Philippines, where the number of children per family averages six or thereabouts, their activities and contributions to the household income should not be overlooked. Therefore, this study intends to supplement the above one by explicitly taking these factors into consideration. The results of this study will be compared with those arrived at by Quizon.

So far as the author is aware, there has been only one study which actually investigated not only the time usage patterns of households but also examined how these time usage patterns are related to the full incomes of these householders.² Farouk, A. of Dacca University, Bangladesh, actually launched a survey to study the use of time of individuals. He had defined the different uses of time, treating time use mainly as an accounting unit. The same definition is adopted in this study for the same reason; i.e., recognition of the problem that non-market output, such as expenditure saving work, is rarely reflected

1 Evenson, R.E. an ADC fellow, has compiled and edited articles on the New Household Economics, but these are unpublished to date.

2 Farouk, A. op cit.

in income figures. Again, it was the time of the husband and the wife that was mainly investigated. It is very interesting to note, however, that the above study found that in Bangladesh the income of a family has no relationship to the hours of productive work of the head of the family. Income, as revealed by the statistical results, is more influenced by capital ownership rather than the amount of work done. Productive work, according to Farouk, increased income only in areas where modernized agriculture has been introduced and practiced.

Professor Gronau has actually measured the wife's contribution to full income.¹ This article emphasizes the value of a housewife's time, and, more importantly, recognizes the fact that the great contribution of household wives to economic activity is most often unaccounted for. Women's economic contributions are not, generally speaking, taken into consideration in national income accounts. Therefore, Gronau's paper represents a breakthrough and departure from the traditional national income accounts approach where the value of home productive time is ignored.

Michael Lopez of the University of Dakar, Senegal, investigated the determinants of income and its distribution in four villages in India.² The study is interesting in that it tried to investigate the relationship between income and a number of variables such as land, education, labour, and animals. It is significant because it implied the following recommendation; that is, a 'model to predict how households decide to allocate the time of their available family between gainful

1 Gronau, Reuben 1976. 'Who is the Family's Main Breadwinner? - the wife's Contribution to Full Income', National Bureau of Economic Research Inc. Working Paper No 148.

2 Lopez, Michael, The Determinants of Income and its Distribution in Four Villages in India, Ph.D thesis, University of Michigan.

employment and ungainful household work or leisure, in light of their alternative earnings', should be developed. Development of such a model will be attempted, among other things, in this study.

CHAPTER 2

METHODOLOGY

This chapter consists of four sections. Section 1 deals with the data. Section 2 contains the models proposed while Section 3 defines the variables used in the models. Section 4 is a brief summary of statistical techniques.

2.1 The Data

2.1.1 Method of Data Collection

Laguna, a province south of Manila in the island of Luzon, has been subjected to a considerable amount of empirical rural development studies ever since 1961. In that year, the "Laguna Development Programme", as a research project in extension, was implemented by the University of the Philippines College of Agriculture. In 1963, a Farm and Home Development Office (FHDO) was set up in the University of the Philippines, College of Agriculture at Los Baños. This office started gathering household data covering numerous aspects such as income, assets, consumption, expenditure, and so forth, of families. In 1968, the same survey was repeated to check for any structural changes. A further study was also undertaken in 1973 for the same purpose.

In 1975, a multi-purpose survey of 573 households distributed over some 34 Laguna barrios was carried out. This particular project was divided into two phases. The first phase was conducted from April to September 1975, primarily employing a recall-record method of survey to obtain information relating to, among other things, health, nutrition level and time budgets of individuals. During the second phase, which

took place between September 1975 and March 1976, ninety-nine of the 573 households interviewed earlier were subjected to an "intensive" survey on time, nutrition, and health data. By "intensive" survey is meant actual observation and recording of the activities of individual respondents. Each interviewer was allowed to stay with the household members for two days. The recall-record method was still employed, however, to gather information relating to the demographic profile as well as the activities of members performed outside the home.

The intensive method data is claimed to be more accurate, especially where time budgets are concerned. It is definitely an improvement over the recall method in view of the possible susceptibility due to (1) memory lapses or lack of time consciousness of the respondent, and (2) failure to measure joint production and time spent for many finer activity classifications. However, the intensive method turned out to be a very expensive technique.

Because of the suspected effect of the presence of an observer on the household activities, the data of the second day of visit was used as "the sequence of daily activities seemed normal then" (Quizon 1975).

2.1.2 The Data Component

The set of sample households employed in this study comes from two sets of data: (1) the Farm and Home Development Office (FHDO) - Households General Information (GI), and (2) the FHDO Individual GI. The first set of data contained household general information, especially those pertaining to housing/homelot, consumer durables, food consumption, farm capital, household income from sources other than wages, as well as sanitary practices. The second set provided all the data relating to each individual member of the household such as demographic profile, schooling, time allocation, morbidity, etc., and work-type engagement such as wage, rice, coconut, other crops labour, and/or business.

The set of Individual GI data were checked against the Households GI data to enable the picking up of common households from which all the necessary and relevant information for the purposes of this study could be obtained. In all, there was a considerable reduction of the surveyed households to only 58 in total for which the complete information is available. These were comprised of 370 individuals from 9 barrios of Laguna (See Figure 2.1). A more detailed description of the variables taken into consideration will be given in the empirical analysis portion of this study.

2.1.3 The Main Data Limitations

Despite the relatively large sample in the survey from which the data set has been derived, this study is limited by the relatively small size sample of only 58 households available for the particular topic being dealt with here. In addition to this limitation, the data does not provide breakdowns per seasons of the year, preventing the analysis of the impact of time budget seasonality. As a consequence, the intended comparison with the study of Elizabeth Quizon may not be feasible in all aspects; where such a comparison could be made, the results may be rather questionable. It may be worthwhile pointing out, furthermore, that the year-round time figure conversions made herein could only be assumed as close approximations of what should have been, given incomplete information on the part of some children's time allocation.

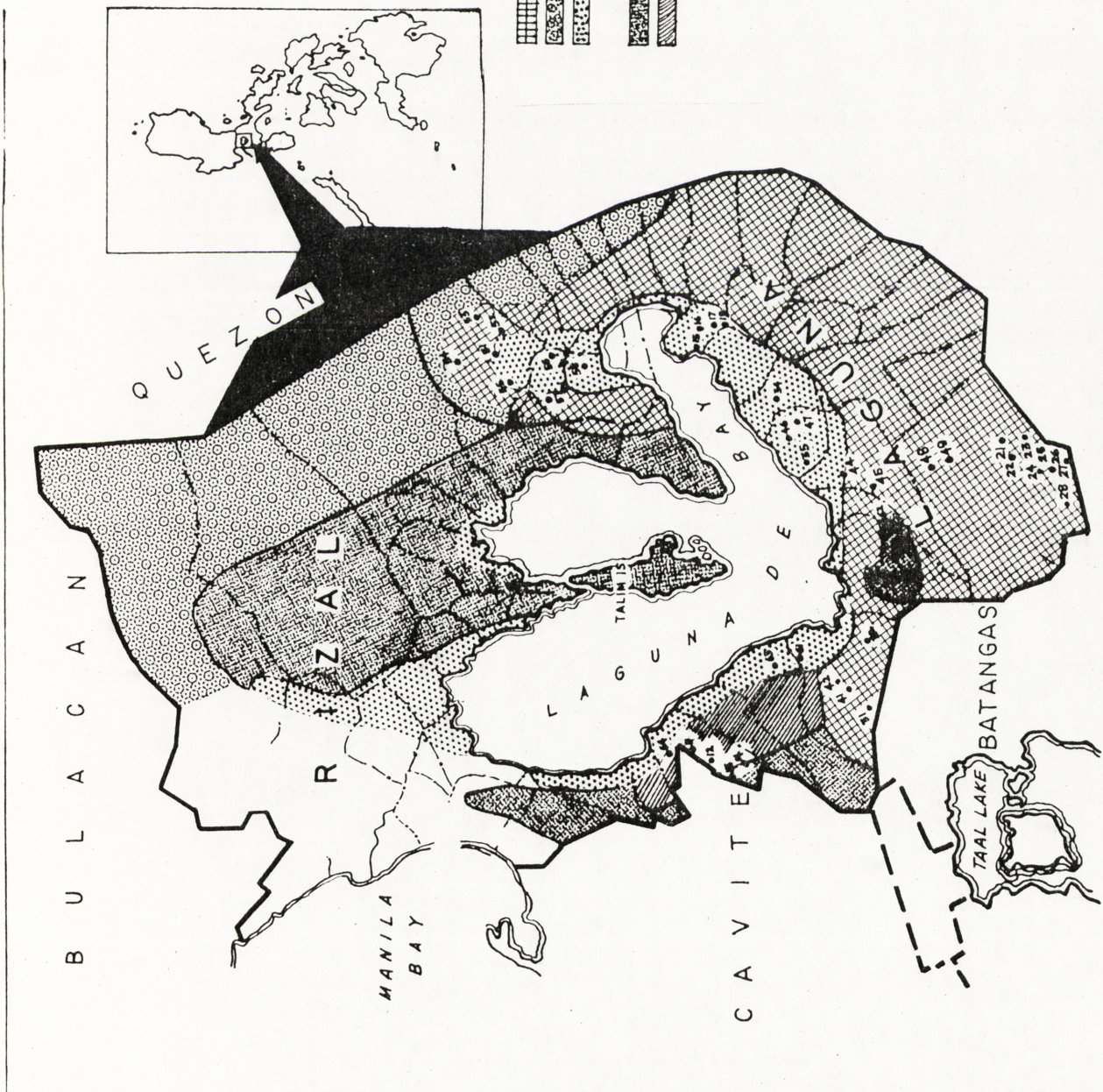
Other income and actual wage rates provided in the data which the respondent may have only approximated himself were unquestionably considered. This was deemed useful as the respondent farmer is recognized as the better judge of what he may be due compared to a different person. In some instances, however, particularly for home-production chores, a wage rate valuation level on legislated domestic pay had to be provided to complete the full income computations.

Figure 2.1 Location of the Project Barrios Used in the Study.

- 18 - Buboy
- 28 - San Isidro II
- 45 - Mabacan
- 47 - Banca-Banca
- 48 - San Lorenzo
- 51 - Coralan
- 52 - Talangka
- 55 - Cambuja
- 56 - San Isidro

- Coconut
- Forest (commercial)
- Rice land & other intensive agricultural uses.
- Some mixed crops
- Sugar Cane

Note: All of the sample barrios (villages) principally use their land to grow coconut and lowland rice.



More limitations include the unavailability of actual input and output data which should have enabled a production-based full income computation. These would have provided a significant comparison to the alternative full income measurement adopted in this study. Other limitations shall be pointed out consequently.

2.2 The Models Used in the Study

To investigate the possible interrelationship between time and full income of the Laguna households, two general models are proposed. These are, namely; (1) time allocation model, and (2) full income model.

2.2.1 The Proposed Time Allocation Model

To recall, the time allocation model¹ is:

$$T_{cj} = f(W_{mj}, NY, E), \quad \dots (2.2.1)$$

where

T_{cj} - stands for the time with C classification
of the j^{th} member

W_{mj} - stands for market-wage of j^{th} member

E - environmental factors such as Education,
Age, etc.

The variable T_{cj} is the sum of three components, namely: (1) T_{mj} (time devoted to market production by the j^{th} member), (2) T_{hj} (the j^{th} member's time allotted to home production), and (3) T_{lj} (leisure time of the member concerned). Each of these three components of T_{cj} can be

1 This has been mentioned earlier in Chapter 1.

considered to be a function of several variables as indicated below in Models 2.2.1 (a) to 2.2.1 (c).

$$T_{mj} = f (W_{mj}, NY, K, Ed_m, Age_j, FS, OC_j) \quad \dots(2.2.1(a))$$

$$T_{hj} = f (W_{mj}, NY, K, Ed_m, Age_j, FS, OC_j) \quad \dots(2.2.1(b))$$

$$T_{lj} = f (W_{mj}, NY, K, Ed_j, Age_j, FS, OC_j) \quad \dots(2.2.1(c))$$

where

W_{mj} - stands for wage of j for market production

NY - non-labour income

K - net capital assets

Ed_j - Education of the j^{th} member

Age_j - Age of the j^{th} member

FS - family size

OC_j - Opportunity cost of the j^{th} member

The parameters of the three "jointly determined" models 2.2.1(a) to 2.2.1(c) had been statistically estimated through the application of ordinary least squares methods by Elizabeth Quizon in her earlier study on time allocation. The results have been in consonance with theory. Because the broad objectives of this study include not only supplementing E. Quizon's study but also exploring other explanations to time patterns, the 3 models above are looked upon to be stochastically dependent equations.

This different viewpoint renders the use of single-equation least squares method as doubtfully appropriate. Even if high values of multiple correlation coefficients are obtained, these coefficients cannot necessarily be indications that Ordinary Least Squares Method is satisfactory and

adequate for the model.¹

Likewise, the treatment of models 2.2.1(a) to 2.2.1(c) as a multi-equational model and attempting simultaneous estimation of the parameters cannot be undertaken. This is because the model is not closed and as such could not show the clearly evident interdependence among the model's three endogenous variables, viz., T_{mj} , T_{hj} , T_{lj} . In other words, variables T_{hj} and T_{lj} should be included among the exogenous variables in relationship 2.2.1(a), variables T_{mj} and T_{lj} in equation 2.2.1(b), and variables T_{mj} and T_{hj} in relationship 2.2.1(c). If this is undertaken, relationships 2.2.1(a) to 2.2.1(c) will be "under-identified" according to the order condition. That is, total number of variables in the model less the number of variables in the equation considered equals one fewer than the number of endogenous variables in the model. Mathematically, that is

$$10-10 < 3-1$$

in the case of equations 2.2.1(a), 2.2.1(b), and 2.2.1(c).

However, if interest is mainly centered on model 2.2.1(a) to 2.2.1(c), and one is concerned with the analysis of "dependence", i.e., how a certain specified group of so-called dependent variates depends on the others, then canonical correlation analysis would be appropriate. This technique which is part of multi-variate analysis will be applied to models 2.2.1(a) to 2.2.1(c) and shall be discussed in the fourth section of this chapter.

1 Fisk, P.R. 1967. 'Stochastically Dependent Equations: An Introductory Text for Econometricians', p.108.

2.2.2 The Proposed Full Income Model

Following the theoretical constructs of the New Household Economics, full income is recognized to be the summation of the products of all abstract goods and their respective shadow prices. This is also equal to the sum of non-labour income and the summation of the products of the different time classifications and corresponding wage rates of the household members for the different abstract goods. The notational form had been shown in Section 1.2 earlier in this study.

To be able to come up with suitable variables to explain full income, abstract goods, together with their shadow prices, consumed by the households need to be identified first. This could not be attempted in this study due to the magnitude and complexity of such a task given the limitations of the data and the time available for the study.

By way of compromise, attention is focused on two sets of possible or plausible variables to check for any meaningful results. They are, namely: (1) "income-component variables" - which include time allocation and wage rates of the households, as well as non-labour income, and (2) "household attribute variables" - which include the demographic characteristics of households (e.g. average age, size, education), consumption, expenditure, assets, etc. Note that full income is arrived at following the equation $FY = NY + \sum_{i=1}^n t_{ij} W_j$ mentioned in the first chapter. Estimating the relative "contribution" of the component variables to the full income derived would prove meaningless because of obvious totalogy effects, thus the inclusion of the second set.

It is emphasized that the full income segment of this study is highly exploratory, and the rationalizations to the inclusion of variables

will be further dealt with in the fourth chapter of this study. Thus, it may be sufficient to say at this point that the proposed model outlined below is basically a working base for the full income study:

$$FY = f (W_m, NY, K, Ed, Age, FS, OC, Cons, TE, t_m, t_h) \quad \dots (2.2.2)$$

where

FY - family income

Cons - consumption of the family

TE - total expenditure

W_m, Ed, Age, OC - stand for indices of market wage, education, age and opportunity cost of the family members respectively

t_m, t_h - summation of time for market production and home production of the family members

NY, K, FS - are as mentioned under the time allocation models

A description of the variables used in both models follow.

2.3 Definition of Variables

2.3.1 Time Variables

The time for market-production, home-production, and leisure are expressed in total hours per year, assuming a 52-week or 365-day year.

Market-production time per member is the sum of hours spent for rice labour, coconut labour, other crops labour, livestock labour,

business labour, and/or outside-employed wage labour.

Home-production time consists of the total hours spent for child-care time, food preparation time, handicraft-making time, home gardening time, and other chores time.

For children, schooltime is the product of the average time for attendance and the number of times of attendance per year.

Leisure time is the residual from 8,760 hours of the first two time variables mentioned.

2.3.2 Wage Variable

The market wage variable is a computed average wage for each member. Specifically, it is the summation of the various market-productive labour classification hours multiplied by their respective replacement costs divided by the total labour hours per year. This variable serves as a regressor in all the models.

2.3.3 Income Variables

For the purpose of arriving at an estimate of the full-income variable, both a home-productive and a market-productive income are computed.

A home-productive income for the year is calculated to be a product of the total home-productive hours and a home-wage rate per hour. In the Philippines, legislation has fixed that a household help should be paid no less than sixty pesos (P 60.00) a month for an eight-hour-a-day, six-day week, job. For this particular study, the home wage rate used is eighty pesos (P 80.00) per month, or approximately P 0.43 per hour. Although the family member has the advantage over that of an employed domestic helper, doing a particular home chore at any time he/she chooses, the wage rate is assumed to be higher by twenty pesos.

(P 20.00) due to the saving in the consumption requirements of an employed helper.

Market-productive income is the summation of the total hours spent for market labour activities multiplied by their respective costs. The different market-labour activities are rice labour, wage labour, coconut labour, other crops labour, livestock labour, and business labour.

Non-marketed income is the sum of the value of the home garden produce, income from fishing, livestock sales, and value of livestock consumed. Non-labour income (NY) includes rent income and donations from non-member non-children and/or non-member children.

Full income is the sum of home-productive income and market-productive income of each member plus the non-labour income of the household.

2.3.4 Capital Assets

Designated as K in the models, this variable consists of the net value of the various assets owned by the household such as house, land, durables, farming machinery, implements, and vehicle, if any.

2.3.5 Consumption

This variable is the total market value of the consumption of the family for the whole year. It consists of the value of rice, fish, meat, vegetables, and so forth. Consumption is deemed to be a determinant of the full income of the household.

2.3.6 Total Expenditure

Expenditure is calculated to be the sum of the various depreciation expenses per year of all the assets, maintenance expenses such as repairs, and other miscellaneous expenses for clothing, ceremonies,

and so forth. Most assets have been assigned a 15-year life. Instead of straightforwardly taking the depreciation expenses per year for houses and lots, the rental expense data given by the respondent has been used in the expenditure computation. In the absence of such data, the house and lot expense was taken to be a quotient of their values divided by 15 years.

2.3.7 Family Size

This variable is the number of family members. It is contended here that when the size is larger, the full income of the household is higher.

2.3.8 Opportunity Cost

One of the two discrete variables in this study, opportunity cost is represented by a one-zero scheme. A household member designated to have opportunity cost is assigned a 1 and if otherwise, a 0. A member who is past the age of eighteen, having a second year high school education or higher, and is working in the farm is deemed to have opportunity cost. On the other hand, one with the same qualifications but who is not working in the farm has no opportunity cost. If the member is eighteen years old or over but has educational qualifications less than second year high school and is not working in the farm has opportunity cost, while that working in the farm has none.

2.3.9 Age

This variable is used as a regressor in all models. It is included because it determines the level of market or home-participation of the members. It is expected that as a person gets older, the level of market participation increases, up to a point when his participation declines in old age.

2.3.10 Education

This is the second of the two dummy variables used in the study. The level of education determines the time allocation of a person, as well as his/her income-generating capacity. The different levels of education used in this study are mainly: no education, elementary education, secondary education, college education, post-graduate, and vocational graduate.

2.4 The Methods of Analysis Used in the Study

There are basically two statistical techniques employed in this study, namely, (1) multiple regression analysis, and (2) canonical correlation analysis. Multiple regression analysis is mainly used to describe the dependence of full income on some variables while canonical correlation analysis is used to account for the maximum amount of the relationship between the time variables and the explanatory variables.

2.4.1 Multiple Regression

Multiple regression technique applied to both single and multi-equational models is used in this study. It is a general statistical technique through which the relationship between a dependent variable and a set of independent variables is analyzed. It is a descriptive tool to summarize and decompose the linear dependence of one variable on others, and it is also an inferential tool to evaluate the relationship in the population from the examination of sample data.

The general form of the regression used in this study is:

$$\begin{aligned} F\hat{Y} = & \alpha + \beta_1 W_m + \beta_2 NY + \beta_3 K + \beta_4 Ed + \beta_5 Age \\ & + \beta_6 FS + \beta_7 OC + \beta_8 Cons + \beta_9 TE + \beta_{10} t_m + \beta_{11} t_h \end{aligned} \quad \dots (2.4.1(a))$$

where $F\hat{Y}$ represents the estimated value for F_y (full income), α is the

Fy intercept, and β_i 's are the regression coefficients. The $\alpha + \beta_i$ coefficients are selected in such a way that the sum of squared residuals,

$$\epsilon^2 = \sum (Fy - F\tilde{y})^2 = \sum (Fy - \alpha - \beta_1 W_m - \beta_2 NY - \dots - \beta_{11} t_h)^2 \quad \dots (2.4.1.2)$$

is minimized, this implies that any other values of α and β_i would lead to a larger ϵ^2 . Selection of the optimum α and β_i coefficients with the use of the least squares criterion means that the correlation between the actual Fy values and the $F\tilde{y}$ estimated values is maximized, while the correlation between the independent variables and the residual values $\epsilon = Fy - F\tilde{y}$ is reduced to zero.

The partial regression coefficient, say β_1 , in equation 2.4.1(a) above stands for the expected change in Fy with a change of one unit of wage rate (w_m) when the rest of the other independent variables are held constant. It can be viewed as a simple β for the regression of Fy on the residuals of w_m from which the effects of NY through t_h are taken out.

In multiple regression, a coefficient of multiple determination, more commonly referred to as R^2 , is used to measure the percentage of the variation in the dependent variable explained jointly by the independent variables. A high R^2 indicates a better fit than a low R^2 .

Multiple regression is not only applied to the study of the full income of the household but also to that of the various individual subjects of this study. This is necessary in recognition of the substantial differences among households due to size and age considerations of its components. Thus, in addition, a regression of individual incomes will have the form:

$$I\tilde{y} = a + b W_m + b_1 FS + b_2 Ed + B_3 Age + b_4 T_m + b_5 T_h \quad \dots (2.4.1(b))$$

2.4.2 Canonical Correlation

Canonical correlation analysis is a member of the closely interrelated family of multivariate linear statistical techniques. Just like most of the other techniques, it assumes that the variables are interval in level of measurement, and the relationship among the variables are linear. It is designed to account for as much variance in certain variables as possible. This method has been introduced by H. Hotelling.

The more usual and general application of canonical correlation analysis is that of seeking relationships between two sets of variables. The time allocation model presented in Section 2.2 of this chapter is analyzed with the use of this technique. Note that the various time variables are interrelated themselves, and this is the precise reason why the application of ordinary least squares method will not suffice to find out their association with the explanatory variables.¹ Canonical correlation identifies the "components" of one set of variables that are most highly linearly related to the "components" of the other set of variables.

In this study, the time variables are set to be a linear combination

$$M = u_1 T_{mf} + u_2 T_{hf} + u_3 T_{lf} + u_4 T_{mm} + u_5 T_{hm} + u_6 T_{lm} + u_7 T_{mc} + u_8 T_{hc} + u_9 T_{lc} \quad \dots (2.4.3(a))$$

where

$u_1, u_2, \dots, u_9$ - are coefficients of M

T_{mf}, T_{hf}, T_{lf} - are time for market production,
home production, and leisure,
of the father, respectively

1 For more information regarding the inconsistency of Ordinary Least Squares (OLS) versus Canonical Correlation, see: Vinod, H.D. 1968. 'Econometrics of Joint Production', Econometrica, Vol. 36, No. 2, pp.322-336.

T_{mm}, T_{hm}, T_{lm} - are time for market-production,
home-production, and leisure of
mother, respectively; and

T_{mc}, T_{hc}, T_{lc} - are time for market-production,
home-production, and leisure of
children, respectively

It could be noted that the first subscript denotes the time classification while the second denotes the member.

However, it could be noticed that T_{mf}, T_{hf}, T_{lf} are auto-correlated in the sense that knowledge of the first 2 time variables for the father suggests the value of the third since the three adds into a constant. Because of this, t_{lf} is chosen to be dropped. This applies also to the mothers' time for market production, home production and leisure. The same is true in the case of the children. Thus, the resulting new linear combination is:

$$M = u_1 T_{mf} + u_2 T_{hf} + u_3 T_{mm} + u_4 T_{hm} + u_5 T_{mc} + u_6 T_{hc} \quad \dots (2.4.3(b))$$

Equation 2.4.3(b), therefore, is the first set of variables.

Also, there is a second set of variables denoted by:

$$N = V_1 WM_f + V_2 WM_m + V_3 WM_c + V_4 NY + V_5 Ed_f + V_6 Ed_m + V_7 Ed_c + V_8 NA + V_9 FS + V_{10} Age_f + V_{11} Age_m + V_{12} Age_c + V_{13} OC_f + V_{14} OC_m + V_{15} OC_c$$

where

$V_1, V_2, \dots, V_{15}$ - are coefficients of N

WM_f, WM_m, WM_c - are market wages of the father, mother,
and children, respectively

NY - stands for non-labour income

Ed_f, Ed_m, Ed_c - are education of the father, mother,
and children, respectively

NA - net assets of the households

FS - family size

Age_f, Age_m, Age_c - are ages of the father, mother,
and children, respectively

OC_f, OC_m, OC_c - are opportunity costs of the father,
mother, and children, respectively

In order to determine the two sets of coefficients $u^1 = [u_1, u_2, \dots, u_9]$ and $v^1 = [v_1, v_2, \dots, v_{15}]$ so as their correlation is maximized, r_{MN} is expressed as a function of u and v .

The quantities ΣM^2 and ΣN^2 which occur in the denominator of the expression

$$\Sigma MN / \sqrt{(\Sigma M^2)(\Sigma N^2)}$$

for r_{MN} are expressible as:

$$\Sigma M^2 = u^1 S_{xx} u$$

$$\Sigma N^2 = v^1 S_{yy} v$$

where

u and v - are coefficients of M and N , respectively

u^1 and v^1 - are transposes of u and v , respectively

S_{xx} - matrix of sum of square products of the set

M variables (Table 2.4.2.1)

S_{yy} - matrix of sum of square products of the set

N variables (Table 2.4.2.2)

Also, ΣMN could be expressed as:

$$\Sigma MN = u^1 S_{xy} v$$

where

S_{xy} - matrix of sums of products between M and N

variables (Table 2.4.2.3)

Thus, r_{MN} could now be expressed as:

$$r_{MN} = \frac{u^1 S_{xy} v}{\sqrt{(u^1 S_{xx} u) (v^1 S_{yy} v)}}$$

Since the two variances should be equal to 1, the above equation becomes

$$r_{MN} = u^1 S_{xy} v \text{ as } u^1 S_{xx} u = v^1 S_{yy} v = 1$$

The introduction of Lagrange multipliers $\lambda/2$ and $\mu/2$ results to the following function to be maximized:

$$F(u,v) = u^1 S_{xy} v - (\lambda/2) (u^1 S_{xx} u - 1) - (\mu/2) (v^1 S_{yy} v - 1)$$

TABLE 2.4.2.1

MATRIX OF THE SUM OF SQUARE PRODUCTS
OF THE SET M VARIABLES (S_{xx})

u_1^2	$u_2 u_1$	$u_3 u_1$	$u_4 u_1$	$u_5 u_1$	$u_6 u_1$
$u_1 u_2$	u_2^2	$u_3 u_2$	$u_4 u_2$	$u_5 u_2$	$u_6 u_2$
$u_1 u_3$	$u_2 u_3$	u_3^2	$u_4 u_3$	$u_5 u_3$	$u_6 u_3$
$u_1 u_4$	$u_2 u_4$	$u_3 u_4$	u_4^2	$u_5 u_4$	$u_6 u_4$
$u_1 u_5$	$u_2 u_5$	$u_3 u_5$	$u_4 u_5$	u_5^2	$u_6 u_5$
$u_1 u_6$	$u_2 u_6$	$u_3 u_6$	$u_4 u_6$	$u_5 u_6$	u_6^2

A series of mathematic operations would finally yield

$$u^1 S_{xy} v = \lambda (u^1 S_{xx} u) = \mu (v^1 S_{yy} v)$$

which further reduces to:

$$u^1 S_{xy} v = \lambda = \mu$$

TABLE 2.4.2.3

MATRIX OF THE SUM OF PRODUCTS BETWEEN M AND N VARIABLES (S_{xy})

$u_1 v_1$	$u_2 v_1$	$u_3 v_1$	$u_4 v_1$	$u_5 v_1$	$u_6 v_1$
$u_1 v_2$	$u_2 v_2$	$u_3 v_2$	$u_4 v_2$	$u_5 v_2$	$u_6 v_2$
$u_1 v_3$	$u_2 v_3$	$u_3 v_3$	$u_4 v_3$	$u_5 v_3$	$u_6 v_3$
$u_1 v_4$	$u_2 v_4$	$u_3 v_4$	$u_4 v_4$	$u_5 v_4$	$u_6 v_4$
$u_1 v_5$	$u_2 v_5$	$u_3 v_5$	$u_4 v_5$	$u_5 v_5$	$u_6 v_5$
$u_1 v_6$	$u_2 v_6$	$u_3 v_6$	$u_4 v_6$	$u_5 v_6$	$u_6 v_6$
$u_1 v_7$	$u_2 v_7$	$u_3 v_7$	$u_4 v_7$	$u_5 v_7$	$u_6 v_7$
$u_1 v_8$	$u_2 v_8$	$u_3 v_8$	$u_4 v_8$	$u_5 v_8$	$u_6 v_8$
$u_1 v_9$	$u_2 v_9$	$u_3 v_9$	$u_4 v_9$	$u_5 v_9$	$u_6 v_9$
$u_1 v_{10}$	$u_2 v_{10}$	$u_3 v_{10}$	$u_4 v_{10}$	$u_5 v_{10}$	$u_6 v_{10}$
$u_1 v_{11}$	$u_2 v_{11}$	$u_3 v_{11}$	$u_4 v_{11}$	$u_5 v_{11}$	$u_6 v_{11}$
$u_1 v_{12}$	$u_2 v_{12}$	$u_3 v_{12}$	$u_4 v_{12}$	$u_5 v_{12}$	$u_6 v_{12}$
$u_1 v_{13}$	$u_2 v_{13}$	$u_3 v_{13}$	$u_4 v_{13}$	$u_5 v_{13}$	$u_6 v_{13}$
$u_1 v_{14}$	$u_2 v_{14}$	$u_3 v_{14}$	$u_4 v_{14}$	$u_5 v_{14}$	$u_6 v_{14}$
$u_1 v_{15}$	$u_2 v_{15}$	$u_3 v_{15}$	$u_4 v_{15}$	$u_5 v_{15}$	$u_6 v_{15}$

Note that λ and μ are equal to the maximum value achievable by the correlation coefficient r_{MN} . It should not be difficult to find the values of the coefficients after λ and μ are computed.

An objection to the use of canonical correlation is the yielding of results that cannot readily be interpreted in terms of economic theory.¹

1 Tintner, Gerhard 1952. Econometrics, John Wiley and Sons, Inc., New York, p.117.

CHAPTER 3

DEFINITIONS AND DESCRIPTIVE ANALYSIS OF KEY VARIABLES UNDER STUDY

This chapter reports the definitions used and the results of the descriptive analysis of (1) the characteristics of the Laguna households and individuals, (2) the different time patterns of the household members, and (3) the full income of the individuals and the households as a whole. The completed family size samples used in this study were drawn from the multipurpose survey carried out in 1975. The possible causal relationship between the above variables, the statistical techniques used to estimate the unknown parameters of the proposed models, the statistical inferences arrived at, and the full implications of the results, however, will be examined in the succeeding statistical analysis chapter.

3.1 Characteristics of the Laguna Households

In order to understand the full income and the time allocation of the Laguna households, their characteristics and also that of the individuals comprising it have to be examined. This is attempted briefly below.

3.1.1 The Distribution of Households and Individuals

The fifty-eight (58) households forming the basis of this study comprise 370 individual observations. Table 3.1.1 that follows shows the absolute and relative distribution of the households and individuals in nine barrios (villages) of Laguna, Philippines.

Table 3.1.1 reveals three things: Firstly, the sample data is small, a limitation that should be pointed out; secondly, the uneven distribution of sample households per barrio; and finally, the differences

TABLE 3.1.1

ABSOLUTE AND RELATIVE DISTRIBUTION OF HOUSEHOLDS
AND INDIVIDUALS IN NINE BARRIOS OF LAGUNA

<u>Barrio</u>	Number of Households		Number of Individuals	
	Absolute	Relative (%)	Absolute	Relative (%)
Buboy	8	13.8	47	12.7
San Isidro II	2	3.4	18	4.9
Mabacan	5	8.6	29	7.8
Banca-Banca	8	13.8	48	13.0
San Lorenzo	3	5.2	25	6.8
Coralan	13	22.4	80	21.6
Talangka	5	8.6	39	10.5
Cambuja	9	15.6	55	14.9
San Isidro	5	8.6	29	7.8
Total	58	100.0	370	100.0

Source: Computer results in this study.

in size of households is evident when comparing the relative number of households and relative number of individuals. The uneven distribution of sample households per barrio is not dealt with in this study. Instead, it is assumed that the barrios are homogeneous because the type of areas devoted to farming and the main crops produced are the same, that is, they are mainly rice-producing lowland areas.

The households are mainly nuclear in nature; that is, they consist only of parents and children. Children who are already married and are living in their own homes are no longer considered as household members. However, sometimes, whoever of the parent or non-member child is the better-off, he/she feels it his/her obligation to provide assistance to the other.

3.1.2 Distribution of Households By Size Groups

The average size of the households included in the study was 7.6 members per household. This shows an increase of only 0.03% since 1968 when the average was 7.4 members. The period 1963 to 1968 reflected an increase of 0.8%. This very low increase in family size could be attributed to the fact that in the second period (1968-1976), a greater number of sons or daughters may have married and established their new homes in other places.

TABLE 3.1.2

COMPARISON OF SIZE OF FARM FAMILIES IN 1963, 1968, AND 1976

Size of Households	1963 (%)	1968 (%)	1976 (%)
2	4	3	2
3-5	36	24	22
6-8	40	46	35
9 and more	20	27	41
Total	100	100	100
N	780	780	370
Average/Household	6.6	7.4	7.6

Source: The 1963 and 1968 data were taken from Rural Change in a Philippine Setting while 1976 data was from computer results in this study.

Table 3.1.2 shows the relative changes in the size of farm families in 1963, 1968, and 1976. Here, a family size of 2 does not necessarily imply a childless couple only but also that the couple's children no longer live with them. The big increase in the 9 and more family size group in 1976 could perhaps be accounted for by the transfer

of some of the former 6-8 group in 1968 to the larger group. However, such an explanation could have been more acceptable if the sample used in both periods was the same.

3.1.3 Age Distribution of Members

The average age of the individual respondents during the period of this study was 26 years. Fathers had an average age of 53 years, mothers 50 years, and the childrens' age mean was 15 years. A profile of the ages of the members is shown in Table 3.1.3.

TABLE 3.1.3

DISTRIBUTION OF AGES OF HOUSEHOLD MEMBERS IN 1976

Age Group	M E M B E R S H I P (%)			
	Fathers	Mothers	Children	Over-all
1 - 5	-	-	15.7	5.9
6 -11	-	-	32.7	16.2
12-17	-	-	17.3	23.0
18-25	-	-	29.2	20.1
25-35	-	5.2	4.3	3.8
36-50	41.4	51.7	0.8	15.1
50 and up	58.6	43.1	-	15.9
Total	100.0	100.0	100.0	100.0
N	58	58	254	370
Mean	53	50	15	26
Coefficient of Variation	19.2	21.8	45.0	72.1

Source: Computer results in this study.

A study undertaken by the Farm and Home Development Office of the College of Agriculture, University of the Philippines at Los Baños

showed that in 1963, 66% of the sons were in the age group 7 and below. This decreased to only 52% in 1968, and to a very low 16.2% in 1976. Daughters in this age group represented 57% in 1963, 46% in 1968, and 15.2% in 1976. This indicates more or less completed and more mature families between 1963 and 1976. Sons between 14-21 years composed 16% in 1963, 31% in 1968, and 50% in 1976, while daughters composed 11% in 1963, 22% in 1968, and 51.9% in 1976.

In 1976, a greater majority of fathers were in the age group 50 and above while a greater percentage of mothers belonged to the 36-50 age group. Of the 254 children, only 15.7% were in the 1-5 age group, 50% were in the 6-17 age group, and 33.3% comprised 18 and above. This suggests that a greater number of the respondent children are in their school-age stages, with fewer outside this stage.

There was only one case in the study where among the children included was a married one who lived with the parents. There were more sons than daughters in the study.

3.1.4 Education of the Members

Of the 370 respondents, 29.6% had no formal schooling, 30.8% had reached the elementary level, 28.1% had a high school background, 16.2% had college schooling, and 5.1% had post-graduate education. The educational attainment per membership status is shown in Table 3.1.4a.

It is clear from Table 3.1.4a that more mothers than fathers had no formal schooling. A possible reason for this is the age-old misconception that a woman's place is solely in the home. However, it will be shown later that at present, the trend is for daughters to be equally as well educated as the sons. Most of the parent respondents have had elementary schooling experience. Expectedly, there are very

TABLE 3.1.4a

EDUCATIONAL ATTAINMENT OF MEMBERS BY NUMBER OF YEARS

Number of Schooling Years	Membership Status (%)			
	Fathers	Mothers	Children	Over-all
0 years [*]	10.3	17.2	20.1	29.6
1-6 (Elementary)	55.3	50.0	21.2	30.8
1-4 (High School)	29.3	29.3	27.5	28.1
1-5 (College)	3.4	1.7	22.9	16.2
1-2 (Post-graduate)	1.7	1.7	8.3	5.1
Total	100.0	100.0	100.0	100.0
N	58	58	254	370
Average (Total Years)	4	4	14	11
Coefficient of Variation	183.7	180.6	45.0	127.3

* This category included those members who gave no answer to this particular question in the data sheet.

Source: Computer results in this study.

few who have reached the college level. Although the Philippines boasts of a high number of college graduates, these usually prefer to live and be employed in urban areas. It is important to note that there was a small percentage of parents who reached the post-graduate level. This would explain an exceptionally high individual income that will be shown in the latter portion of this chapter.

Even with the spread-out of public schools in most rural areas, the study reveals that some of school-age children do not attend schools. Only 8.7% of total number of children do not study because of purely age limitations while about 11.5% may not necessarily be limited by their ages. Nevertheless, in the second generation, a higher percentage

reached the post-graduate level. A detailed account of the education of children in this study sample is given in Table 3.1.4b where their educational attainment is shown by their age group.

TABLE 3.1.4b

DISTRIBUTION OF CHILDREN BY EDUCATIONAL ATTAINMENT AND AGE

No. of Years	Age Group				Over-all
	1-6	7-12	13-18	19 & more	
0 years (no schooling)	22 (8.7)	25 (9.8)	1 (0.4)	3 (1.2)	51 (20.1)
1-6 (elementary)	-	32 (12.6)	16 (6.3)	6 (2.3)	54 (21.2)
1-4 (high school)	-	3 (1.2)	42 (16.5)	25 (9.8)	70 (27.5)
1-4 (college)	-	-	24 (9.4)	34 (13.5)	58 (22.9)
1-2 (post-graduate)	-	-	2 (0.9)	19 (7.4)	21 (8.3)
Total	22 (8.7)	60 (23.6)	85 (33.5)	87 (34.2)	254 (100.0)

Note: * Figures in parenthesis show relative distribution.

Table 3.1.4c gives the break-down of educational attainment of children by sex and age group.

Generally speaking, it is presumed that sons and daughters more or less pursue equal levels of education. However, despite the relatively small size of the sample a closer look at the 19 and up age level suggests the following: firstly, more daughters than sons stop at the elementary level; secondly, more sons than daughters stop at the high school and college levels; and thirdly, a slightly higher percentage

TABLE 3.1.4c

DISTRIBUTION OF MALE AND FEMALE CHILDREN BY EDUCATIONAL ATTAINMENT AND AGE

Educational Attainment in Years	Age Group									
	1-6		7-12		13-18		19 and more		Over-all	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
0	13 (9.2)	9 (8.0)	13 (9.2)	12 (10.7)	1 (0.7)	-	1 (0.7)	2 (1.8)	28 (19.7)	23 (20.6)
Elementary	-	-	19 (13.4)	13 (11.6)	11 (7.7)	5 (4.5)	-	6 (5.4)	30 (21.1)	24 (21.4)
High School	-	-	1 (0.7)	2 (1.8)	21 (14.8)	21 (18.8)	15 (10.6)	10 (8.9)	37 (26.1)	33 (29.5)
College	-	-	-	-	15 (10.6)	9 (8.0)	22 (15.5)	12 (10.7)	37 (26.1)	21 (18.7)
Post-graduate	-	-	-	-	1 (0.7)	1 (0.9)	9 (6.3)	10 (8.9)	10 (7.0)	11 (9.8)
Total	13 (9.2)	9 (8.0)	33 (23.2)	27 (24.1)	49 (34.5)	36 (32.1)	47 (33.1)	40 (35.8)	142 (100.0)	112 (100.0)

Note: * Figures in brackets show relative percentages.

of daughters pursue post-graduate studies.

3.1.5 Family Resources, Facilities, Consumption and Expenditure Patterns

Among the goals of most farm families is the acquisition of home-lots and ownership of homes. During the period of this study, only 36.6% of the respondents owned their home-lots and their homes, the average value of homes was ₱ 7,173.18, while the average value of a home-lot was ₱ 2,642.65. The home size averaged 78.3 square meters, although there were cases where the area reached as much as 600 square meters with a total of eight rooms. Home-lots averaged 109 square meters, with a maximum of 800 square meters. Most of the households used about 80.9 square meters of their total land area for gardening purposes. Very few of the respondents reported ownership of furniture, appliances, and other modern conveniences of living, and those who did had greatly varying estimates of its value, thus such information is deemed inconclusive in this study.

However, from the little information available it could be concluded that there has been a marked improvement in some aspects of living of the Laguna farmers. For instance, during the first year of the survey, only 12.8% of the respondent farmers had toilet facilities. If, before, only 31.7% engaged in sewing their own clothes, now at least 34.1% of the respondents are venturing in such activity. The number of respondents who now engage themselves in home industry increased from 17.1% to 39.0%.

The consumption pattern of the Filipino household is monotonous. That is, the diet is mainly a rice-fish-vegetable one. However, there are different varieties of vegetables consumed. In the Philippines,

there are two staple diets, viz., rice and corn. In Laguna, a rice-producing province, the bulk of the diet is provided by the staple rice, in contrast to a typical Visayan province where the main staple is corn as it is the crop mainly produced. Most deviations in the consumption pattern are dependent on the agricultural production with seasonal characteristics.

The average expense for total consumption of a Laguna household was found to be ₱ 2,429.91 per annum. The total amount varied from a minimum of ₱ 520.00 to a maximum of ₱ 4,685.00, due to the different number of household members, their age distribution, as well as different tastes and eating habits. As expected, the largest single consumption expense of a Laguna household is that incurred in purchasing rice. Of the total household expense on food, about 67% is spent on rice, with only 33% for fish, vegetables, and other food.

Generally speaking, according to Engel's law, households with higher income levels spend a lesser proportion of their income for food consumption than households with lower income levels. During a symposium which dealt with changes in food habits in relation to increase of productivity organized by the Asian Productivity Organization in August 1972, it was found that on the average, Filipinos spend 53.7% of their income on food. This was held true especially for families earning from ₱ 4,000.00 to ₱ 4,999.00 annually (Bureau of Census and Statistics 1968). Families belonging to the ₱ 6,000.00 - ₱ 7,999.00 category spent approximately 46.7%, while those within the ₱ 10,000.00 and over spent 32.3% on food consumption. This study, however, revealed that the Laguna household spent on average approximately 35% of its ₱ 7,000.00 income for food consumption. The difference of the findings

could perhaps be attributed in addition to the size of the sample, to (1) the different valuation of income employed in this study, and (2) the different particular characteristics of the sample Laguna household from those of a typical Filipino household. No attempt was made in this study to deal with the protein content aspect of the consumption pattern of the families due to lack of information. This would have provided valuable insights as to the level of living of the households.

The non-food expenditure of a Laguna farmer includes expenses for different types of ceremonies such as weddings, baptisms, funerals, and fiestas, clothing expenses, schooling expenses, and other miscellaneous expenses. On the average, a household incurred a total expense of P 3,383.89 per annum, nearly 30% of which is made up of schooling expenses. It was difficult to ascertain the proportion of the other expenses due to lack of detailed information.

3.2 The Time Allocation Patterns of the Households

Time is the only common resource available to all individuals. Every member of society has 24 hours a day within which time he/she chooses to spend for certain activities further classified into productive and non-productive activities. The findings of this study as regards the different time allocation patterns of the subjects do not differ greatly from the earlier study undertaken by Elizabeth King Quizon. Fathers, on the average, spend 6.75 times longer hours than their wives for market productive activities but devote 11.4 times hours less than their wives for home productive activities. It is clear what roles fathers and mothers play in a farming household. Children spend a greater number of hours for market production activities than their mothers and a greater number of hours for home production activities than their fathers.

Nevertheless, results gathered were inconclusive. For one thing, difficulties in classifying the activities, primarily of the mothers, arose. For instance, some mothers perform child-care and other chores simultaneously, so that the problem of accounting for the time spent arises. This does not necessarily arise in mothers only but also with some fathers and siblings. For another, the data did not provide information as to the number of school hours of each child attending school, thus the leisure time of the children was highly over-estimated. Furthermore, this study, unlike that of Quizon's, is very limited in that the data did not include detailed description of the various activities under the classification home-production and leisure, as this could have aided the researcher greatly.

It will be indicated in the succeeding section of this chapter that despite the comparatively long hours that mothers spend for productive hours like their husbands, they contribute a relatively low percentage to the full household income. This is attributed among other things, to the fact that home activities are claimed to be easier than market-activities, reflected in low home-wage against relatively higher market-wage rates. Full income, by its definition in this study, is also made up of leisure time multiplied by its cost. Because a look at the only valuation possible for it (that is, through the opportunity cost concept) showed that nobody in the sample received opportunity cost, this has been dropped.

The general time usage patterns are detailed below, and tabulations have been derived from computer results in this study.

3.2.1 Home Time of the Individual Household Members

As could be seen in Table 3.2.1, mothers spend from at least

TABLE 3.2.1

PERCENTAGE DISTRIBUTION OF HOUSEHOLD MEMBERS BY HOME TIME HOURS

	Fathers	Mothers	C H I L D R E N		Over-all
			Sons	Daughters	
0- 723	94.8	20.7	90.1	62.5	78.0
724-1446	3.4	17.2	5.7	13.4	9.1
1447-2169	-	20.7	2.1	15.2	7.9
2170-2892	-	22.4	-	6.3	2.8
2893-3615	-	15.5	2.1	1.8	2.0
3616-highest	1.8	3.5	-	0.8	0.4
Total	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254
Average	157.8	1798.2	247.0	715.1	453.4
Coefficient of Variation	329.3	61.2	224.1	131.6	172.7
					155.3

104 hours a year for home chores to as much as 4,004 hours. Fathers may not spend any of their time for household work at all, or, if they do, do not normally exceed 1,446 hours. Of the 58 subjects, only one of them spent 3,616 or more hours for home chores. Mothers have varying home times, all depending upon the size of the family and the total number of younger children. On the average, however, mothers spend 11 times as much home time than their husbands, and 4 times as much as their children. A look at the home times of the children show that generally daughters spend more time on household chores than the sample sons.

Home time included income-earning home production such as sewing, gardening, handicraft-making as well as expenditure-saving activities like child-care time, clothes and dishwashing, ironing, cleaning the house, and so forth. The average home time of all households in the study was found to be 3,916 hours per annum.

3.2.2 Market Time of the Individual Household Members

Market time includes time devoted to farming activities, wage employment, and livestock raising. Most of the respondents in this study, particularly the fathers in each household, engaged primarily in farming although they generally had secondary jobs. The taking on of a secondary job is due to two reasons: firstly, the seasonality of farm work, and, secondly, the less formal working hours in the farms. Mothers and children do help in some farm work, too, but attend to livestock raising more than fathers.

It was found in the study that of the total 370 respondents, only 42% engaged in market income-generating activity. All of the 58 household fathers engaged in one or a combination of market activity;

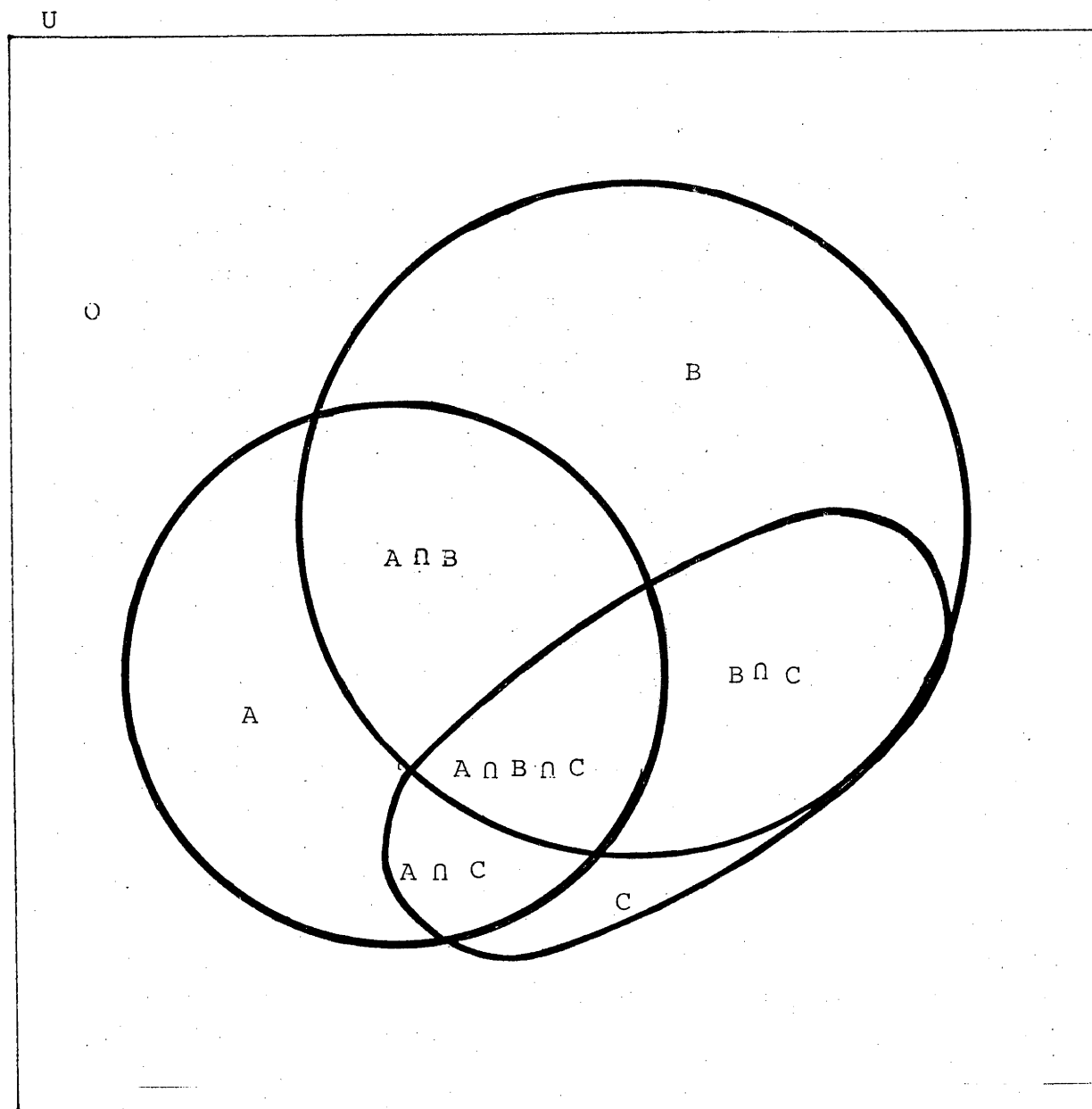
however, only 52% of the total number of mothers and 27% of the total number of children devoted some of their time in one or a combination of market activities. In the Venn Diagram that follows, the number of respondents according to the market activities they engage in is shown.

Table 3.2.2 shows the percentage distribution of household members by market-time hours. On average, fathers devote 3,316 hours a year for market production, while mothers and children devote 491.0 hours and 451.6 hours, respectively, for the same. Sons spend much longer hours for market-production than mothers. The market time hours of the respondents ranged from zero to 8,655 hours.

A high percentage of mothers and children belong to the 0-723 hours of market time, i.e., nearly 76% and 83% respectively and in the case of fathers, a varied distribution is observed. Most of them, however, belong to the 1,447 to 2,892 hours level. The wide variation in their market time level could perhaps be attributed to the different market income activities they engage in. A wage-earner's market time would normally follow an eight hour day's work. A farmer's market time is dependent on the area of his farm, the availability of machines and implements he uses to aid him in his chores, and even perhaps the number of helpers and/or other family members helping him. Likewise, the farmer father's market time varies depending on his particular crop and the season.

In her study, Elizabeth Quizon (1976) found that the number of children does not necessarily affect the total market production time of fathers and mothers. This, too, has been observed in this study, and, additionally, the ages of the children has been found to have a more

FIGURE 3.2.2
 VENN DIAGRAM OF THE RESPONDENTS ACCORDING
 TO MARKET ACTIVITIES



Legend:

U = 370 - total samples
 O = 219 - non-market producers
 A = 25 - purely wage earners
 B = 52 - pure farmers
 C = 6 - pure livestock-raisers

A ∩ B = 24-wage earner and farmers
 A ∩ C = 6-wage earner and livestock raiser
 B ∩ C = 25-farmer and livestock raiser
 A ∩ B ∩ C = 13-wage earner, farmer and livestock raiser

Note: farmers - denotes rice, coconut and other crops farmers.

TABLE 3.2.2

% DISTRIBUTION OF HOUSEHOLD MEMBERS BY MARKET OF TIME HOURS

	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0- 723	17.2	75.9	77.5	90.2	83.1	71.6
724-1446	10.4	12.1	6.3	4.5	5.5	7.3
1447-2892	27.6	8.6	9.9	4.5	7.5	10.8
2893-4338	12.1	3.4	3.5	0.8	2.4	4.1
4339-5784	17.2	-	0.7	-	0.4	3.0
5785-7230	1.7	-	0.7	-	0.4	0.5
7231-highest	13.8	-	1.4	-	0.7	2.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average	3316	491.0	656.2	192.3	451.6	906.8
Coefficient of Variation	77.0	159.3	213.4	301.3	251.9	193.3

important effect on the market production time. Furthermore, the age of the father, itself, has an important bearing on his market production time.

It was found that the average total market production time of the households was 3,542 hours per annum.

3.2.3 Leisure Time of Individual Household Members

After a look at the home productive and market productive time of the respondents in this study, one can immediately get an idea of the leisure time, being defined as the residual from twenty-four hours of the total productive time. It is suggested by the table that the Laguna individuals generally enjoy 7,236 hours of leisure time in a year, and this includes hours of sleeping, of active and passive recreation, of attending to personal hygiene, and, generally, of rest. It could additionally be noted that fathers enjoy less leisure time hours compared to mothers. In addition, a greater concentration of mothers appear to have higher leisure hours than fathers.

TABLE 3.2.3

% DISTRIBUTION OF HOUSEHOLD MEMBERS
BY LEISURE TIME HOURS PER ANNUM

	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0- 723	6.9	-	-	-	-	1.1
724-1446	8.6	-	1.4	-	0.8	1.9
1447-2892	-	-	0.7	-	0.4	0.3
2893-4338	15.5	10.3	2.1	0.9	1.6	5.1
4339-5784	13.8	22.4	4.9	3.6	4.3	8.6
5785-7230	29.3	34.5	12.0	21.4	16.1	21.1
7231-highest	25.9	32.8	78.9	74.1	76.8	61.9
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average	5286.2	6472.2	7859.0	7852.4	7856.1	7236.3
Coefficient of Variation	48.3	22.3	19.6	13.6	17.2	26.0

It is worthwhile pointing out, nevertheless, that the accuracy of these figures given in Table 3.2.3 below for all members is very questionable. This is notably true when a comparison with the results of the study of E. Quizon is made.

One decidedly important point of difference concerns the leisure hours of the mothers. This study shows a 26% overstatement of the leisure time of the mothers. This could perhaps be due to the differences in sample size and/or the different accounting classifications. As a consequence, the figure indicating that mothers generally enjoy more leisure hours than their husbands could not be acceptably true. Note how 15.5% of the fathers enjoy from 0-2892 hours while the same percentage of their spouses enjoy a minimum of 2892 hours, a finding better intuitively acceptable the other way around, considering past studies and other considerations.

Another difference lies in the leisure time of children. This is attributed to the fact that her data provided total school hours of children which were promptly included under home production. Data in this study did not, and in fact included the number of hours spent for schooling under leisure time.

3.3 The Full Income of the Individual Members and the Households

Recalling that an individual's income is the sum of his/her valuation of time spent for market production, home production and leisure, this section gives results of such computation of income. It must be pointed out further that the family full income is nothing else but the summation of the incomes of the individuals comprising it, plus the value of non-labour income such as donations from non-member children of the household.

3.3.1 Individual Incomes

This study illustrates the primary roles that family members

play as regards income producing activities. It has been proven that fathers are mainly preoccupied in market-type activities in procuring income while mothers are basically kept occupied with home-type activities. However, fathers still do devote part of their total time for home labour-saving activities and some mothers themselves still do engage in some market income activities. Children, like their parents, engage in both types of activity depending upon their age and their education. A young child is primarily engaged in school work - a chore which is neither considered as a market or home producing activity. School work, like in previous works of economists, is regarded here as some type of human investment. It deters a member child from contributing to family income at a certain stage. On the other hand, it does help the family at some later time in the form of improvement not only in quality of chore but also in improving the income generating prospects.

3.3.1.1 Individual Home Incomes

Home income earning activity is defined here to include income from gardening, handicraft making as well as income saving activities like child minding and all the household chores. The overall mean home income arrived at according to the above definition in this study was ₦ 259.20 a year. Fathers earn an average home income of ₦ 72.70 a year, representing only 10% of the average home income earned by mothers estimated to be ₦ 748.40 a year. Children earn relatively higher home income than their fathers; i.e., by about 2.6 times higher. However, there are some fathers who earn as much as ₦ 1,551.00 worth of home income a year as compared to mothers whose maximum earning of home income is ₦ 1,682.00 per annum.

The relative distribution of family members by level of home income is summarized in Table 3.3.1.1. Seventy-nine and three-tenth per cent (79.3%) of the 58 fathers earn between 0 - P 100.00 of home income a year. The same percentage of mothers earn home income that ranges from P 201.00 to P 1,600.00 a year. Seventy-three per cent of children earn home income that ranges from 0 to P 200.00 a year. As expected, daughters earn more home income than sons. While only 7% of the 142 sons get between P 401 - 1,600 of home income, 30.4% of the 112 daughters get the same amount and even higher at times.

TABLE 3.3.1.1
RELATIVE DISTRIBUTION OF FAMILY MEMBERS
BY HOME INCOME LEVEL

Home Income	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0- 100	79.3	10.3	73.9	50.9	63.8	57.8
101- 200	10.3	8.6	12.0	5.4	9.1	9.2
201- 400	6.9	12.1	7.0	13.4	9.8	9.7
401- 800	1.8	24.2	3.6	15.3	8.7	10.0
801-1600	1.7	43.1	3.5	14.3	8.2	12.7
1601-highest	-	1.7	-	0.9	0.4	0.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average	72.7	748.4	103.7	299.6	190.1	259.2
Coefficient of Variation	305.9	62.9	224.2	159.1	172.9	155.4

By its very definition and method of computation, the income of an individual from home producing activities is dependent upon

two basic factors. These are, namely: (1) the time spent for such-type activities, and (2) the home-wage rate used. In turn, the time spent is a result of several factors; i.e., the need to do so as dictated by family size and perhaps age of the members, as well as the actual capability or age limitations and other opportunities that are available. For instance, a mother with several young children would be forced to devote more time to household chores. Likewise, the age of a child would dictate the household participation rate, hence to a certain extent affects his/her household income. Also, the availability of alternative employment, i.e., market time participation also affects the home incomes of individuals.

3.3.1.2 Individual Market Incomes

Market income is defined as the summation of income from rice, coconut, other crops, livestock, business, and other wage labour. Recalling from Chapter 2, the wage rate from each particular market activity is provided by the respondent himself. An individual's wage rate is arrived at by averaging his/her wage from all the different market activities he/she is engaged in. In this study, most of the respondents were primarily engaged in rice and wage labour. Only a few mixed these two activities with coconut and other crops' labour. A great majority of the respondents, mostly wives, and children, engaged themselves in livestock production. The details have been outlined under the earlier market-time section of this chapter.

Table 3.3.1.2a provides a summary of the percentage distribution of family members by market wage levels. The majority of the fathers in the study, i.e., 62.1% had market wages in the range ₱ 5.01 - ₱ 10.00 per eight-hour day, while the same percentage of mothers

had market wages in the range 0 - ₱ 5.00 only. Children mostly got wage rates in the 0 - ₱ 5.00 range: however, sons got relatively higher wage rates than daughters.

TABLE 3.3.1.2a
PERCENTAGE DISTRIBUTION OF FAMILY MEMBERS
BY MARKET WAGE LEVELS

Market Wage	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0 - 5.00	15.5	62.1	68.3	83.9	75.2	63.8
5.01-10.00	62.1	31.0	21.1	14.3	18.1	27.0
10.01-15.00	19.0	5.2	8.5	0.9	5.1	7.3
15.01-20.00	3.4	1.7	0.7	0.9	0.8	0.8
20.01-25.00	-	-	1.4	-	0.8	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average ₱	8.14	3.49	3.45	1.64	2.65	3.64
Coefficient of Variation	53.6	131.1	155.5	235.5	182.4	140.2

The over-all wage rate calculated in the study was as low as ₱ 3.64 a day. Although the mean wage rate of fathers of ₱ 8.14 a day fall normal and expected minimum wage set by law for farmers, the over-all wage rate is pulled down by that of the mothers and children which are ₱ 3.49 and ₱ 2.65, respectively. The low wage rates given to mothers and children would partly explain their low market income which is shown consequently. It may be interesting to note that some children had a higher maximum wage rate than either parents. This suggests the

role that age and education can sometimes play in income earning opportunities

The study confirms the hypothesis that fathers generally have a much higher market income than mothers. In particular, this is shown in Table 3.3.1.2b that the average market income of mothers which is ₱ 466.60 a year is about 9% that of the fathers which is ₱ 4,097.30 per annum. However, it is felt that the latter figure is highly affected by the presence of an observation where market income was ₱ 23,423.00 a year. The mothers' market incomes ranged from 0 - ₱ 3,749, while that of the children ranged from 0 - ₱ 8,684.00 a year. Children appeared to have an average market income of ₱ 562.30, or a difference of ₱ 95.70 over that of the mothers. The over-all average market income amounted to ₱ 1,101.40 a year.

TABLE 3.3.1.2b

RELATIVE DISTRIBUTION OF FAMILY MEMBERS
BY MARKET INCOME LEVEL

Market Income	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0- 500	15.5	77.6	72.5	87.5	79.1	68.9
501- 1500	12.1	8.6	9.2	7.1	8.3	8.9
1501- 3000	17.3	12.1	8.5	3.6	6.3	8.9
3001- 6000	36.2	1.7	7.0	1.8	4.7	9.3
6001-12000	15.5	-	2.8	-	1.6	3.5
12001-23423	3.4	-	-	-	-	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average	4097.3	466.6	810.3	247.8	562.3	1101.4
Coefficient of Variation	102.0	180.5	207.0	310.0	245.5	218.5

A high percentage, 77.6%, of mothers included in the study was found to have had market income in the range of 0 - ₱ 500.00 a year. The level of market income of fathers varied. A simple majority of them had incomes within the ₱ 3,001 to ₱ 12,000 levels. As regards children, a great concentration of them earned market income in the 0 - ₱ 500.00 range. As the market income level increased, the percentage of children identified with such market income level decreased. It should be noted, however, that a greater percentage of sons had earned higher market income than daughters, i.e., between ₱ 501.00 and ₱ 12,000.00 a year.

In a study involving farmers, there is another way by which their market income could be calculated. That is, their farm output could be valued, whether marketed or not. Had there been data on this, the present study would have been more meaningful in that some kind of gauge or measurement regarding the market income computations employed herein would be compared.

3.3.1.3 Individual Total Income

The total income of an individual is the summation of the various incomes from time spent for market and home production. The difference in the nature of market production against home production is not necessarily overlooked. Generally, market work is claimed to be more difficult than home work because it is usually done under more restrictive conditions and environment as an office or factory or sun-exposed fields. However, this difference such as to the quality of time inputs has been considered through assigning varying wage rates for each particular type of chore by the subject himself.

In Table 3.3.1.3 following, it is shown that the average

total income of fathers is ₦ 4,170.10, that of the mothers is ₦ 1,215.00, and that of the children is ₦ 752.40 per annum. Also, it could be noticed that while some fathers and some children may have no total income at all, a mother at least earns no less than ₦ 84.00 within the year. Of the total number of fathers and mothers in the study, 81.1% of the former were in the ₦ 0 - ₦ 6,000.00 total income range, and 89.7% of the latter were in the 0 - ₦ 3,000.00 range. Of the 254 children, 85.1% earned a total income within the range 0 - ₦ 1,500.00 a year. It should be noted, too, that while 1.5% of the children earned income between ₦ 6,001 and ₦ 12,000, not one of the mothers did so, stressing, once again, the relatively important roles children do play within a family.

TABLE 3.3.1.3
RELATIVE DISTRIBUTION OF FAMILY MEMBERS
BY TOTAL INCOME LEVEL PER ANNUM

	Fathers	Mothers	C H I L D R E N			Total
			Sons	Daughters	Total	
0- 500	13.8	27.6	66.9	62.5	65.0	51.1
501- 1500	12.1	46.6	13.4	28.6	20.1	23.0
1501- 3000	19.0	15.5	7.0	6.2	6.7	10.0
3001- 6000	36.2	10.3	9.9	2.7	6.7	11.9
6001-12000	15.5	-	2.8	-	1.5	3.5
12001-highest	3.4	-	-	-	-	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	58	58	142	112	254	370
Average	4170.1	1215.0	914.0	547.5	752.4	1360.6
Coefficient of Variation	99.8	84.0	187.0	152.4	186.4	175.2

A comparison of the market and full income of the family members would show that on average, 81% of the total incomes of the sample individuals is made up of market-income. For fathers and mothers, the relative contribution of market income to total incomes are 98% and 38%, respectively. The varying role between the father and the mother with respect to income generation in a household is substantiated by this finding. Children's market incomes contribute 75% to their total incomes, with the difference in percentages of 89% and 45% for sons and daughters, respectively, further emphasizing the home roles between sexes.

A comparison of the distributions shown in Tables 3.3.1.2b and 3.3.1.3 suggest that at a certain level (e.g. ₦6,000.00 and up), total income is solely made up of market-income. This is particularly true with fathers' total incomes, where levels above ₦3,000.00 appear to be made up solely of market income. When incomes are low, fathers' market incomes are supplemented by home incomes, thus the relative movement of distributions from a low level to a high level after accounting for the compensating home-type activities. This is true in all other family members. The suggestion of "joint production" in these occasions is very strong, in contrast to simply role specializations. However, this is indeterminate in this study. In the case of mothers, the movement to a higher level of incomes after home income is added to the market income is readily apparent. Note the concentration of a high percentage of mothers (77.6%) at the ₦0-500.00 level considering only their market incomes in contrast to a distribution at higher levels after the addition of their home incomes.

It may be safe to conclude that there could probably be a cut-off point of incomes where fathers think it sufficient to devote their time only for market-type activities. That mothers do so after a certain value of home-type activities is not necessarily true, however, as evidenced by a comparison of the earlier-mentioned tables.

The present study generally reveals that mothers do earn at least 29% of that of their husbands while children earn 18% of that of their fathers or 62% of that of their mothers. The proportion of full income of mothers to that of the fathers would therefore suggest that assuming a household's full income is the summation of the total earnings of the father and the mother only, then the wife's contribution is 23% while the husband's is 77%. This seems well below a finding made on the wife's contribution to full income (Gronau 1976) which was at least 44%. Considering that a wife's productive time is 39% of the couple's total productive time, it would seem that the home-wage rate assigned to the wife is understated in this study. To introduce the fact that home production is tax exempt, the picture is all the more obliterated by present findings; nevertheless, only further study could clarify the point.

3.3.2 Household Full Income

The full household income is regarded as the summation of the full individual incomes of the household members plus the non-labour income such as rental of property and donations from non-members. Thus, the total amount is dependent not only on the size of the household and the ages of the members given certain wage rates but also perhaps on the life stage of a family as this may determine to a certain extent the value of assets accumulated in its lifetime. This point will be dealt with further in the following chapter.

It has been estimated in this study that the average market income of a Laguna household is ₱ 6,988.26, ranging from 0 to ₱ 24,798.00 a year. Again, the wide variance is attributable to the different ages and number of members making up the household. The average home income

was found to be ₱ 1,659.57, with a minimum of ₱ 109.00 and a maximum of ₱ 4,172.00 per annum. Total income showed an average of ₱ 8,699.55; that is, from a low of ₱ 848.00 to a high of ₱ 26,786. Full household income was found to reach a mean of ₱ 8,797.26, or only an average amount of ₱ 98.00 added non-labour income of a Laguna household. It is clear that the bulk, i.e., nearly 99% of the full income of a household mostly arises out of value of efforts (productive-time) of its components. It may be worthwhile to note that of the 58 households considered in this study, only 6, 7, 14, and 1 households derived income from non-labour miscellaneous sources, non-member income donations, non-member children income donations, and rental income, respectively.

CHAPTER 4

STATISTICAL ANALYSIS OF FULL INCOME AND TIME
ALLOCATION; DISCUSSION OF RESULTS

Following the specification of the time budgets and full income models of the Laguna farmers in the previous chapter, an examination of the variables that describe and explain these is attempted in this chapter. It elucidates the results of the statistical analyses undertaken in this study. In accord with the statistical models postulated in Chapter 2, Section 1 of this chapter contains the estimated parameters of the time allocation model, while Section 2 presents the parameters of the full income models. Section 3 attempts to depict the interrelationship question between full income and time allocation.

4.1 Analysis of Time Allocation

One's time allocation function, as revealed by previous similar studies, depends on one's attributes, other's attributes, children, and wealth. The word "attributes" includes wages, years of formal schooling, ages, working status, and occupations. Elizabeth King Quizon's study, in particular, studied the separate influences of these independent variables on the different time classifications, i.e., market-production time, home-production time, and leisure (Quizon 1976).

This study differs from Quizon's study not only in the explanatory variables but also in the analytical methodology employed. Recognition herein has been placed on the existing dependence of the three time classifications. Hence the use of canonical correlation analysis in addition to the traditional least-squares multiple regression analysis to explain the time allocation of the Laguna households and its constituents.

As indicated earlier in Chapter 2, canonical correlation is employed to identify the "components" of the set of time variables that are most highly related in a linear form to the "components" of the other set of variables, earlier termed "attribute" variables in this study. Briefly, the time variables are assumed to be a linear combination of:

$$M = u_1 T_{mf} + u_2 T_{hf} + u_3 T_{mm} + u_4 T_{hm} + u_5 T_{mc} + u_6 T_{hc}^1$$

while the attribute variables are set to be a linear combination of:

$$N = v_1 wm_f + v_2 wm_m + v_3 wm_c + v_4 NY + v_5 Ed_f + v_6 Ed_m + v_7 Ed_c + v_8 NA + v_9 FS + v_{10} Age_f + v_{11} Age_m + v_{12} Age_c^2$$

The basic strategy of canonical correlation analysis is to derive a linear combination from each of the time variables and the attribute variables in such a way that the correlation between these two linear combinations is maximized. Canonical correlation analysis usually yields two or more pairs of canonical variates. The first is selected to have the highest intercorrelation possible, given the variables involved. A second pair is then selected to account for a maximum amount of the relationship between the two sets of variables left unaccounted for by the first canonical variates, and so forth.

Three reports subdivide this chapter's first section. While the first subsection provides the general information derived from the time allocation analysis, the second mainly reports the specific results obtained with regard to the different attributes' influences on the different time allocation of the members. The third subsection attempts to further delve

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- 1 The reader is referred to Chapter 2 for definitions of these variables.
 - 2 These attribute variables used to include opportunity costs of the father, mother and children, but these have been dropped since none of the respondents was found to have opportunity costs.

on the inter-actions of the household members. This latter outlook also tries to relate the findings with the expectations suggested in the theoretical framework of time allocation in 1.2.2 of this study.

4.1.1.1 General Information from the Analysis

The computer results of this study yielded six canonical correlations. However, only the first two are significant, and therefore are the only ones reported in Table 4.1.1, where it could be seen that the first canonical correlation coefficient between the time and attribute variables is 0.962, indicating that the first pair of canonical variates share almost 92% of their variance (that is, their eigenvalue). The second canonical correlation coefficient of 0.919 indicates that the second pair share 84% of their variance.

Two general conclusions could be arrived at upon analysis of results. First, in predicting the attribute variables, the largest weight is given to the time for the home of the mother, followed by the market time of the children, the market time of the mother, and finally, the home time of the father, in that order. Second, in explaining the set of time variables, the education of the father is shown to carry the biggest weight, followed by children's market wage, mother's market wage, mother's education, mother's age, etc., (see the various weights given in Table 4.1.1).

However, looking at the relative weights under the also significant results of the second pair of canonical variates, a different sequence of importance of the variables could be garnered. For instance, it could be found that the second pair gives the largest weight to the father's market time, then home time of the children, market time of the children, the father's home time, the mother's market time, and the mother's home time, in that order. Also, the market wage rate of the father, then that of the mother, the children's education, the family size, are the first four

TABLE 4.1.1
COEFFICIENTS OF THE CANONICAL VARIABLES
IN TIME ALLOCATION STUDY

	First Pair	Second Pair
Variables:		
Time Variables:		
Father's Market Time (T_{mf})	-0.545 (3)	0.616 (1)
Mother's Market Time (T_{mm})	-0.404 (5)	-0.092 (5)
Children's Market Time (T_{mc})	-0.581 (2)	0.327 (3)
Father's Home Time (T_{hf})	-0.310 (6)	-0.236 (4)
Mother's Home Time (T_{hm})	-0.647 (1)	-0.010 (6)
Children's Home Time (T_{hc})	0.479 (4)	0.481 (2)
Attribute Variables:		
Father's Market Wage (w_{mf})	0.171 (8)	-0.548 (1)
Mother's Market Wage (w_{mm})	-0.281 (3)	0.306 (2)
Children's Market Wage (w_{mc})	0.295 (2)	0.070 (8)
Non-labour Income (NY)	0.231 (7)	0.183 (5)
Father's Education (Ed_f)	-0.403 (1)	0.137 (6)
Mother's Education (Ed_m)	0.242 (4)	-0.070 (9)
Children's Education (Ed_c)	0.008 (12)	-0.288 (3)
Net Assets (NA)	0.121 (9)	0.076 (7)
Family Size (FS)	-0.080 (11)	-0.230 (4)
Father's Age (Age_f)	-0.236 (6)	0.002 (12)
Mother's Age (Age_m)	-0.239 (5)	-0.030 (11)
Children's Average Age (Age_c)	-0.116 (10)	-0.053 (10)
Eigenvalue	0.926	0.845
Canonical Correlation	0.962	0.919
Wilk's Lambda	0.000	0.005
Chi-Square	207.558	138.358
DF	120	95
Significance	0.000	0.002

Note: Figures in parenthesis denote order according to weights/importance as a variable.

important contributing, i.e., "explanatory", variables.

Just looking at the relative weights could not suggest a particular type of patterning due to considerable overlapping between the two pairs. Thus, a careful look not only on the coefficients but also the direction or movement of variables is made, whereupon a comparison of results from both is taken. Table 4.1.2 below provides a summary of the relationships found from such a detailed introspection, while the following subsection discusses the findings.

TABLE 4.1.2
MATRIX OF RELATIONSHIPS AMONG THE TIME
AND ATTRIBUTE VARIABLES

Time Attribute Variables	Mother's Home Time (T_{hm})	Children's Market Time (T_{mc})	Father's Market Time (T_{mf})	Children's Home Time (T_{hc})	Mother's Market Time (T_{mm})	Father's Home Time (T_{hf})
(1) Father's Education (E_{df})	?	+	+	?	?	?
(2) Children's Market Wage (Wm_c)	-	?↓	?↓	+	-	-
(3) Mother's Market Wage (Wm_m)	?	+	+	?	?	?
(4) Mother's Education (Ed_m)	?↓	-	-	?	?↓	?↓
(5) Mother's Age (Age_m)	+	?	?	-	+	+
(6) Father's Age (Age_f)	?	+	+	?	?	?
(7) Non-Labour Income (NY)	-	?↓	?↓	+	-	-
(8) Father's Market Wage (Wm_f)	?↓	-	-	?↓	?↓	?↓
(9) Net Assets (NA)	-	?↓	?↓	+	-	-
(10) Children's Ages (Age_c)	+	?	?	-	+	+
(11) Family Size (FS)	+	?	?	-	+	+
(12) Children's Education (Ed_c)	?↓	-	-	?	?↓	?↓

Notes: (+) denotes direct relationships.

(-) denotes inverse relationship.

(?) denotes an indeterminate relationship, but tending to be positive.

(?↓) denotes a negatively inclined indeterminate relationship.

(The time and attribute variables have been arranged in order of largest weights as suggested by the first pair of canonical variates).

4.1.2 Some Aspects of Time Allocation Behaviour

This subsection looks at the influences the different attribute variables have on the time allocation of the household members. The behaviour of the father, the mother, and the children, are separately looked at and discussed below.

4.1.2.1 Fathers' Time Allocation Behaviour

Father's market participation rate appears to increase as their education and age levels are higher, and as the market wage rates of their wives are higher. The effects of these variables on their home times are indeterminate, but tend to have a positive effect also when looking only at the results of the first pair. When the market wage rate of the father is low, and the education levels of his wife and children are low, the father appears to be more highly compelled to devote more time for market-production activities. Perhaps the dictation of needs (i.e., consumption and other expenditures) comes, to a certain extent, into this decision. While a higher market wage rate of the father and a high level of education of the children somewhat decreases the fathers' home times, a higher education level of the wife would tend to increase the home times of the fathers. Generally, however, these three variables' effects on the fathers' home times are indeterminate.

The higher the market wage rate of the children, and the higher the net assets and the non-labour incomes of the households, the more definitely a father's home time is less. Although indeterminate, these three variables' effects on market participation rates of the father would tend to be negative in the majority of cases. As the wives' and children's ages, and family size increase, the home time of the fathers increase, too; and though somewhat indeterminate, the father's market-participation rate tends to increase, as well.

4.1.2.2 Mothers' Time Allocation Behaviour

Mothers' decisions to allocate time for market and home production activities appear not only to be affected by the same variables but to follow the same direction. The mothers' home time and market time are shown to be positively affected by their own ages, the ages of their children, and the size of the family. Thus, the older a mother is, the older her children are getting to be, and the more additions to the family are, the higher is the number of hours a mother devotes for home-productive and market-productive activities. In contrast, the higher the non-labour income and the net assets of the households, and the higher the market wage rates of the children, the smaller times devoted to home and market production are going to be. A search for a compensating explanation to this could perhaps be found in children's tendency to devote more home-time hours as shown in Table 4.1.2.

Although generally indeterminate, the low education level of the mother, low market wage rate of the father, and low level of education of the children, are shown to have a negative effect; i.e., tend to increase mother's market and home times. Similarly indeterminate as to their effects on mothers' home and market times are the variables education of the father, market wage rate of the mother, and age of the father. However, a seemingly stronger inclination for a positive relationship or influence occurring is evident. Generally, despite the same effect of same variables on mothers' productive activities, home time is still seen to be the primary point of concentration as shown by the sequence of relative weights.

4.1.2.3 Children's Time Allocation Behaviour

The effect of all the "attribute" variables on the market-participation rate of household children are exactly the same as that of their fathers. Also, just like in the case of their fathers, the variables

education and age of their fathers, market wage rate of mothers, have the same positive indeterminate effect on the children's home times. High market wage rates of children, high non-labour income and net assets, all increase the home time allocations of children. As their mothers and they themselves are getting older, as their number is increasing, the children's home-time decreases. A higher level of education of all the family members, and a high market wage rate of the mothers, tend to increase the home times of their children. The same thing applies when their fathers' ages are increasing. However, a high market wage rate of the father would tend to decrease the children's home times. This effect is rather difficult to explain considering that a further look could not show who among the other members would compensate for the effective reduction. It may thus be necessary to stress at this point how an indeterminate relationship further requires looking into the influence of other factors to check whether preliminary conclusions derived at first glance could be supported.

4.1.3 Time Allocation Within the Households - Members' Interactions

This subsection focuses attention to the interactions within the households, as they are affected by three general "attribute" variables: (1) non-labour income and net assets of the households, (2) market wage rates of members, and (3) the productivity-contributing variables, e.g. age and education. Furthermore, attempt is made to reconcile results with the time allocation theoretical framework given in Section 1.2.2 of this study.

4.1.3.1 Time Allocation with Non-Labour Income and Net Assets

An increase in the non-labour income and net assets of the household tantamounts to decreased market time of all household members, but is most certain on the part of the mothers than the fathers and the children. This finding substantiates, to a certain degree, Figure 1.4 of this study.

Theory propounds that an increase in non-labour income produces no change in home production time. Results, however, suggests a decrease in home times of both fathers and mothers, although there seems to be a compensating increase on the part of the children, thus there may still be no effective change in home productive time in the household.

4.1.3.2 Time Allocation and Market Wage Rates

An increase in market wage rate of the fathers, assuming prices remaining the same, tends to decrease the home and market times of all the household members. The opposite is true as regards an increase in market wage rate of the mothers. Although an increase in market wage rates of the children tend to decrease all the family members' market time, it decreases the home times of both the fathers and the mothers while increasing that of the children.

Figure 1.3 in Chapter 1 shows that the effect of increased market wage rate to fathers' home times is a reduction. This is found true in this study especially because most fathers primarily work in the market. The increase in the wages may have made the price of goods in terms of time lower, and this made home-production less profitable. A look would show that the fathers' market times decreased, thus it may be safe to assume that the reduction in home work may have been less than the increase in their leisure times causing market times to decrease.

The behaviour of the fathers in response to changes in their market wage rate leaves a question for further discussion. It seems to be an irrational behaviour to decrease market participation rate when market wages increase. However, this study seems to show precisely this fact. Herein may then lie one of the many explanations to continuing poverty of certain members of the lowest-income classes. This preliminary conclusion had further been provoked by the general observation in Chapter 3 that a

market-income cut-off level whereby farmers stop increasing their productive activities seems to exist.

Most mothers do not actively work in the market. The study again substantiates the theory that an increase in real wages lures the non-market participating individual (in this case the mothers) to increase their market participation rate. For most of the sample wives of this study, however, even home times do increase, but other factors may well have contributed to this. Whether the theory also applies to the children is rather difficult to see because of the question of market employment or not. The only significant knowledge garnered with respect to children's time allocation is the fact that they tend to be the shock absorbers of decreases in their parents' home times.

4.1.3.3 Time Allocation and the Variables Age and Education

Previous studies have shown that as a person gets older, and as his level of education gets higher, most likely his productivity increases. Although this study may safely assume that age and education increases, implicitly, the productivity of the members, the separate influences of these variables are investigated.

The study shows that age generally increases the productive time allocations of all household members. The only exception is in the case of children where age increases of the mother and the father tend to decrease their home times. The suggestion that this is resultant of probably decreased time for care of siblings may be valid. Additionally, it may be noted that where there are definite changes in home times of any member of the household, another is very likely to bear such a change. This further substantiates the fact that a "household management adopts certain distributional rules and procedures enabling it to act as one" (Banskota and Evenson, 1977), rather than a direct result of

the attribute variables themselves.

A positive influence of education of the father to productive time of all members is evident. This is true also in cases of increased education of mothers and children when related to children's home times. However, this study shows a negative influence of mothers' and children's education level with the productive times of fathers and mothers. The conclusion of low education level of mother and children tending to increase their productive times to reach a target income may be a fairer view rather than accepting the suggestion of high education level tending to decrease productive time. This might warrant further study, however.

Reconciling the results with that suggested in Figure 1.5 in Chapter 1 is not further attempted owing to the difficulty of ascertaining whether the assumed productivity increase due to higher age and education applies for home or market activities. This is further prevented by the insufficiency of data on the cost of, and actual time for, going to and coming from market-productive activities.

Some of the results of the study are quite understandable, and most, in fact, have been expected on a priori grounds. It must be remembered that the conclusions arrived at and outlined above may not necessarily concur with all previous studies owing to differences in data and restrictions of the model used with respect to assumption requirements. Despite the dropping of the leisure variables to minimize first-order correlation problems, the requirements that (1) the variables be interval in level of measurement, (2) the variables be linearly related, and (3) the variance of the variables be constant, could not be closely and completely adhered to, and thus have only been assumed to be true. Nevertheless, the analysis had still been undertaken in the absence of an appropriate parametric program package to handle it otherwise.

Furthermore, it must be mentioned that the choice of canonical correlation had been precipitated by the existing collinearity among the set of time variables. This was evidenced by an r^2 of 99.99% when one of the time variables was regressed on the 2 other time variables and the so-called "attribute" variables. Even if the specification problems may have been minimized, the required simultaneous treatment of the highly related time variables earlier eluded to would not have been possible. Thus, regression analysis had proven to be unwieldy in this case. Factor analysis, on the other hand, could have handled a greater number of variables unlike multiple regression analysis. However, it offers no distinction between independent and dependent variables, and may only have indicated the relevant factors among the gamut of independent variables. Hence, use of this was not attempted especially because it addresses a different set of issues to the present objectives.

4.2 Analysis of Full Income of Households and Individuals

Regression analysis has been employed to explore then describe the linear dependence of full income of the households on several independent variables. Section 2.2.2 of this study had outlined the working base necessary for these exploratory analyses. This is undertaken to depict the possible interactionary factors influencing the "component" members of the household. After having identified the "explanatory" variables to household income, attention is then turned to the individuals themselves to check which of possible variables best explain their respective incomes. This is undertaken because of the intuitive feel that their traits/attributes determine their individual full-income earning capacity. It is additionally done to check off any cancelling effects of aggregation which may surely have happened with the variables used in analyzing the full income of the household itself.

Just like in canonical correlation, non-adherence to the underlying assumptions of the least squares regression technique presented problems. This had been seen to be especially true when the household was the center of discussion mainly because of their size and age distribution differences. Variable transformations attempted herein gave more unsatisfactory results than an assumed linear relationship. Despite these facts, the analyses are still presented mainly to provoke discussions and further studies when data may so permit.

4.2.1 Correlation and Regression Analysis of Household Full Income

There are two main difficulties encountered in the analysis of full income. These are, namely: (i) the small data sample, (ii) the demographic differences of the households, particularly their differences not only in size but also in the ages and level of education of the members. Least squares regression analysis. Despite the violations of a constant variance the analysis is again only assumed to be applicable here as a starting point. The explanatory variables included in household full income analysis are mostly aggregations and averages derived from data on members of the households.

The model that had been proposed as a starting point is:

$$FY = f(w_m, t_m, t_h, NY, K, Ed, Age, FS, OC, Cons, TE)$$

It was mentioned earlier in Chapter 2 that in the absence of abstract goods and their values, full income can be arrived at through time and their respective prices, imputed by the household members plus non-labour income. This is similar to the value-added approach of income derivation. Because of totalogy effects expected, the attribute variables education, age, family size and net assets have been included to check for any significance. Further addition of the variables consumption and total expenditure makes the

model, at first glance, a combination of micro and macro income concept. However, this is not the case in this study if the rationalization to their inclusion below is looked at.

This particular aspect of study is rather critical, it being one of the first to attempt to measure full income the unconventional way. The cost of effort, no matter how detailed it may have been looked at, remains questionable. The time inputs, multiplied by their corresponding prices, may have been closely accurate. However, farming is still recognized to be a mode of employment the effort for which is still difficult to value.¹ In the absence of data on the value of benefits and costs which may closely approximate the true value of the effort, and on which a comparison could be made, only a certain range can be safest to infer. Although the problem may not have been considered in the actual computation, it cannot be overlooked in its explanation.

Carl Hamilton² had established the minimum and maximum value of family labour cost, which are, respectively, the cost of increased food requirement, and the one based on revealed preference. Increased physical effort implies increased energy, which in turn implies food intake. This further requires not only the calorie figure for increase of work effort but also the calorie content of the food item actually consumed. These, much more prices, are not available for the study. Thus, crude as it may be, the consumption variable is simply turned to. Likewise, the amount of total expenditure (this is for all other expenses outside of consumption) had been considered to reflect the "revealed preference" of households, as, to a certain degree, it reflects the level of increased utility of households' incomes.

1 Hamilton, Carl 1976. 'The Cost of Effort Expended: Examination of Some Arguments for its Omission and an Illustration', Oxford Economic Papers, Vol.28, No.2, p.305.

2 Ibid, pages 309-313.

The correlation analysis revealed that except for leisure time and total consumption, household full income is positively correlated with all other explanatory variables included in the model. Thus, the higher the age, the family size, education level, market and home time, market wage rate, total expenditure and net assets are, the greater the income of the household is expected to be. However, none of the correlation coefficient was highly significant as shown in Table 4.2.1.1 below.

TABLE 4.2.1.1

CORRELATION COEFFICIENTS OF HOUSEHOLD FULL INCOME VARIABLES

	FY	AGE	FS	ED	TL	TM	TH	WM	TC	TX	NA
FY	1.000										
AGE	0.286	1.000									
FS	0.316	0.377 ^c	1.000								
ED	0.313	0.137	0.087	1.000							
TL	-0.051	-0.051	-0.024	-0.154	1.000						
TM	0.188	-0.045	0.008	-0.214	0.183	1.000					
TH	0.281	-0.071	0.219	0.081	-0.098	0.553	1.000				
WM	0.584	0.277	0.390 ^c	0.429 ^b	-0.262	0.004	0.417	1.000			
TC	-0.409 ^b	-0.122	-0.274	-0.044	0.116	-0.515 ^a	-0.612 ^a	-0.538 ^a	1.000		
TX	0.083	0.173	0.004	0.190	0.157	0.027	-0.232	-0.095	0.229	1.000	
NA	0.065	0.034	-0.083	0.080	-0.256	0.039	0.309	0.388 ^c	-0.354	0.007	1.000

Note: a significant at the 1% level.

b significant at the 5% level.

c significant at the 10% level.

FY - means full income of households.

A high leisure time understandably decreases full income. Total consumption of the farmers show a negative correlation with household income, and is significant at the 5% level. If consumption is viewed as a factor which motivates full income in the sense that it increases efforts out of the clear need to do so, then the correlation analysis leads to an improbable result. However, consumption can also be viewed as a "use" of household full income, and, apparently, this is what the present analysis suggests. Because of this, the final portion of this subsection discusses the association of total consumption with full income of the household.

The lack of strength of the linear relationship among most variables is made much more evident by the non-significance of most correlation coefficients. Among the only significant associations shown in the study are the positive correlation of family size, education, and net assets to market wage rates. Education level, if high, will increase market wage rates. Net assets and market wage rates can understandably increase together, too. The interaction of family size with market wage rate is difficult to see, however. All of the time variables are negatively correlated with age, but fail to be statistically significant. These results are highly questionable, simply because of the extreme differences existing among the components of most sample households. Three regression models were specified and estimated to check on the best explanation to household full income. Table 4.2.1.2 shows the estimated coefficients and the regressions undertaken.

The estimated parameters of the full household income model were:

$$\begin{aligned} \text{FY} = & 0.435\text{TM} - 0.086\text{TH} + 267.508\text{AGE} - 75.502\text{FS} + 157.039\text{ED} \\ & + 0.926\text{TX} + 1.121\text{WM} - 13461\text{TC} - 0.086\text{NA} + 29364.0 \text{ (constant)} \end{aligned}$$

This regression explains about 50.5% of the total variation in full household income, as shown by the R^2 . Note that the coefficients of the variables

TABLE 4.2.1.2
COEFFICIENTS OBTAINED FROM THREEHOUSEHOLD FULL INCOME
REGRESSIONS

Dependent Variable	A		B		C	
	FY	t-	FY	t-	FY	t-
Independent Variables:	β	value	β	value	β	value
Market Time (TM)	0.435	1.678 ^b	0.452	1.98 ^b	0.412	2.32 ^a
Home Time (TH)	-0.086	0.268	-0.078	0.75	-	-
Leisure Time (TL)	-	-	-	-	-	-
Age (AGE)	267.508	1.064	268.799	1.09	256.375	1.17
Family Size (FS)	75.502	0.326	-72.778	0.32	-	-
Education (ED)	157.039	0.625	152.459	0.62	161.977	0.69
Total Expenses (TX)	0.926	2.021 ^b	0.935	2.09 ^b	0.892	2.13 ^b
Wage in Market (WM)	1.121	2.541 ^a	1.147	2.88 ^a	1.064	3.09 ^a
Total Consumption (TC)	-13.461	0.151	-	-	-	-
Net Assets (NA)	- 0.086	0.865	-8.349	0.87	-8.056	0.91
Constant (α)	27016.89	-	26499.80	-	24270.47	-
Overall F	3.5135		4.074		5.696	
Multiple R	0.711		0.710		0.708	
R ²	0.505		0.505		0.501	
Adjusted R ²	0.361		0.381		0.413	
Standard Error	34386.955		33857.768		32956.086	

Note: a significant at the 1% level.

b significant at the 5% level.

market time and total expenditure are significant at the 5% level while market wage rate is significant at the 1% level. The adjusted R², which is a more conservative estimate of the per cent of variance explained, however, is low relative to the R² value. These are particularly shown in Column A of Table 4.2.1.2.

In the second regression shown in Column B, the variable total consumption was dropped because it is the least partially significant variable included. This newly specified model has the following parameters:

$$\begin{aligned} \text{FY} = & 0.452\text{TM} - 0.078\text{TH} + 268.799\text{AGE} - 72.778\text{FS} + 152.459\text{ED} \\ & + 0.935\text{TX} + 1.147\text{WM} - 8.349\text{NA} + 26499.8 \text{ (constant)} \end{aligned}$$

This explains 50.5% of the full household income variation, with a more conservative estimate of 38% after adjusting for the number of independent variables and numbers of cases. The three variables found significant in the previous regression remained the same in significance levels.

In the final regression model specified in Column C, the two least partially significant variables in the third regression were dropped. These are home time (TH) and family size (FS). The results showed a marked improvement in the model. For one thing, market time is now found significant at the 1% level. Total expenditure and wage in the market remained significant at the 5% and 1% level, respectively, as in the preceding regressions. Furthermore, the difference between the R^2 and the adjusted $\bar{R}^2$ is smaller than in the first two regressions. About 50% of the variation of the Laguna farmers' full household income is explained by this regression. The conservative estimate of $\bar{R}^2$ is 41%. The overall F has also risen to 5.696. This final full household income model has the parameters:

$$\begin{aligned} \text{FY} = & 0.412\text{TM} + 256.375\text{AGE} + 161.977\text{ED} + 0.892\text{TX} \\ & + 1.064\text{WM} - 8.056\text{NA} + 24270.47 \text{ (constant)} \end{aligned}$$

Thus, the variables found to best explain the households full income are market time and wage rates, age, education, net assets and total expenditure. The model specified in Column C avoids the problems resulting

from the fact that the three time variables, i.e. TM, TH and TL are, strictly speaking, endogenous variables determined simultaneously. That is, they seem to unity and are expected to be perfectly correlated. In such situations, the researcher should ideally use a multi-equational model. However, this was not attempted in this study.

4.2.1a Association of Total Consumption and Full Income

When undertaking regression analysis, total consumption is not considered to be an important variable to explain full income. However, the difficulty of explaining why it is negatively correlated with full income has motivated further investigation. As has been mentioned earlier, consumption can perhaps be viewed as a "use" as well as a "motivating factor" to increase full income. The former viewpoint is true in the sense that one of the purposes of full income is for the purchase of food. The latter can be held true if it is considered to be some sort of stimuli to encourage efforts at earning more income. That is, the more consumption expense a family anticipates, the more time they would devote for income-earning activities to cope with the need, i.e., consumption horizon.

This relationship is investigated through the use of simultaneous equations approach and the two-stage least-squares method. For simplicity of exposition and to illustrate mainly the procedure to be followed, let us assume that the two structural relationships in the simultaneous equations model are:

$$C = F_1 (Z, S, I),$$

and
$$I = F_2 (C, W, Z)$$

where C = consumption, I = full income, Z = family size, S = school expenses and W = wage. Both of these two simple structural relationships are just-identified. Consequently, they could be equally estimated by either the indirect least-squares method or the two-stage least-squares method.

The two-stage least-squares method was used in view of its advantage when data is subject to errors of measurement and in the first stage total consumption and full income are held to be both functions of three exogenous variables, namely family size, wage in the market, and school expenses. It is not difficult to see why the first two variables are chosen. School expense is chosen because it has been found to be one of the biggest use of income of most Laguna farm families. As a consequence, it is expected to have some effect on total consumption. The models estimated in the first stage would respectively give estimated total consumption and full income for use in the second stage estimation.

It is found that the three exogenous variables are all negatively correlated with total consumption but positively correlated with household income. In both regressions, only the variable market wage rate is found to be significant in explaining total consumption and full income. The overall F in both regressions indicate high significance of both 1st stage models; however, the R^2 's are not very high. This possibly suggests insufficiency of explanatory variables in both cases and limits the predictive powers of the first stage estimation to estimate full income and total consumption to be used in the second stage. However, this exploratory analysis was continued for its educational benefits. Table 4.2.1a.1 rounds up the first-stage regression results.

In the second stage, the parameters of the structural relationship are estimated. Here, the endogenous variable total consumption is held to be a function of family size, school expenses, and estimated household income (from first stage). Also, the second endogenous variable full income is held to be a function of estimated total consumption (also from first stage), wage in the market, and family size. Table 4.2.1a.2 shows the regression coefficients obtained in the second stage of least squares method.

TABLE 4.2.1a.1
RESULTS OF THE FIRST STAGE REGRESSIONS

Dependent Variable	Total Consumption (TC)		Full Income (FY)	
Independent Variables:	Coefficients	t-values	Coefficients	t-values
Family Size (FS)	-0.346	0.700	71.180	0.345
Wage in Market (WM)	-0.002	3.499 *	1.139	3.678 *
School Expense (SCX)	-0.001	0.818	0.645	1.503
Constant	160.520	-	31616.530	-
Overall F	5.469		7.818	
Multiple R	0.554		0.623	
R ²	0.307		0.388	
Adjusted R ²	0.251		0.338	

Note: * - denotes significant at the 1% level.

TABLE 4.2.1a.2
RESULTS OF THE SECOND STAGE REGRESSIONS

Dependent Variable = Total Consumption			Dependent Variable = Full Income *		
Independent Variables:			Independent Variables:		
	Coefficients	t-values		Coefficients	t-values
Estimated Full Income	-0.002	3.499	Estimated Total Consumption	-457.369	4.588
School Expense	-0.002	1.997	Wage in Market	-	-
Family Size	-0.184	0.359	Family Size	-	-
Constant	232.602	-	Constant	105938.7	-
Overall F	5.469				
Multiple R	0.554				
R ²	0.307				
Adjusted R ²	0.251				
Standard Error	83.839				

Note: * - F-level or tolerance level insufficient for further computation.

The t-values show that estimated household income is a significant explanatory variable to total consumption, and vice versa, estimated total consumption is also a significant explanatory variable to household full income. There are glaring limitations to the models and the results arrived at. However, only availability of more refined data and further study could prove or disprove the preliminary conclusions held herein that total consumption and full income are jointly determined and there is a two-way relationship between them.

4.2.2 Correlation and Regression Analysis of Individual Full Income

In the analysis of household full income, included in the best explanatory variables were age and education, which were relatively insignificant. A further look at these variables, from the perspective of each individual is made due to the suspicion of cancelling effects brought about by aggregation procedures. Along this reasoning, another exploratory model evolved, that is:

$$IY = f (TM, TH, SCX, WM, ED, TS, AGE)$$

where IY pertains to Individual full income. Note that SCX (school expenditure) has replaced TX (total expenditure) used earlier in the household income analysis. This has been done in view of the finding that school expenditure is the greatest component of total expenditure, a variable which was significant in the household full income analysis, not to mention that data is available for most of the sample individuals. Note, as well, how only two of the time variables have been included to minimize first-order correlation problems.

Correlation coefficients among the nine variables of the above model were estimated. Table 4.2.2.1 shows the calculated correlation coefficients.

TABLE 4.2.2.1

CORRELATION COEFFICIENTS OF INDIVIDUAL INCOME VARIABLES

	IY	AGE	FS	ED	TL	TM	TH	WM	SCX
IY	1.000								
AGE	0.376 ^a	1.000							
FS	-0.138 ^b	-0.503 ^a	1.000						
ED	0.207 ^a	-0.380 ^a	0.253 ^a	1.000					
TL	-0.848 ^a	-0.483 ^a	0.215 ^a	0.290	1.000				
TM	0.894 ^a	0.384 ^a	-0.138 ^b	-0.190 ^a	-0.862 ^a	1.000			
TH	0.028	0.243 ^a	-0.170 ^a	-0.222 ^a	-0.382 ^a	-0.139 ^b	1.000		
WM	0.663 ^a	0.347 ^a	-0.158 ^a	-0.251 ^a	-0.536 ^a	0.609 ^a	-0.062	1.000	
SCX	-0.080	-0.138 ^b	-0.076	-0.113 ^a	0.109	-0.104	-0.022	-0.059	1.000

Note: a significant at the 1% level.

b significant at the 5% level.

The above table indicates that five independent variables are very significantly correlated with individual full income. Of these independent variables are age, time devoted in the market, and wage in the market. This means that the older an individual is, the longer time he/she devotes for market time; and the higher his/her market wage rate is, the higher his full income will be. Total leisure time is significantly though negatively correlated with the individual's income. This is understandable in view of the fact that the more leisure time an individual enjoys, the less likely time is available for his market-productive activities. This substantiates the time allocation mechanism presented in the theoretical background of this study. Family size is shown to be negatively correlated to individual full income, and is significant only at the 5% level. A possible explanation is that the less the number of family members, the more likely one can

participate in income-earning activities, as evidenced by its correlation with market time. However, this conclusion is withheld until the regression analysis results are discussed. Home time and school expense are expected to have a positive and negative correlation, respectively, with individual full income. However, the estimated correlation coefficients failed to be statistically significant.

The age variable was found to be positively correlated with total market time, total home time, and wage in the market. All the estimated correlation coefficients were at the 1% level. The reason is rather obvious. However, it is negatively correlated with family size, education, total leisure time, and school expenses. The younger an individual is, the higher the leisure time he/she enjoys. The apparent higher education level of most children relative to that of their parents, and that of the increasing significance attached to education in latter years, as is evident in the descriptive analysis in Chapter 3, must be possible explanations to the negative correlation of education and schooling expenses with age. The appropriateness of the inclusion of family size as a regressor in individual income becomes more doubtful upon examining its correlation with the other independent variables. The place or number in the family could have given a more meaningful result; but this, however, is not attempted in this study in view of unavailability of this information.

The level of individual education is positively correlated with leisure time, but negatively correlated with market time, home time, and wage in the market, at the one percent significance level. A great proportion of individuals sampled was students, therefore it is understandable how the time spent in getting higher and further education pulls down time for home and market production. Wage rates are consequently low, as well.

Leisure time variable is negatively correlated with market and home time, as well as with market wage, and is significant at the one per cent level. There is a very high collinearity between leisure time and market time.

Market time is negatively correlated with home time and leisure time, as expected, and in confirmation of the theory presented earlier in Chapter 1. Also, the lower one's wage in the market is, the more likely one devotes more hours for market work to compensate.

Along similar reasoning to that followed in the analysis of full household income, three regression analyses were undertaken to check on the most appropriate specification and best explanation of individual incomes. In Table 4.2.2.2 that follows, Column A shows the parameters estimated when the data is fitted to the full model specified earlier. Columns B and C show the estimated coefficients of the other two regression models attempted. The coefficients obtained in all three regressions remained more or less the same. The significance of the explanatory variables improved as the number of variables are reduced. The values of the R^2 's did not change greatly which might indicate the possible collinearity between the variables dropped in Models B and C and the remaining independent variables in these models.

The estimated model represented in Column A is:

$$\begin{aligned}
 IY = & -2.349 + 1.111TM + 0.416TH + 0.909WM - 0.042AGE + 0.100SCX \\
 & + 0.013ED + 0.117FS \quad \dots A
 \end{aligned}$$

This regression explains about 85% of the total variation in individual incomes. The coefficients of the variables TM, TH, and WM are all of the expected signs and are statistically significant at the 1% level.

In view of the very low partial significance of school expense and family size and the doubt as to the appropriate inclusion as an

TABLE 4.2.2.2

ESTIMATED COEFFICIENTS FROM FOUR INDIVIDUAL INCOME REGRESSIONS

	A	B	C
Dependent Variable	IY	IY	IY
Independent Variables:			
Market Time (TM)	1.111(29.83) ^a	1.111(29.95) ^a	1.111(29.95) ^a
Home Time (TH)	0.416(7.49) ^a	0.416(7.48) ^a	0.407(7.45) ^a
Leisure Time (TL)	-	-	-
Wage in Market (WM)	0.909(7.33) ^a	0.908(7.33) ^a	0.894(7.29) ^a
Age (AGE)	-0.042(1.21)	-0.050(1.59)	-0.056(1.88) ^b
Education (ED)	0.013(0.780)	0.014(0.83)	-
Family Size (FS)	0.117(0.540)	-	-
School Expenses (SCX)	0.100(0.500)	-	-
Constant	-2.349	1.261	-0.769
Overall F	331.301	398.282	498.112
Multiple R	0.919	0.907	0.919
R ²	0.846	0.823	0.845
Adjusted R ²	0.843	0.820	0.844
Standard Error	9.447	10.107	9.433

Note: Figures in parentheses are t-values.

a significant at 1% level.

b significant at 5% level.

explanatory variable of the latter, these are dropped in the second regression undertaken, referred to as Model B. The estimated parameters of this new model are:

$$IY = 1.261 + 1.111TM + 0.416TH + 0.908WM - 0.050AGE$$

$$+ 0.014ED$$

...B

Just over 82% of total individual income variations is explained by Model B, and the same explanatory variables as in Model A are significant.

However, the significance of the age factor seemed to be improving. Consequently, a last regression was undertaken, dropping education from the

model. Although the coefficients remained more or less the same, the $\bar{R}^2$ of Model C is almost identical to those of Model A. The estimated parameters of Model C are:

$$IY = -0.769 + 1.111TM + 0.407TH + 0.894WM - 0.056AGE \quad \dots C$$

The age variable like the three other variables, is now significant but at a lower level. Also, the adjusted R^2 , which takes into account the number of degrees of freedom and is a more conservative estimate of the percentage of variance explained after adjusting for the number of variables and the number of cases, indicate the satisfactory results of the regression analyses. The standard error in regression analysis is a measure of the "average error" of predicting IY from the model. This is seen to be least in the third regression undertaken, viz., Model C specification. Finally, the overall F, by its magnitude, shows that the overall fit of the regression line is very significant.

4.3 Association of Time Allocation With Income

The general objective of this study is to find out the relationship between time usage and income. In the process of looking for explanatory factors affecting time and income variables, the association of time and income has been touched upon. Although the results more or less conformed with expectations, the limitation of the discreteness of most variables highly makes the results questionable. Therefore, this section presents other statistical measures of association made available through the employment of contingency table analysis.

The joint frequency distribution of cases according to the two classificatory variables time and income have been analyzed through the

chi-square statistic.¹ This helps determine whether a systematic relationship exists between the two variables. However, this, too, has some limitations in that although it helps in deciding whether the variables are independent or related, it does not tell how strongly they are related, the reason being that the χ^2 is not independent of the sample and table size. This limitation is partly overcome by further summarizing the distributions with two other measures of association, i.e., the Cramer's V² and the Tau C.³ While the former gives an idea on the strength of relationships, the latter indicates the direction or manner of association.

- 1 Chi-square, a test of statistical significance, is computed as follows:

$$\chi^2 = \sum_i \frac{(fo_i - fe_i)^2}{fe_i} \quad \text{where: } fo_i \text{ is observed frequency in each cell}$$

$$fe_i \text{ is expected frequency in each cell,}$$

$$\text{calculated as } fe_i = \frac{c_i r_i}{N}, \text{ where}$$

$$c_i - \text{column marginal frequency}$$

$$r_i - \text{row marginal frequency}$$

$$N - \text{total number of valid cases.}$$

The greater the discrepancy between the expected and actual frequencies, the larger chi-square becomes, which usually indicates presence of relationship.

- 2 The Cramer's V is a measure of strength of relationship which corrects for the fact that the value of chi-square is directly proportional to the number of cases N by adjusting the χ^2 value, in large tables with any number of rows or columns. It is computed as:

$$V = \left(\frac{\phi^2}{\min(r-1)(c-1)} \right)^{\frac{1}{2}}, \quad \text{where } \phi = \left(\frac{\chi^2}{N} \right)^{\frac{1}{2}}$$

$$\min - \text{means minimum}$$

$$r \text{ \& } c - \text{are rows and columns, respectively}$$

It ranges from 0 to +1. N - number of cases

A large V denotes high degree of association, while a low V denotes low degree of association.

- 3 Tau C is a measure of association between two ordinal-level variables which use information about the ordering of variables by considering every possible pair of cases in a rectangular table. Each pair is checked to see if their relative ordering is the same (denoted by P) as their relative ordering on the second variable or is different (denoted by Q). Its formula is:

$$\text{Tau C} = \frac{2 \min(P-Q)}{N^2 (\min-1)}, \quad \text{where P \& Q are as mentioned above, min - means}$$

$$\text{whichever is the smaller between row or column}$$

$$\text{and N - total sample.}$$

The income variables have been computed with the use of time as an accounting unit. Hence, the dependence and association should be obvious. Therefore, the analysis had been elaborated through the introduction of control variables; namely: age, education, and family size, to check for any meaningful results.

Tables 4.3.1, 4.3.2, 4.3.3 include the statistics on the association of home time, market time, and leisure time, respectively, with incomes by education, age, and family size.

Generally speaking, the tables suggest the following:

- (1) the independence of home time and market income, and, conversely, the independence of market time and home income;
- (2) the statistically significant dependence of market time with market income, home time with home income, leisure time with both market and home income; and
- (3) the understandably statistically significant dependence of all three classificatory time variables with total income, total income being composed of market and home income.

These are true under all three controls offered by the variables education, age, and family size.

The other two statistics, Cramer's V and Tau C, confirm the second and third observations mentioned above. The strong positive relationships among (a) home time with home income, (b) market time with market income, and (c) both home and market time with total income, as expected, are evident in the tables. Likewise, the strong negative

TABLE 4.3.1

STATISTICS ON THE ASSOCIATION OF HOME TIME WITH INCOME
BY EDUCATION, AGE, AND FAMILY SIZE *

	Home Time With Market Income			Home Time With Home Income			Home Time With Total Income		
	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)
<u>Education</u>									
(1) no schooling	0.516	0.446	-0.083 (0.283)	0.000	0.782	0.741 (0.000)	0.378	0.474	0.194 (0.119)
(2) elementary	0.736	0.187	-0.057 (0.138)	0.000	0.672	0.587 (0.000)	0.000	0.309	0.188 (0.001)
(3) high school	0.459	0.219	-0.187 (0.001)	0.000	0.623	0.627 (0.000)	0.000	0.344	0.045 (0.244)
(4) college	0.982	0.194	-0.106 (0.064)	0.000	0.716	0.555 (0.000)	0.001	0.435	0.208 (0.005)
(5) post-graduate	0.908	0.215	-0.159 (0.082)	0.001	0.745	0.437 (0.000)	0.033	0.546	0.159 (0.108)
<u>Age</u>									
(1) 6 - 11 years	-	-	-	0.000	0.762	0.228 (0.000)	-0.000	1.000	0.129 (0.000)
(2) 12- 17 years	0.391	0.223	-0.035 (0.275)	0.000	0.623	0.636 (0.000)	0.000	0.369	0.309 (0.000)
(3) 18- 25 years	0.586	0.247	-0.132 (0.020)	0.000	0.710	0.453 (0.000)	0.000	0.409	0.097 (0.078)
(4) 26- 35 years	0.588	0.483	-0.046 (0.408)	0.000	0.711	0.727 (0.000)	0.091	0.671	0.449 (0.015)
(5) 36- 50 years	0.227	0.327	-0.323 (0.000)	0.029	0.671	0.686 (0.000)	0.001	0.442	-0.133 (0.076)
(6) 51 up	0.085	0.345	-0.248 (0.003)	0.000	0.690	0.680 (0.000)	0.171	0.327	-0.048 (0.298)
<u>Family Size</u>									
(1) 2 members	0.849	0.408	-0.375 (NA)	0.191	0.816	0.833 (NA)	0.301	0.764	0.083 (NA)
(2) 3 - 5 members	0.289	0.263	-0.016 (0.412)	0.000	0.732	0.672 (0.000)	0.002	0.362	0.244 (0.001)
(3) 6 - 8 members	0.621	0.163	-0.141 (0.002)	0.000	0.607	0.535 (0.000)	0.000	0.355	0.130 (0.009)
(4) 9 + members	0.632	0.172	-0.031 (0.187)	0.000	0.647	0.429 (0.000)	0.000	0.365	0.164 (0.000)

* Computer Results from Subprogram Crosstabs.

Note: NA - means not available in print-out.

TABLE 4.3.2

STATISTICS ON THE ASSOCIATION OF MARKET TIME WITH INCOME
BY EDUCATION, AGE, AND FAMILY SIZE *

	Market Time With Market Income				Market Time With Home Income				Market Time With Total Income			
	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)
<u>Education</u>												
(1) no schooling	0.000	0.809	0.561 (0.000)	0.932	0.315	-0.214 (0.075)	0.004	0.709	0.517 (0.000)			
(2) elementary	0.000	0.708	0.569 (0.000)	0.869	0.194	-0.107 (0.034)	0.000	0.642	0.554 (0.000)			
(3) high school	0.000	0.711	0.681 (0.000)	0.601	0.207	-0.193 (0.002)	0.000	0.606	0.641 (0.000)			
(4) college	0.000	0.775	0.449 (0.000)	0.550	0.308	-0.077 (0.126)	0.000	0.665	0.427 (0.000)			
(5) post-graduate	0.000	0.816	0.454 (0.000)	0.686	0.365	-0.081 (0.243)	0.000	0.816	0.454 (0.000)			
<u>Age</u>												
(1) 6 - 11 years	-	-	-	-	-	-	-	-	-	-	-	-
(2) 12- 17 years	0.000	0.736	0.322 (0.000)	0.928	0.150	-0.040 (0.247)	0.000	0.579	0.343 (0.000)			
(3) 18- 25 years	0.000	0.705	0.620 (0.000)	0.497	0.282	-0.037 (0.297)	0.000	0.642	0.604 (0.000)			
(4) 26- 35 years	0.000	0.915	0.612 (0.000)	0.940	0.323	-0.031 (0.445)	0.001	0.885	0.658 (0.001)			
(5) 36- 50 years	0.000	0.676	0.745 (0.000)	0.059	0.363	-0.474 (0.000)	0.000	0.568	0.696 (0.000)			
(6) 51 up	0.000	0.731	0.794 (0.000)	0.171	0.359	-0.276 (0.002)	0.000	0.655	0.731 (0.000)			
<u>Family Size</u>												
(1) 2 members	0.003	1.000	0.609 (NA)	0.815	0.527	-0.469 (NA)	0.042	1.000	0.609 (NA)			
(2) 3 - 5 members	0.000	0.766	0.631 (0.000)	0.691	0.249	-0.069 (0.160)	0.000	0.708	0.596 (0.000)			
(3) 6 - 8 members	0.000	0.731	0.592 (0.000)	0.181	0.222	-0.112 (0.022)	0.000	0.620	0.584 (0.000)			
(4) 9 + members	0.000	0.663	0.430 (0.000)	0.978	0.131	-0.029 (0.230)	0.000	0.573	0.413 (0.000)			

* Computer Results from Subprogram Crosstabs.

Note: NA - means not available in print-out.

TABLE 4.3.3

STATISTICS ON THE ASSOCIATION OF LEISURE TIME WITH INCOME
BY EDUCATION, AGE, AND FAMILY SIZE *

	Leisure Time With Market Income			Leisure Time With Home Income			Leisure Time With Total Income		
	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)	Chi-Square Significance	Cramer's V	Tau C (Significance)
<u>Education</u>									
(1) no schooling	0.011	0.647	-0.492 (0.000)	0.335	0.484	-0.187 (0.124)	0.000	0.754	-0.706 (0.000)
(2) elementary	0.000	0.534	-0.440 (0.000)	0.000	0.327	-0.247 (0.000)	0.000	0.623	-0.658 (0.000)
(3) high school	0.000	0.547	-0.465 (0.000)	0.034	0.282	-0.180 (0.005)	0.000	0.617	-0.632 (0.000)
(4) college	0.000	0.560	-0.319 (0.000)	0.001	0.419	-0.189 (0.006)	0.000	0.602	-0.514 (0.000)
(5) post-graduate	0.000	0.727	-0.393 (0.002)	0.014	0.603	-0.222 (0.057)	0.000	0.824	-0.675 (0.000)
<u>Age</u>									
(1) 6 - 11 years	-	-	-	0.000	1.000	-0.066 (0.007)	0.009	0.701	-0.064 (0.000)
(2) 12- 17 years	0.000	0.618	-0.186 (0.000)	0.000	0.418	-0.290 (0.000)	0.000	0.580	-0.369 (0.000)
(3) 18- 25 years	0.000	0.507	-0.474 (0.000)	0.006	0.353	-0.247 (0.000)	0.000	0.576	-0.678 (0.000)
(4) 26- 35 years	0.251	0.438	-0.276 (0.080)	0.080	0.708	-0.673 (0.002)	0.012	0.764	-0.735 (0.001)
(5) 36- 50 years	0.000	0.574	-0.555 (0.000)	0.151	0.339	-0.056 (0.284)	0.000	0.680	-0.727 (0.000)
(6) 51 up	0.000	0.578	-0.545 (0.000)	0.010	0.399	-0.167 (0.046)	0.000	0.641	-0.693 (0.000)
<u>Family Size</u>									
(1) 2 members	0.079	0.842	-0.469 (NA)	0.731	0.601	-0.042 (NA)	0.050	0.935	-0.750 (NA)
(2) 3 - 5 members	0.000	0.562	-0.490 (0.000)	0.000	0.390	-0.342 (0.000)	0.000	0.681	-0.704 (0.000)
(3) 6 - 8 members	0.000	0.485	-0.428 (0.000)	0.000	0.306	-0.185 (0.000)	0.000	0.565	-0.632 (0.000)
(4) 9 + members	0.000	0.561	-0.339 (0.000)	0.000	0.352	-0.193 (0.000)	0.000	0.600	-0.496 (0.000)

* Computer Results from Subprogram Crosstabs.

Note: NA - means not available in print-out.

relationship of leisure time with both market and home income is shown. However, the significantly negative relationship of leisure time is relatively greater with market income than with home income under all three controlling variables.

The few meaningful conclusions to be drawn from this analysis relate to the influence of home time on market time and market income on home time. Despite the revealed independence of the two upon looking at the chi-square statistics, the Cramer's V and Tau C depict the existence of some kind of weak negative relationship. This observation is especially significant at high school level of education, 36 and up years of age, as well as in individuals belonging to families comprised of 6-8 members. Knowing that high school education happens to be relatively the highest level in Laguna farming households, it should be safe to infer that the higher one's education is, the greater negative effect home time will have on market income. Conversely, the greater negative effect market time will have on home income. Perhaps the same conclusion could be drawn when the age of a person is higher as when he comes from a relatively large-size family. Also, note the negative influence home time has on total income at age levels of 36 and above.

It should be remembered, however, that the one great flaw in this analysis is in the measurement of income itself. This study of association should have been more meaningful, realistic, and effective, had there been a chance of doing the same type of analysis using a conventionally measured income, for an appropriate comparison of results attained, as well.

CHAPTER 5

SUMMARY AND CONCLUSIONS

In both the fields of economics and sociology, a great pre-occupation still centers around the problem of poverty. Among the reasons for the difficulty of assessing the cause of poverty are the differences not only in biological make-up of individuals being assessed but also in value judgements of assessors. Individuals have always differed biologically; that is, in physical aspects, endurance, and ability. This is partly due to different settings of growth, different motivations and limitations. As a whole, poverty had been thought to be caused by three reasons: (1) lack of effort on the part of the individual concerned, (2) result of circumstances beyond his/her control, and (3) a combination of the two.

To a certain extent, this study focused on the efforts of some individuals, particularly the Laguna farmers. Just like most subsistence farmers, who oftentimes are claimed to be members of the impoverished class, they have been, and in fact still are, faced with economic decisions such as varieties of products and inputs to use as well as combinations of methods and procedures to employ in various activities. To some extent, uncontrollable factors such as government regulations and weather abnormalities affect the farmers' plans and decisions. Ultimately, however, it is their behaviour which determines their income level, income being the yardstick of their success or failure.

Detailed investigations of the behaviour of the farmers weremade possible by the treatment of time as their most important resource

in the generation of income. Its importance is magnified because it is the only common resource available to all individuals in the same quantities. This study associates more productive time-use with more efforts. Likewise, less productive time-use is held synonymous with less efforts. Insights on quantitative efforts of the farmers, therefore, have been gained through looking into their time budgets.

The different time uses of an individual are mainly three-fold: home-productive time, market-productive time, and leisure. Leisure includes time devoted for personal hygiene and all other passive type of recreation. In the case of the Laguna farmers, the choice of type of productive time-use has been found to be mainly dictated by norms. That is, a wife is generally thought of as being responsible for most home chores, while the husband is expected to devote most of his time to market-type chores or employment. The reader should note that market-type activities generally refers to income-earning activities outside of normal home chores.

The present study showed that on average, mothers spend 11 times as much home time hours as their husbands, and 4 times as much as their children. In contrast, fathers spend 7 times more market-productive hours than their wives and 5 times more than their children, on average. In addition, it revealed that the type of time use is affected by the age and education level of the individual concerned. The variable wage rate is an important factor affecting time allocation. However, this is suspected to be influenced by age and education variables in the first instance.

The use of canonical correlation analysis in arriving at some preliminary conclusions was quite useful in its capacity to allow for the simultaneous treatment of the interrelated time variables. Section 4.1.3

fully discussed the few meaningful findings from the analysis, however, these perhaps could be rounded up into two general conclusions. Firstly, time allocations are influenced not only by the person's attributes but also by the attributes of all other members of the household, and the degree of effect relatively varies with each individual. Secondly, whenever a certain household or individual attribute changes a household member's time allocation, at least one other member will likely bear such a change to maintain the original activity within the household system. This is more certainly the case if the change in time allocation is a decrease rather than increase.

The interpretations had, to a certain extent, been clouded by the incomplete adherence to some underlying assumptions of the technique used. It is therefore felt that conclusions, no matter how close they may have been to expectations per theory, are only preliminary. Future studies in this area, if and when all required conditions for the technique are satisfied first, might yield more significant and meaningful results.

In view of the fact that income has been estimated using time as an accounting unit, the association between income and time is fairly large. The more time devoted to more income-generating activities, the higher the income is expected to be. By contrast, the greater the quantity of leisure, the less the income is expected to be. Whether a higher income gives rise to increased time for leisure in farmers, as is suspected in high-income non-farming households, has not been demonstrated in the study.

The premise that time is the most important resource available to the household is substantiated by the results of the "exploratory" regression analysis on full household income. Net assets have been found to be among the important variables affecting full household income. However, it is relatively an insignificant factor unlike the productive-time variables.

Despite the earlier assertion that family labour valuation can only be accurately based on a certain range; i.e., that bounded by the crudely-considered variable consumption at one end and expenditure at the other, it must be pointed out that the full income computations arrived at using the new approach here were somewhat comparatively equal to conventionally measured income reported in the survey. Thus, it may be safe to infer that the alternative computational approach in arriving at full income in this study is questionable only in so far as the wage rates used were determined by the respondents themselves.

The variable wage rates in the market could possibly be an indication of the quality of effort in the sense that it is affected by educational level and age. If this is safely acceptable, then, in view of all the above findings, the hypothesis implicitly put forward throughout the study that it is mostly efforts which mainly determines the level of income of households is very well supported.

There are at least two other important findings of this study. For one thing, the question of cause and effect of total consumption with total income, or, for that matter, total effort as well, is put forward. Past studies had always considered consumption to be a function of income in the aggregate approach. The question of need (as in consumption) determining the effort (as in time, income) appears more relevant in a microeconomic sense. Thus, a further investigation of this is suggested. For another thing, the study had presented that wives and children do contribute a fair amount to the full income of the household. However, unlike Gronau's finding about wife's contributions being 44%, this study shows only 26%, perhaps as a result of differences not only of data but time classification itself. Despite these differences, it may still be safe to say that non-recognition of this fact in the past may have

contributed to the understatement of real income of most households.

To sum up, the findings presented should suggest to the policy-makers that motivating the efforts of individuals is indeed as important as instigating controls on inputs and products. Improved educational programs, not only in their capacity of improving the quality of efforts but in instilling self-discipline, are repeatedly proving necessary and important. The improvement of data collection methods and estimation of resources should not be overlooked and instead be further pursued. This study would have been more meaningful and accurate were the data problems minimal.

Lastly, but in no way unimportantly, no matter what this and other present studies may have suggested, future evaluations of individual behaviour should consider that the rationality or irrationality, i.e., conformity with the postulates of utility theory, may not necessarily be a result of inconsistency with the same individual's own preferences but with the preferences of an entirely different set of individuals.

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