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TITLE OF THESIS Changes in Rural Consumption Patterns in Taiwan
1960-1970

Summarize in fifty words or less the purpose
and principal conclusions of your thesis

The principal purpose of this study is to describe the
changes in rural consumption patterns in Taiwan over the
1960-1970 period. The study showed that rural consumption
patterns have experienced substantial changes in Taiwan over
time. Income was found to be the crucial factor affecting
consumption patterns during this period.

Dale W Adams

CHANGES IN RURAL CONSUMPTION PATTERNS
IN TAIWAN 1960-1970

A Thesis

Presented in Partial Fulfillment of the Requirements
for the Degree Master of Science

by

Lien-In Amy, Chin, B.S.
The Ohio State University
1973

Approved by

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Economics and Rural
Sociology

DEDICATION
TO MY PARENTS

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Chapter I

Introduction

Rapid agricultural growth in less developed countries is a universally recognized need. During the past decade some regions within countries as well as some individual countries have been able to sharply increase rural output and incomes. Most other less developed countries are attempting to initiate similar progress in rural areas. Under these growth conditions rural consumption patterns can be expected to undergo major changes. To date, unfortunately, there has been little attention paid to the nature of these changing consumption patterns nor to their policy implications. Very little empirical work on rural consumption in less developed countries can be found in the literature.

During the past four decades economists have addressed a good deal of attention to aggregate consumption questions. Neo-classical Keynesian analysis has stressed the role which short-run changes in overall consumption have on economic stability. Most of this analysis has assumed that entrepreneurial investment decisions and consumption decisions were independently made, an assumption clearly more functional for urban industrial analysis than for rural studies.

The short-run nature of post Keynesian consumption theory has other limitations for analyzing consumer behavior in a growth environment. To date, major emphasis has been placed on associating various consumer related variables to consumption behavior. Little or no attention has been given to how changes over time in the goods available for consumption affect consumers' decisions. That is, does the introduction into local rural markets of popular consumer items like radios, television sets, motor bikes, refrigerators, ice cream, health services and educations induce people to substantially alter their time preference in favor of current consumption? This issue plus the whole question of how changing rural consumption patterns affect development planning clearly need more careful, systematic research.

There are at least three major ways in which rural consumption is tied to overall development. First, the expansion in rural consumption provides a major market for industrial goods. A number of countries have underutilized industrial capacity because rural incomes are too low to purchase industrial products. Rural consumption, therefore, has closed ties to industrial output, employment and industrial capital formation. Second, rural consumption decisions directly affect individual savings and the ability to make private investments in rural areas. Only that portion of

output which is not consumed is available for investment. Third, rural consumption decisions also directly affect the amount of rural savings capacity which might be mobilized and transferred to other sectors. The growth in rural productive capacity, taxable surplus, and financial savings is largely dependent upon individual consumption-savings decisions.

An indepth study of the consumption process requires detailed time series data. Taiwan is one of the few less developed countries (LDC's) which has this type of rural data available. In addition, a good deal of research has already been done in Taiwan on other economic changes at the farm level which have taken place over the past couple of decades. Moreover, since the early 1950's Taiwan has realized substantial increases in rural incomes, rural consumption, and major changes in the types of good available for purchase in rural areas. In many respects Taiwan offers a unique opportunity to study changes in rural consumption patterns under rapid growth conditions. The orders of magnitude of changes in rural consumption in Taiwan may have been greater than other LDC's can reasonably expect. The patterns and directions of these changes, nevertheless, may provide some very useful insights into what other LDC's might experience.

Research Objectives

The principal objective of the following study is to describe the changes in rural consumption patterns in Taiwan over the 1960 to 1970 period. This will include an attempt to evaluate the importance of several factors which have been thought to influence changes in these consumption patterns.

An additional objective is to check the consistency of consumption measures drawn from cross sectional data of a changing sample with time series information based on sets of panel farms.

A final objective is to identify any important policy implications flowing from this research which might have relevance for other LDC's.

Specific Hypotheses

The specific hypotheses to be tested in this study are as follows:

- (1) Farm families in Taiwan have experienced major changes in their consumption patterns over the 1960-1970 period.
- (2) Total farm family income, family wealth, and family size are associated in a systematic way with changes in these consumption patterns.
- (3) Income elasticity of demand for staple consumer

goods has been low and declining over the 1960-1970 period.

- (4) Income elasticities of demand for human investments expenditures and for consumer durables, on the other hand, have been high over the 1960-1970 period.
- (5) Adjustments in consumption patterns among farm families included in a series of cross sectional data sets have been very similar to those observed in time-series panel data.
- (6) A major increase in the diversification of consumer durables available for purchase in rural areas of Taiwan during the late 1960's has substantially altered rural consumers' time preferences.

Organization of The Study

This study is organized into six chapters. The chapter which follows presents a brief review of consumption theory literature and a summary of recent consumption work in Taiwan. The third chapter describes the data which will be used in this study. It also presents an analysis of changes in consumption patterns in cross sectional data covering the 1960 to 1970 period. Chapter IV presents an analysis of two sets of panel, time series information as

a check on the cross sectional data. Chapter V presents a statistical analysis of various consumption elasticities derived from panel data. The final chapter presents a summary of the study, outlines the major policy recommendations related to the study, and also make suggestions regarding future research on consumption topics.

Chapter II

Review of Consumption Theory and Consumption Studies in Taiwan

This chapter has two main purposes. The first is to briefly review the major contributions to consumption theory made over the past four decades. The second is to highlight some of the most important consumption studies carried out in Taiwan during the past two decades. Emphasis is placed throughout on identifying those issues in the literature which bear most closely to the objectives of this study.

Contributions to Consumption Theory

Aside from some early interest by Ramsey in household consumption behavior, economists paid little attention to the determinants of consumption prior to 1930.¹ Keynes' work on this topic during the early 1930's focused mainly on the relationship between income and consumption.² His

¹F. P. Ramsey, "A Mathematical Theory of Saving," Economic Journal, No. 152, Dec. 1928, pp. 543-549.

²J. M. Keynes, The General Theory of Employment, Interest, and Money, New York: Harcourt, Brace, & World, Inc., 1936.

primary interest in the determinants of consumption were tied to his search for a linkage between income, consumption, and employment levels. That is, he wanted to know how changes in aggregate consumption affected economic stability. Although Keynes recognized that other factors may influence consumption decisions, he left the specification and measurement of these other variables as a challenge to other economists.

As Suits points out, the post-Keynesian theory of consumption developed along several lines.³ Until recently the main effort was directed toward more precise formulation, extension, and elaboration of the Keynesian consumption function in which short-run variations in the level of consumer expenditure are primarily caused by short-run variation in spending unit incomes. More recently, it has been concluded that consumers do not react on a day-to-day basis, and that consumption determinants have a relatively extended time dimension. Economists have argued, however, that consumption habits do adjust with changes in their experience and with general development. Research on the consumption function has indicated that an explanation

³Daniel B. Suits, "The Determinants of Consumer Expenditure: A Review of Present Knowledge," Macroeconomics: Selected Readings, edited by Walter L. Johnston and David R. Kamerschen, Boston: Houghton Mifflin Co., 1970, pp. 59-92.

of consumer behavior requires a complex formulation. Only three of these factors are treated in the following discussion: income, wealth and consumer units.

Income

The consumption theory formulation in Keynes' early work suggested that there was great stability in the relationship between aggregate income and aggregate expenditures. Keynes suggested that when real income of the community increased or decreased, its consumption increased or decreased, though at a slower rate.⁴ Walters correctly pointed out that Keynes was mainly concerned with the short-run.⁵ In the long-run, post-Keynesian economists have argued that the ratio of consumption to income will gradually decrease as income increases. Thus, the use of cross-sectional data to predict long-run changes in consumption will result in overestimation. Suits argued that short-run consumption patterns are more stable than incomes.⁶ But, he further suggested that the variation in the level of consumer expenditure is primarily generated by short-run variation in consumer unit income.

⁴J. M. Keynes, op. cit., pp. 95-114.

⁵A. A. Walters, An Introduction to Econometrics, New York, W. W. Norton & Co., Inc., 1970, pp. 207-269.

⁶Daniel B. Suits, op. cit., pp. 59-92.

Duesenberry based his consumption analysis on a theoretical structure that emphasized the desire to emulate one's neighbors and the "demonstration effect" of unknown or unused consumption goods.⁷ In addition, he suggested that the relative income hypothesis could be used to interpret aggregate data by expressing the ratio of consumption to income as a function of the ratio of current income to the highest income level previously reached. Tobin concluded that the weight of evidence favors the absolute income hypothesis.⁸ Friedman also argued that permanent income was the major determinant of consumption.

Wealth

The importance of the level of wealth for an individual's consumption decision was initially stressed by Pigou.⁹ In his dialogs with Keynes he argued that the real value of liquid assets are an important factor affecting

⁷James S. Duesenberry, Income, Saving and the Theory of Consumer Behavior, Cambridge: Harvard University Press, 1949, pp. 54-81.

⁸James Tobin, "Relative Income, Absolute Income, and Saving," Money, Trade, and Economic Growth: Essays in Honor of John H. Williams (New York: The MacMillan Co. Publishers, 1951), pp. 135-137, quoted by Milton Friedman, A Theory of the Consumption Function, Princeton, National Bureau of Economic Research, Princeton University Press, 1957, pp. 3-6.

⁹A. C. Pigou, "The Classical Stationary State," Economic Journal, Vol. 53, Dec. 1943, pp. 343-351.

consumption. Modigliani and Brumberg suggested that the wealth effect may have something to do with the life-cycle of the individual consumer.¹⁰ Ando and Modigliani proposed a consumption function in which individual consumption depends on the resources available to the individual, the rate of return on capital and the age of the consumer unit.¹¹ Among families with declining incomes, the level of consumption of those with liquid assets was suggested to be higher than those without.¹²

Generally, liquid assets have had no significant effect on the consumption function when cross-sectional data was used or was in the function. Tobin, however, suggested that changes in wealth may explain the approximate stability in the fraction of income saved.¹³

One empirical study by Hamburger found that the ratio of wealth to income is closely correlated with the ratio of consumption to income, as judged by aggregate time series

¹⁰Milton Friedman, op. cit., pp. 3-6.

¹¹Ando and E. Modigliani, "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests," American Economic Review, Vol. 53, No. 1 (March, 1963), pp. 55-84, quoted by Michael K. Evans, Macro-Economic Activity: Theory, Forecasting, and Control, New York, Harper and Row Publishers, 1969, pp. 13-47.

¹²Daniel B. Suits, op. cit., pp. 59-92.

¹³Milton Friedman, op. cit., pp. 3-6.

data.¹⁴ Klein has used budget data to investigate the role of particular kinds of wealth, especially liquid assets.¹⁵

Consumer Units

Evans suggested that family composition, including family size and consumer age, has been used mainly in cross-section analysis, and is usually considered to be more important in influencing purchases of consumer durables than other consumption activities. He also mentioned that large family units have larger marginal propensities to consume (MPC's) over the short-run and long-run than do small families.¹⁶ Walters argued that the age of the head of the household also has some effect on consumption, and that the age-effect is strong in decisions to purchase consumer durables. Clearly, however, goods are often purchased by households rather than just by individuals. For most items of consumer expenditure the typical unit is the household.¹⁷

¹⁴William Hamburger, "The Relation of Consumption to Wealth and the Wage Rate," Econometrica Vol. 23, Jan. 1955, pp. 1-17.

¹⁵Lawrence R. Klein, "Estimating Patterns of Savings Behavior From Sample Survey Data," Econometrica Vol. 19, No. 4, Oct. 1951, pp. 438-454.

¹⁶Michael K. Evans, op. cit., pp. 13-47.

¹⁷A. A. Walters, An Introduction to Econometrics, New York, W. W. Norton & Co. Inc., 1970, pp. 207-267.

Utility of Consumption

To date most consumption studies have been based on short run analysis. Under these conditions the bundle of goods over which a consumer could make his selection was assumed to be fixed. Economic analysis has, as a result, mainly focused on the consumption impacts of short run changes in prices and income. A few economists such as Hicks, Henderson and Quandt, and Slutsky have concerned themselves with how consumers maximize their utility in this framework.¹⁸ Hicks, especially, focused on how changes in income would affect consumer purchases of different classes of goods. The "substitution effect," the "income effect," "inferior and superior goods" are well known economic terms which have come out of this type of analysis. Said another way, economists to date have mainly focused on variables on the right hand side of the consumption function.

In a rapidly developing country like Taiwan, major changes in the kinds of commodities and services available for consumption appear to force a modification in existing consumption theory. It appears that if one wants to explain

¹⁸James W. Henderson and Richard E. Quandt, Micro-economic Theory: A Mathematical Approach, New York, St. Louis, San Francisco, McGraw Hill Book Co., 1971, pp. 6-48.

adequately long-run changes in consumption patterns in a high growth environment more attention must be given to the left hand side of the consumption equation. To date economists have given little consideration to how the introduction of attractive consumer goods like television sets, motor bikes, refrigerators, etc. affect consumers' time preferences. Measurement difficulties make this issue larger than can be handled by this study. Some attempts will be made, however, in this study to specify several reasonable hypotheses related to this important topic.

Consumption Studies in Taiwan

Taiwan has experienced substantial development since World War II. Few studies of consumption have been made in rural Taiwan, however, a brief summary of several consumption studies in Taiwan are presented below.

H. Y. Chang did an overall study of food consumption in Taiwan in the late 1960's.¹⁹ He concluded that food consumption patterns changed substantially in Taiwan over time. He noted that main food expenditures decreased, but food other than main food increased. He found that Taiwanese consumers increased their intake of protein and calories

¹⁹Hime-Yu Chang, "Expectation and Changes in Food Consumption Patterns during the Process of Economic Development in Taiwan," Unpublished report, Department of Economics, National Taiwan University, Taipei, Taiwan, 1971 (in Chinese).

over time. He also found that the Engel coefficient (the ratio of value-of-food to total expenditures) had gradually decreased year-by-year. This coefficient was 49 percent in 1961, but it was only 33 percent in 1969. He also argued that the changes in agricultural production were stimulated by the changes in consumption patterns.

Chou and Chen argued that increases in family income are the most crucial determinant of changes in consumption patterns in Taiwan.²⁰ They found that when income increases, the ratio of food-expenditure-to-total-expenditure decreased. They also found, however, that the expenditures for durable goods increased over time. They also suggested that the development of the electric appliances industry accelerated changes in household consumption patterns. This implies that changes in the availability of new consumer goods alters consumption patterns.

In a recent study of rural consumption in Taiwan, Ong found that the Taiwanese farm household consumption was positively related to current income and lagged consumption, and negatively related to the ratio of farm-income-to-farm-family income. In her study, the increase in net worth was

²⁰Mow-in Chou and Woo-hsun Chen, Long Term Expectation of Electric Appliances in Taiwan, Unpublished Report, Department of Economics, Provincial Chung-Hsin University, Taichung, Taiwan, 1971 (in Chinese).

positively associated with the increase in consumption.²¹

Ong also pointed out that changes in household expenditures during the 1960's took up about 80 percent of the increases in total income. Her aggregate consumption study, based on panel data to be used later in this study, suggested that the sample farms were heterogenous in consumption behavior. She also found that cash expenditures among farmers became more important over the 1960-1970 period, and that increases in expenditures for more nutritious food, education, social activity, medical care and durables were quite important.

²¹Marcia Ong, "Changes in Farm Level Savings and Consumption in Taiwan 1960-1970," unpublished Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, the Ohio State University, 1972.

Chapter III

Changes in Consumption Patterns among Farm
Record-keeping Families
in Taiwan 1960-1970

The data used in the following analysis was drawn from cross-sectional farm account records maintained by the Provincial Department of Agriculture and Forestry (PDAF) in Taiwan over the years 1960 to 1970.¹ This farm record-keeping project was initiated in 1953. Senior students in ten agricultural vocational schools helped with the periodic posting of this data. In 1960 the responsibility for the program was shifted to local farmers associations with PDAF handling the posting, tabulation and publications of the data.² As can be noted in Table 1, until 1964 only three of the eight major agricultural regions in Taiwan were covered by the record-keeping project.³ In that year

¹For further background on this data refer to: Marcia Ong and Dale W. Adams, "A Summary of Various Economic Data From Accounts of Farm Record-Keeping Families in Taiwan, Yearly Average Covering 1960 through 1970." Economics and Sociology Occasional Paper No. 65, Department of Agricultural Economics and Rural Sociology, The Ohio State University, March 1972.

²Summaries of this data are published yearly by PDAF in Report of Farm Record-Keeping Families In Taiwan, (Nantou, Taiwan: PDAF, yearly 1961-1971).

³A map of Taiwan's Agricultural Regions is presented in Appendix E.

the project was extended to the additional five regions and the total number of farmers participating more-or-less doubled. It can also be noted in Table 1 that the total number of farmers participating in the project over the 1960 to 1970 period ranged from a low of 95 in 1960 to a high of 535 in 1964. Over the last seven years, (1964-1970) over 400 individual farmers have kept records under the project.

Analysis in this chapter will focus on the consumption patterns of all of the farms in the record-keeping project over the 1960-1970 period. As can be noted in Table 1, a number of these farmers have been in the record-keeping program consecutively over extended periods of time. For an example, five farms (panelists) maintained records over the entire eleven year period. Fifty-three farmers were in the program from 1964 to 1970, etc. Data from these two panels of farmers are presented in Chapter IV. These relatively long term participants in the program provide very valuable data for studying changes in rural consumption. They also provide a cross check on conclusion drawn from analysis of cross sectional data presented in this chapter.

Farmers participate in the record-keeping project on a voluntary basis. As a result they are not entirely representative of Taiwanese farmers as a whole. In general, as Ong has pointed out, record-keeping farmers generally have

Table 1

Number of Farmers' Associations, Agricultural
Regions and Individuals Participating
in Farm Record-keeping Project in
Taiwan 1960-1970

Year	Number of			
	Farmers' Associations	Agricultural Regions	Individual Farmers Total	Panel Farms*
1960	7	3	95	5
1961	17	3	207	9
1962	18	3	223	11
1963	21	3	277	15
1964	40	8	535	53
1965	40	8	501	78
1966	28	8	430	117
1967	28	8	402	142
1968	36	8	416	228
1969	36	8	411	308
1970	36	8	404	404

Source: Department of Agriculture and Forestry (PDAF),
Provincial Government of Taiwan, Report of
Farm Record-Keeping Families in Taiwan,
yearly reports running from 1960 to 1970
(Nantou, Taiwan, PDAF, various years 1961
through 1971).

*Panel farms are those for which yearly data from 196X
to 1970 is available.

somewhat higher incomes, and slightly larger farm than the average Taiwanese farmer.⁴ Because of the nature of the project, record-keeping farmers are also probably tied in more closely to change agents than the average farmer. On the other hand, because of the relatively small size of all farms in Taiwan, and the relatively homogenous nature of farms within each major agricultural region, the representativeness of the farms under study appear to be less of a problem than similar data from other countries would present. The long term nature of this data provides valuable insights into how firm household consumption patterns have adjusted during a period of rapid income change. The overall magnitudes of these changes, however, may be overstated by data drawn from record-keeping farms. There is no reason, however, to believe that the directions of change are unrepresentative of rural Taiwan in general.⁵

Classification of Consumption Expenditures

In the following analysis, consumption expenditures have been broken down into seven classes. A brief description of these classes follows:

⁴Marcia Min-Ron Lee, op. cit., p. 127.

⁵A good deal of analysis has already been done on changes in consumption patterns among the entire group of farmers included in the record-keeping program. See Ong and Adams, op. cit., and Ong, Ibid.

1. Staple food: this category includes foods such as rice and flour.
2. Other foods: this includes diet other than staple food such as meat, fruit. It also includes expenditures on cigarettes, liquor, tea, etc.
3. Clothings: this item includes clothes, blanket, shoes, and hats, etc.
4. Household operations: includes ornaments and decorations, rent or repair on dwelling, furniture, cooking instruments, china-ware, interest on household borrowings, taxes, and assessment.
5. Utilities: includes all fuel, light and water expenses.
6. Human agent: includes all educational expenses, as well as sanitary expenses and medical treatments.
7. Other: includes all other expenditures on social activities, festivals, postage. Purchases of consumer durables make up a large part of this item.

Changes in Consumption Patterns Among
All Farm Record-keeping Families

In Table 2 it can be noted that income and some associated consumption patterns have changed substantially during the 1960's. The average farm in the project in 1970 had current income 55 percent above project participants in

Table 2
Income and Consumption Expenditure Classes of Farm Record-keeping
Families, Average Value Per Family in Current NT\$ 1960-1970

Year	Expenditure Classes							
	Income	Total	Food	Clothing	Household Operations	Utilities	Human Agent	Other
1960	33,828	27,347	17,721	1,153	1,295	1,519	2,123	3,536
1961	37,950	31,077	19,418	1,322	1,742	1,934	2,738	3,923
1962	38,113	30,455	18,000	1,355	1,914	1,903	2,859	4,424
1963	41,757	32,084	19,045	1,528	1,968	1,737	3,401	4,404
1964	40,094	30,740	17,918	1,705	2,433	1,466	3,169	4,049
1965	43,114	33,089	18,512	1,612	2,543	1,757	3,232	5,433
1966	48,716	35,221	19,411	1,634	2,855	2,283	3,836	5,202
1967	50,958	38,029	20,233	1,871	2,729	2,080	4,488	6,704
1968	56,854	40,720	21,890	1,961	3,068	2,064	4,815	6,922
1969	47,948	42,432	21,430	1,992	3,497	2,232	4,915	8,366
1970	52,550	42,133	21,525	1,896	3,902	2,238	4,783	7,789

Source: Calculated from Taiwan Farm Record-keeping Accounts.

1960. It can also be noted that total consumption expenditures over the same period increased by an almost identical percentage. Consumption of food, both home produced and purchased increased by only 20 percent during the decade. Aside from utility expenditure, all other expenditure classes increased by substantially higher percentages: clothing - 64 percent, household operations - 125 percent, and "other" - 120 percent.

It can also be noted in Table 2 that food expenditures dropped from two thirds of total expenditures in 1960 to about half in 1970.

Additional detail on changes in food consumption patterns over the past decade can be noted in Table 3. In this Table, food expenditures are divided into three subclasses: staple food, other foods, and tea, wine, and tobacco. Expenditures on staple food declined absolutely as well as relatively during the decade - a further confirmation of Engel's Law. On the other hand, expenditures on other food items, mainly purchased goods, increased by 55 percent. Average family purchases of tobacco, tea and wine increased by over a quarter during the decade. These farm families, while not increasing food consumption dramatically, have increasingly purchased a larger part of their food through the market and relied less on home produced goods.

In Table 4 we can see that the average propensity to consume (APC) decreased from 1960 to 1968 and then apparently

Table 3
 Household Consumption Expenditures on Various Types
 of Food Classes by Farm Record-keeping
 Families, Average Value per Family
 in Current NT\$ 1960-1970

Year	Item	Staple Food	Food Other than Staple Food	Tobacco, tea, Wine, etc.
1960		9,466	6,998	1,257
1961		10,440	7,647	1,331
1962		9,380	7,283	1,337
1963		9,526	8,004	1,515
1964		8,569	7,935	1,414
1965		8,947	8,119	1,446
1966		8,813	9,058	1,549
1967		9,063	9,543	1,627
1968		9,527	10,572	1,791
1969		8,969	10,536	1,925
1970		9,034	10,885	1,606

Source: Calculated from Taiwan Farm Record-keeping
 Accounts.

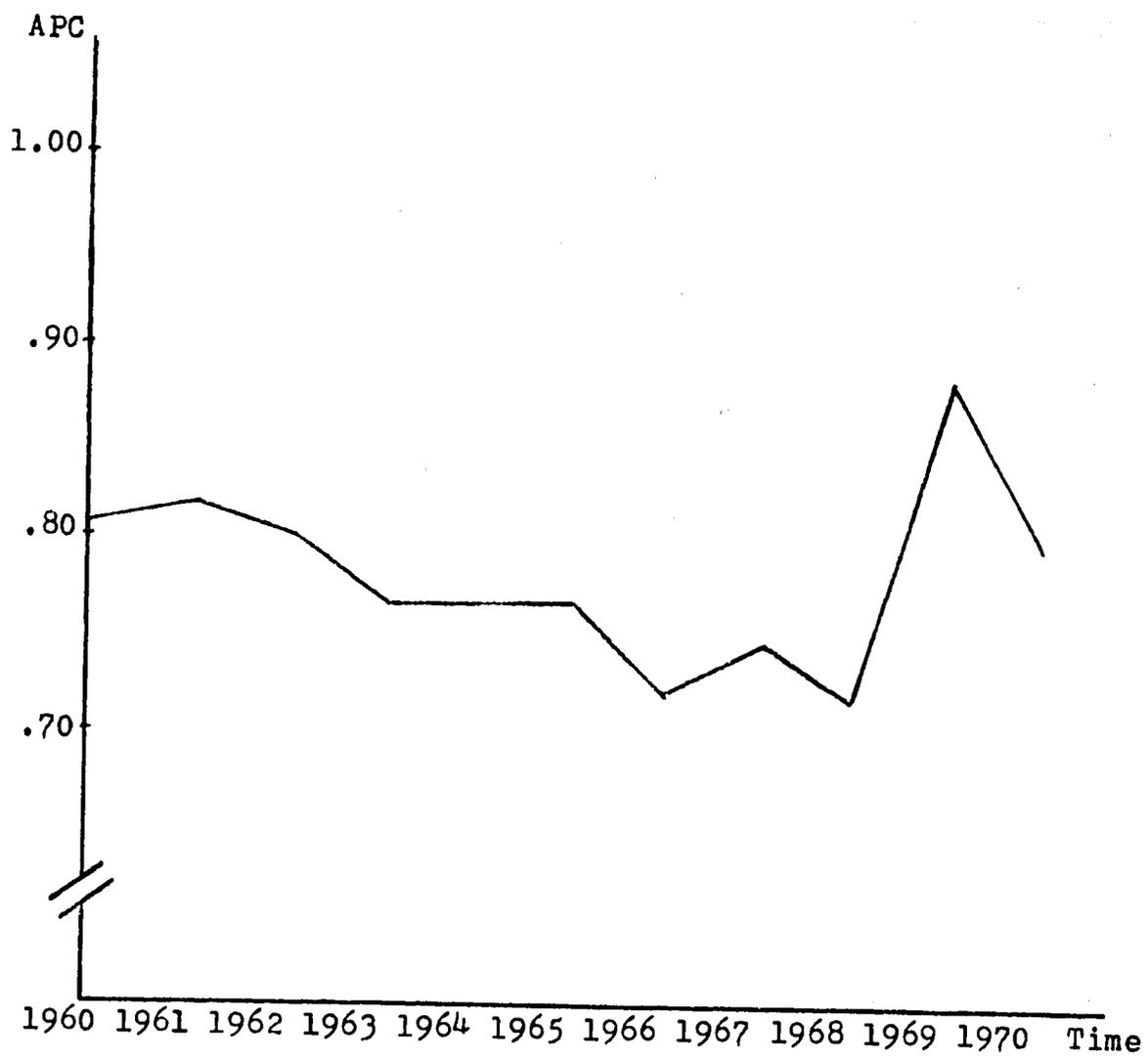
Table 4

Income, Total Consumption and Average Pro-
pensity to Consume (APC) of Taiwan
Farm Record-keeping Families
in Current NT\$ 1960-1970

Year	Income	Total Consumption	APC ($\frac{\text{Consumption}}{\text{Income}}$)
1960	33,828	27,347	.81
1961	37,950	31,077	.82
1962	38,113	30,455	.80
1963	41,757	32,084	.77
1964	40,094	30,740	.77
1965	43,114	33,089	.77
1966	48,716	35,221	.72
1967	50,958	38,029	.75
1968	56,854	40,700	.72
1969	47,948	42,432	.88
1970	52,550	42,133	.80

Source: Calculated from Taiwan Farm Record-keeping
Accounts.

Figure 1
The Average Propensity to Consume by
Farm Record-keeping Families
1960-1970



Source: Table 4 data.

increased through 1970. The APC curve is plotted in Figure 1. The decrease in APC up to 1968 is what one might expect with Engel's Law in mind. The upturn in the last two years is more difficult to explain. On one hand APC in 1969 was adversely affected by lower family income caused by very adverse weather. At the same time, however, the average current value of consumption went up in 1969 even though income was off sharply. The failure of the APC in 1970 to drop to a lower level than 0.80 is part of the same puzzle. One might hypothesize that the introduction into markets in rural areas of more attractive consumer durables during the late 1960's substantially altered consumer's time preferences. That is, the widespread availability of television sets, refrigerators, motor bikes, sewing machines and radios may have increased the marginal utility of consumption. Although far from conclusive in this point, the data does tend to substantiate H. Y. Chang's similar point referred to in Chapter II.

A further breakdown of consumption information is presented in Table 5. As one might expect, a good deal of food consumed in the household is in kind. That is, it is produced on the farm. In 1960 the average farm directly produced a little over 40 percent of its total consumption - consumption in kind. The absolute value of this consumption in kind changed very little over the decade. In relative terms, however, average consumption in-kind decreased to a

Table 5

Household Consumption Expenditures of Farm
Record-keeping Families, Average Value
per Family in Current NT\$ 1960-1970

Year	Total Consumption			Percent of Total Consumption in kind
	total	in cash	in kind	
1960	27,347	15,990	11,357	41.53
1961	31,077	17,830	13,247	42.62
1962	30,455	18,187	12,268	40.28
1963	32,084	20,486	11,598	36.15
1964	30,740	20,897	9,843	32.02
1965	33,089	22,796	10,293	31.11
1966	35,221	24,535	10,686	30.34
1967	38,029	27,169	10,860	28.56
1968	40,720	29,387	11,333	27.83
1969	42,432	31,395	11,037	26.01
1970	42,133	30,620	11,508	27.31

Source: Taiwan Farm Record-keeping Accounts.

little over a quarter of total consumption by 1970. That is to say, that the degree of self-subsistence among record-keeping farms dropped sharply during the decade as farmers moved into the market to resolve a larger proportion of their consumption decisions.⁶

Changes in Expenditure Groups Among
Different Classes of Farms

(a) By farm size:

In Tables 6, 7, and 8 expenditure classes are presented by farm size groups. For purposes of saving space data for only three years are presented: 1960, 1965 and 1970. Farms are divided into five size groups: less than 0.5 hectares⁷ (ha.), 0.51 to 1.00 ha., 1.01 to 1.50 ha., 1.51 to 2.00 ha. and above 2.00 ha.

It can be noted in Table 6 through 8 that the average propensity to consume (APC) in each year generally declines with increases in farm size. Also, as might be expected, average family expenditures for each class of consumption goods tended to increase with size-of-farm. This general pattern can be observed in each of the three years. The large increases in average family expenditures for the human

⁶These data present further proof of the "market contribution" which agriculture gives to general development as pointed out by Simon Kuznets, Economic Growth and Studies, (New York: W. W. Norton, 1965) pp. 244-250.

⁷1 hectare = 2.47 acres.

Table 6
Average Family Consumption by Expenditure Classes
and Farm Size in Current NT\$ in 1960

Item	Farm Size in Hectares				
	0.00-0.50	0.51-1.00	1.01-1.50	1.51-2.00	2.00+
No. of farms	5	33	20	16	21
Staple Food	6,533	7,226	8,519	10,519	13,629
Diet other than staple food	3,828	5,327	6,934	8,424	9,202
Hobbies	907	974	1,322	1,314	1,659
Clothing	463	867	1,168	1,483	1,469
Housing	1,001	1,054	1,193	1,807	1,414
Utilities	1,105	1,141	1,585	1,655	2,020
Human agent	1,200	1,770	1,864	2,228	3,040
Other	2,609	2,006	4,411	3,849	5,008
Total consumption	17,650	20,357	26,998	31,276	37,459
Disposable income*	17,160	24,400	30,473	39,138	51,527
APC $\left(\frac{\text{Consumption}}{\text{Income}}\right)$	1.03	.83	.89	.80	.73

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 7
Average Family Consumption by Expenditure Classes
and Farm Size in Current NT\$ in 1965

Item	Farm Size in Hectares				
	0.00-0.50	0.51-1.00	1.01-1.50	1.51-2.00	2.00+
No. of farms	110	138	89	61	103
Staple Food	6,749	7,247	8,792	9,872	13,093
Diet other than staple food	5,844	6,949	8,439	9,267	11,096
Hobbies	944	1,147	1,513	1,776	2,082
Clothing	1,066	1,437	1,617	1,644	2,393
Housing	1,223	2,297	2,480	2,793	4,168
Utilities	1,330	1,538	1,801	1,897	2,406
Human agent	1,848	2,868	3,364	3,347	4,979
Other	2,072	3,626	4,820	7,526	9,841
Total consumption	21,078	27,134	32,533	38,122	50,837
Disposable income*	24,020	33,561	43,964	49,926	71,078
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.88	.81	.74	.74	.72

Source: Calculated from Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 8

Average Family Consumption by Expenditure Classes
and Farm Size in Current NT\$ in 1970

Item	Farm Size in Hectares				
	0.00-0.50	0.51-1.00	1.01-1.50	1.51-2.00	2.01+
No. of farms	38	108	96	73	89
Staple Food	6,892	7,844	8,265	9,695	11,674
Diet other than staple food	9,130	10,010	9,753	11,715	13,239
Hobbies	1,351	1,513	1,481	1,701	1,870
Clothing	1,459	1,710	1,762	1,706	2,604
Housing	2,819	3,516	3,739	3,936	4,974
Utilities	1,551	2,101	1,894	2,220	3,086
Human Agent	2,860	4,293	3,560	4,533	7,684
Other	4,514	7,730	5,100	8,900	11,318
Total consumption	30,553	38,697	35,557	44,479	56,451
Disposable income*	35,882	44,143	45,577	55,732	74,682
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.85	.88	.78	.80	.76

Source: Calculated from Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

agent and "other" category with increase in farm size, and through the three years, is another interesting feature in these tables.

(b) By income level:

As was pointed out before, the level of income is an important factor in consumption decisions. Additional data on this relationship are shown in Tables 9, 10 and 11. Again, only data for the years 1960, 1965 and 1970 are presented. Six income sub-classes are presented in these Tables. As might be expected, in all three years families in the lowest income class (0 - 20,000 NT\$) consumed close to or more than their disposable income. In many cases farmers fell into this income category for only one year due to temporary adverse economic condition. Credit was likely used to offset abnormally low incomes during that particular year.

It can also be noted in Tables 9, 10 and 11 that the APC's, in general, decrease sharply as one moves from low to high income classes. In general, farmers in the highest two income classes were consuming only one-half to three-quarters of their total income.

It is also interesting to note the very large percentage increase in expenditures on the human agent and "other" expenditure classes between 1960 and 1965 among the two largest income groups. As was suggested earlier, the

Table 9
Average Family Consumption Expenditures by Family
Income Groups in Current NT\$ in 1960

Item	Income Groups					
	0-20,000	20,000- 40,000	40,000- 60,000	60,000- 80,000	80,000- 100,000	100,000+
No. of farms	16	51	21	5	1	1
Staple Food	5,794	8,583	11,144	17,852	22,877	22,588
Diet other than staple food	4,267	6,604	8,234	12,833	8,763	13,853
Hobbies	890	1,194	1,528	1,559	3,505	1,124
Clothing	530	1,019	1,678	1,915	2,685	1,521
Housing	1,128	1,162	1,654	1,039	2,705	3,037
Utilities	1,181	1,373	1,668	2,964	3,116	2,404
Human Agent	1,398	1,977	2,746	3,666	5,071	7,560
Other	1,622	2,910	6,033	5,196	4,435	4,632
Total consumption	16,771	24,631	34,688	47,026	53,155	56,718
Disposable income*	14,758	28,329	46,872	72,401	87,632	108,618
APC($\frac{\text{Consumption}}{\text{Income}}$)	1.14	.87	.75	.65	.61	.52

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 10

Average Family Consumption Expenditures by Family
Income Groups in Current NT\$ in 1965

Item	Income Groups					
	0-20,000	20,000- 40,000	40,000- 60,000	60,000- 80,000	80,000- 100,000	100,000+
No. of farms	64	231	114	54	21	17
Staple Food	5,415	7,768	10,078	11,666	15,314	14,160
Diet other than staple food	4,399	6,695	9,544	11,268	12,253	16,728
Hobbies	741	1,200	1,495	2,322	2,405	3,235
Clothing	679	1,227	2,057	2,240	2,745	3,977
Housing	820	1,712	2,876	4,492	5,488	8,303
Utilities	1,195	1,488	1,976	2,223	2,716	3,399
Human Agent	1,164	2,570	3,820	4,576	4,948	9,644
Other	1,266	2,760	5,427	8,931	15,216	29,339
Total consumption	15,678	25,312	37,284	47,720	61,087	93,498
Disposable income*	15,948	30,320	49,257	67,490	88,054	145,081
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.98	.83	.76	.71	.69	.64

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 11
Average Family Consumption Expenditures by Family
Income Groups in Current NT\$ in 1970

Item	Income Groups					
	0-20,000	20,000- 40,000	40,000- 60,000	60,000- 80,000	80,000- 100,000	100,000+
No. of farms	23	137	127	63	28	26
Staple Food	5,403	7,293	8,339	10,711	12,094	14,522
Diet other than staple food	6,803	8,574	10,895	13,298	13,677	17,771
Hobbies	858	1,138	1,683	1,829	3,065	2,190
Clothing	701	1,346	1,881	2,247	2,908	3,968
Housing	1,173	1,943	3,513	4,880	9,788	9,815
Utilities	1,278	1,879	2,137	2,543	3,107	3,793
Human agent	1,930	3,124	4,706	6,016	6,411	11,525
Other	1,286	3,088	6,235	9,562	16,203	32,681
Total consumption	19,390	28,373	39,991	51,169	67,254	96,269
Disposable income*	15,374	30,783	49,176	69,440	88,996	136,185
APC ($\frac{\text{Consumption}}{\text{Income}}$)	1.26	.92	.81	.74	.76	.71

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

increased availability of education in rural areas as well as introduction of more attractive consumption items may have caused the substantial jump in expenditures among the relatively well to do in these two areas.

(c) By family size:

In addition to breaking down the consumption data by farm size and income levels, an attempt was also made to evaluate the effect of family size on consumption. An overview of this analysis is presented in Tables 12, 13 and 14. Again, data for only three years are presented: 1960, 1965 and 1970. Data are also divided into five family size groups.

Surprisingly, no consistent pattern emerges for APC with respect to family size. A priori one might expect APC to increase with number of individuals in the family unit. The fact that the largest families generate more total income appears to be one of the reasons why this expectation is not confirmed. The different age compositions of the various sized family groups may have further clarified this relationship. Detailed age information was not available in the data to further explore this age-composition issue.

Aside from the sharp increases in total expenditures for the two food classes, family size did not appear to be a consistent factor in influencing changes in other consumption patterns of the family.

Table 12
Average Family Consumption Expenditures by
Family Size Groups in Current
NT\$ in 1960

Item	Family Size				
	0-3	4-6	7-9	10-12	13+
No. of Farms	1	17	47	10	20
Staple Food	4,666	7,727	8,506	9,167	14,861
Diet other than staple food	4,914	4,866	6,360	7,753	10,035
Hobbies	309	1,005	1,062	157	1,838
Clothing	2,001	700	1,094	1,374	1,521
Housing	1,551	844	1,241	1,737	1,569
Utilities	1,628	950	1,471	1,524	2,106
Human Agent	592	1,223	1,970	2,407	3,187
Other	18,043	2,597	2,954	3,487	5,027
Total Consumption	33,701	18,375	24,660	29,011	40,140
Disposable Income*	42,118	22,300	29,349	34,557	53,863
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.80	.82	.84	.84	.75

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 13
Average Family Consumption Expenditures by
Family Size Groups in Current
NT\$ in 1965

Item	Family Size				
	0-3	4-6	7-9	10-12	13+
No. of Farms	10	151	224	63	53
Staple Food	3,771	6,084	8,444	11,314	17,387
Diet other than staple food	5,376	6,214	7,707	10,502	12,949
Hobbies	1,458	1,198	1,369	1,864	2,009
Clothing	852	1,218	1,620	2,061	2,311
Housing	1,283	1,875	2,472	3,171	4,250
Utilities	1,437	1,344	1,684	2,180	2,801
Human Agent	1,626	2,233	3,431	3,603	5,086
Other	5,039	3,953	4,056	9,313	9,348
Total Consumption	20,844	23,954	30,782	45,282	56,161
Disposable Income*	26,377	32,185	39,616	55,685	77,280
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.79	.74	.78	.81	.73

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Table 14
Average Family Consumption Expenditures by
Family Size Groups in Current
NT\$ in 1970

Item	Family Size				
	0-3	4-6	7-9	10-12	13+
No. of Farms	1	131	168	66	38
Staple Food	3,535	6,417	8,832	12,083	15,679
Diet other than staple food	7,117	9,198	10,501	12,980	16,157
Hobbies	1,332	1,306	1,726	1,624	2,107
Clothing	843	1,499	2,023	2,074	2,672
Housing	2,490	3,020	4,262	3,985	5,537
Utilities	1,036	1,917	2,218	2,719	2,997
Human Agent	2,766	3,753	4,769	5,371	1,882
Other	4,635	4,975	7,025	11,701	15,863
Total Consumption	23,644	32,094	41,364	52,560	68,897
Disposable Income*	34,552	39,947	50,997	63,996	89,804
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.68	.80	.81	.82	.77

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*Disposable income can be defined as net farm family income which is the sum of net on-farm income and net non-farm income.

Overall Summary of Data

All of the consumption and income data presented to this point have been expressed in current values. As can be noted in Appendix A inflation, especially increases in the wholesale price index, in Taiwan during the 1960's has been moderate. In Table 15 a number of the most important economic indicators previously presented in this Chapter are summarized and expressed in 1970 prices. Rates of growth for some of the most important of these indicators are also presented.

Income has increased by 26 percent over the 1960's. Again, the sharp drop in real income in 1969 was caused by very bad weather. The average total consumption expenditures increased around one-fourth in these 11 years. A continuous declining in staple food expenditures can also be noted in Table 15. Moreover, the real expenditures for human investment and other consumption almost doubled during the period.

Table 15
Summary of Various Economic Indicators for Taiwan Farm
Record-keeping Families 1960-1970, in 1970 Prices*

Year											
Indicator	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Income	41,763	45,449	48,062	48,330	44,698	48,334	54,737	54,501	57,896	50,155	52,550
Index	100	109	115	116	107	116	131	131	139	120	126
Growth rate		9	6	1	-9	9	15	0	8	-19	6
Consumption	33,762	37,218	38,405	37,134	34,270	37,295	39,574	50,673	41,466	44,385	42,133
Index	100	110	114	110	102	110	117	121	123	132	125
Growth rate		10	4	-4	-8	8		4	2	9	-7
Staple food expenditures	11,686	12,503	11,828	11,025	9,553	10,030	9,902	9,693	9,702	9,382	9,034
Index	100	107	101	95	82	86	85	83	83	80	77
Growth rate		7	-6	-6	-13	4	-1	-2	0	-3	-3
Education expenditures	2,621	3,279	3,605	3,936	3,533	3,623	4,310	5,375	4,903	5,141	4,783
Index	100	125	138	150	135	138	164	205	187	196	182
Growth rate		25	13	12	-15	3	26	41	-18	9	-14
Other Expenditures	4,365	5,698	5,579	5,097	4,514	6,091	5,845	7,170	7,049	8,751	7,789
Index	100	108	128	117	103	140	134	164	161	200	178
Growth rate		8	10	-11	-14	37	-6	30	-3	39	-22
APC ($\frac{\text{Consumption}}{\text{Income}}$)	.81	.82	.80	.77	.77	.77	.72	.75	.72	.88	.80

Source: Calculated from Taiwan Farm Record-keeping Accounts.

*See Appendix A for price indexes used to adjust current values to 1970 prices.

Chapter IV

Analysis of Time-series, Panel Data

As was pointed out earlier, the cross sectional data discussed in Chapter III was drawn from a sample of farms whose membership changed at least partially from year-to-year (See Table 1). One might argue that the changing nature of this sample introduced systematic biases into the consumption data. For example, it might be argued that increases in the average propensity to consume (APC) noted during the late 1960's among the cross sectional farms was due to families with high APC's entering the sample in the late 1960's while low APC families dropped out. At least a partial test of sample-change biases can be carried out through the analysis of time-series panel data.

The major purpose of this chapter is to analyze two overlapping sets of panel data which were drawn from the group of farms discussed in Chapter III. The first panel includes 53 families and spans the 1964 to 1970 period. Each of these 53 families participated in the farm record-keeping project in each of the seven years included in this period. The second panel is made up of five families who participated in the record-keeping project for all eleven

years: 1960-1970. These five families are also included in the 53-family panel.

Fifty-three Family Panel Data
1964-1970

A breakdown of the regional location of these 53 farms is given in Table 16. Two regions, the tea, and the southwestern sugarcane and rotation regions contributed about half of the farms in the sample. The remainder of the 53 farms come from the other six agricultural regions.

Average income and consumption expenditure figures for the 53 farms are presented in Table 17. As can be noted average family income increased from NT\$47,249 in 1964 to NT\$54,128 in 1970, a fifteen percent increase. Over the same period, as can be noted in Table 2, average income among the cross section farm sample increased by about 24 percent in real terms. Average income among the 53 farm panel was, however, higher in both 1964 and 1970 than average income among the cross section farms. The abnormally high income for 1968 shown in Table 17 was due to very good harvests as well as some off-farm income. The sharp drop in income in 1969 was mainly due to crop damage caused by two serious typhoons during that year.

On the expenditure side, the 53 farmers appear to have experienced changes in consumption patterns quite similar to those changes reported in Chapter III for the cross

Table 16

Number of Panel Farms Spanning the Period 1964-
1970 in Taiwan Farm Record Keeping
Program by Agricultural Region

Agricultural Region	Number of Farms
Northern Rice Region	2
Middle Rice Region	7
Southern Rice Region	6
Tea Region	12
Southwestern Mixed Farming Region	4
Southwestern Sugarcane & Rotation Region	15
Banana & Pineapple Region	6
Eastern Mixed Farming Region	1
Total	53

Source: Calculated from Taiwan Farm Record Keeping
Accounts for 1964-1970.

sectional farms. That is, expenditures on staple food declined over the period while consumption of other food items increased somewhat. Expenditures on hobbies, clothing and utilities showed only modest changes. At the same time, expenditures on the human agent and other items increased very sharply.

It can also be noted in Table 17 that the APC for the 53 farms also trended up during the latter part of the 1960's. The APC for 1968 is low because of the sharp increase in farm income for that year. Likewise the APC for 1969 appears to be high because of the sharply lower income for that year. Some average of the APC's for 1968 and 1969 would probably be more representative of the trend which may be underway.

As was pointed out earlier, expenditures on food is an important item in consumption patterns. Again, main food expenditures are divided into food expenditure in-cash and expenditure in-kind. This information is shown in Table 18. It can be seen that the average degree of food self-subsistence for these 53 farms have exceeded 75 percent in each of the seven years. This shows that the panel farmers have spent relatively little money on purchase of food in the market.

Table 17
Average Consumption Expenditures by Panel
of 53 Farm Families 1964-1970
in Real Terms 1970=100

Items	Income	Consumption Expenditures Classes									APC*
		Staple Food	Diet Other than Staple Food	Hobbies	Clothings	Housings	Utilities	Human Agent	Other	Total	
Year											
1964	47,249	9,355	8,314	1,751	2,084	3,319	1,711	3,856	4,627	35,847	.76
1965	55,463	10,406	9,783	1,738	2,094	2,878	2,058	4,507	5,904	41,058	.74
1966	56,712	10,258	10,589	1,867	1,940	3,992	2,471	4,792	7,738	43,435	.77
1967	56,137	10,078	11,035	1,860	1,918	2,933	2,244	5,030	10,143	45,222	.81
1968	60,248	9,668	10,752	1,836	2,210	3,226	2,258	4,946	8,040	43,059	.72
1969	52,221	9,212	11,128	2,130	2,427	4,632	2,312	5,659	12,234	49,733	.95
1970	54,128	8,868	11,075	1,642	2,060	3,909	2,110	6,016	10,361	46,092	.85

Source: Calculated from Taiwan Farm Record Keeping Accounts.

*APC = Total Family Consumption/Total Family Income.

Table 18

Staple Food Consumption by Panel of
53 Farm Families 1964 - 1970
in Current NT\$

Year	in cash	in kind	total	Degree of Self-Sufficiency in Main Food*
1964	1,778	6,613	8,391	78%
1965	1,856	7,627	9,282	82%
1966	1,863	7,276	9,130	79%
1967	2,295	7,128	9,423	75%
1968	2,149	7,345	9,494	77%
1969	1,798	7,009	8,807	79%
1970	1,968	6,900	8,868	77%

Source: Taiwan Farm Record Keeping Accounts.

*Value of staple food in kind consumed/Total value of staple food consumed.

Panel Data on Five Families
1960-1970

Some further insights on changes in consumption patterns can be gained by analyzing data for five farm families who participated in the record-keeping project over the entire 1960-1970 period. Four of these farms were located in the middle rice region, while the remaining farm was in the southern rice region. All of these farms were included in the previously discussed data for the 53 farms.

Average income and consumption expenditure data for these five farms are presented in Table 19. It can be noted that, in real terms, average family income increased by almost 38 percent over the 11 year period. The very high average income in 1966 resulted from a large amount of non-farm receipts realized by one farm family in that year. This farm had very unstable non-farm income during the period under analysis. In 1966 this farm family realized around eighty thousand NT\$ of income from off-farm sources. But in 1969 off-farm receipts were only eight thousand NT\$.

On the expenditure side, these five farms have apparently experienced similar changes in consumption pattern in the 1960's to those of 53 farms and likewise the cross sectional farmers. An exception is that the expenditure for staple food decreased somewhat. In contrast, the cross sectional and 53 panel data suggest a relatively constant

Table 19
Average Consumption Expenditures by Panel
of 53 Farm Families 1960-1970
in Real Terms 1970=100

Items	Income	Consumption Expenditures Classes									APC*
		Staple Food	Diet than Staple Food	Other than Staple Food	Hobbies	Clothings	Housings	Utilities	Human Agent	Other	
Year											
1960	38,702	13,117	6,546	1,183	1,128	1,368	1,911	2,416	2,998	33,664	.79
1961	36,286	10,497	6,925	1,299	1,269	1,133	1,163	2,706	2,915	27,905	.77
1962	42,299	11,453	8,523	1,376	1,363	2,641	1,595	2,733	2,279	31,552	.75
1963	42,056	11,091	7,012	1,087	969	2,339	1,479	3,192	2,275	29,444	.70
1964	40,239	9,474	7,509	1,310	1,588	3,604	1,462	3,504	3,003	31,450	.78
1965	48,705	11,070	7,132	1,359	1,824	2,482	1,748	4,855	2,924	33,615	.69
1966	62,606	9,503	8,330	1,302	2,030	3,592	1,634	4,436	3,840	34,565	.55
1967	43,463	10,637	7,415	1,128	1,244	2,212	1,196	6,796	2,321	32,949	.76
1968	48,103	10,102	8,229	1,241	1,088	2,654	2,379	4,125	3,271	33,067	.69
1969	49,311	8,157	7,020	1,287	1,862	5,067	2,007	4,528	17,332	47,294	.96
1970	53,612	8,617	7,234	1,205	1,710	3,780	2,467	5,377	12,443	42,832	.80

Source: Calculated from Taiwan Farm Record Keeping Accounts.

*APC = Total Family Consumption/Total Family Income.

average main food expenditure during most of the 1960's.

The sharp increase in expenditures under the "other" category is especially noteworthy in both 1969 and 1970. It appears that purchases of consumer durables made up a large part of this increase in "other" expenditures. In large part the sharp rise in the APC in 1969 and 1970 is due to the major increase in "other" expenditures. As with the cross sectional data and the 53 panel farm data, the APC for the five farms appears to have drifted down somewhat during the early 1960's and then risen sharply during the very late 1960's.

In Table 20 the staple food consumption for these five farms is broken down by in-cash and in-kind. Unlike the data presented for the larger sample of farms discussed earlier, in-cash staple food consumption appears to have drifted down somewhat among the five panel farms. Because these five farms are all located in intensive rice growing regions they have been able to rely on home production for 75 percent or more of their main food consumption during the entire 11 years.

In summary, it appears that similar changes in consumption patterns can be found in all three groups of data analyzed. In general Taiwanese farm families appear to have held food consumption relatively constant during the 1960's. Some shifting from home produced to purchased foods

Table 20
**Staple Food Consumption by Panel of
 5 Farm Families 1960 - 1970
 in Current NT\$**

Year	in cash	in kind	total	Degree of Self-Sufficiency in Main Food*
1960	2,168	10,949	13,117	83%
1961	1,091	9,406	10,497	89%
1962	1,237	10,216	11,453	89%
1963	1,350	9,741	11,091	87%
1964	2,287	7,187	9,474	75%
1965	1,878	9,192	11,070	83%
1966	1,689	7,814	9,503	82%
1967	2,464	8,173	10,637	76%
1968	658	9,444	10,102	93%
1969	514	7,643	8,157	93%
1970	1,190	7,427	8,617	86%

Source: Taiwan Farm Record Keeping Accounts, 1960 -
1970.

*Value of staple food in kind consumed/Total value of
staple food consumed.

did occur however. Expenditures on human investment and consumer durables appear to have increased rather dramatically during the latter part of the 1960's in all three of the data sets examined.

Chapter V

Calculation of Various Expenditure Elasticities by Selected Expenditure Classes

This Chapter presents various expenditure elasticities for several important expenditure classes identified in Chapters III and IV. Three different expenditure elasticities are determined: income, wealth, and family size. The Chapter is organized into four sections. The first section outlines the statistical model adopted to calculate the elasticities, identifies the data and expenditure classes used in the analysis, and specifies the variables included. The next section presents the statistical results of cross-sectional analysis of the 53 panel farms reported on in Chapter IV. The third section presents a brief look into how the level-of-self-sufficiency affects consumption patterns. The final section of the Chapter presents elasticities calculated from a time series analysis of the five panel farms discussed in Chapter IV. The main purpose of this last section is to illustrate the complex, heterogeneous nature of changes in rural consumption patterns over long time periods.

Statistical Model

Definitions

Income elasticities of expenditures for consumer goods can be defined as follows:

$$E = \frac{\Delta C}{C} / \frac{\Delta Y}{Y} = \frac{\Delta C}{\Delta Y} / \frac{Y}{C} = MPC \cdot \frac{1}{APC}^1,$$

Where C is consumption expenditure, ΔC is the change in consumption, Y is disposable income, and ΔY is the change in Y. The income elasticity of expenditure is equal to the MPC times the reciprocal of the APC.²

Engel's Law suggests that the larger a family's income, the smaller is the fraction that will be spent on food. Stigler, on the other hand, points out that most budget studies reveal income elasticities above unity for domestic servants, restaurant meals, medical care, expenditure on the education of children, etc. and income elasticities below unity for grain products (and purchased food generally), fuel, newspaper, liquor, and so forth.³

¹MPC = $\Delta C / \Delta Y$, i.e., the marginal propensity to consume.
APC = C / Y , i.e., the average propensity to consume.

²Hime-yu Chang, "Expectation and Changes in Food Consumption Patterns during the Process of Economic Development in Taiwan," Unpublished Report, Department of Economics, National Taiwan University, Taipei, Taiwan, 1971 (in Chinese).

³George J. Stigler, The Theory of Price, New York, MacMillan Co., 1968, pp. 33-38.

Following from the review of literature presented in Chapter II, expenditure elasticities were calculated with respect to three major family characteristics: income level, family wealth, and family size. A number of students of consumption behavior have felt these three variables were the most important factors affecting consumptions. Farm family income is here defined as the sum of net farm receipts as well as income derived off-farm activities. Wealth is defined as total assets of the farm family in this study.⁴ The family size is the sum of the number of adults in the family, plus half the number of children under 15 years of age and half the old people over 60 years of age.

Expenditure Classes and Data Used

As was previously discussed in Chapter III, eight expenditure classes were used in earlier parts of this study. The descriptive analysis of consumption patterns presented in Chapters III and IV showed five of these expenditure classes to be the most interesting: staple food, other foods, human agent, "other" and total expenditures. The elasticity analysis in this Chapter will, therefore, focus on calculation for these classes.

Two sets of data are used in making these elasticity

⁴Total assets are the sum of liquid assets and fixed assets. In the Taiwanese case, the average fixed assets were almost 7 times liquid asset during 1960's.

estimates. The first and most important is the 53 panel farms covering the period 1964 to 1970. A cross sectional analysis is made of this set of data. The other set of data used is the panel of five farms covering the 1960 to 1970 period.⁵ A time series analysis of this data is presented.

Model

The basic statistical model used in this analysis is nonlinear.⁶ It can be seen from LeBaron's empirical study in Iran, that the nonlinear equation is better fitted to consumption analysis.⁷ On the other hand, the expenditure elasticity of consumption for a certain consumer goods can be estimated directly from the nonlinear consumption function. But the regression coefficient is a constant in this case, and there is some important information lost. Therefore both cross-sectional and time-series data will be estimated in this study. A brief description of this equation is as follows:

One individual family's expenditures for a certain good,

⁵A description of the data used was presented in Chapter VI.

⁶Robert D. Stevens, "Elasticity of Food Consumption Associated with Changes in Income in Developing Countries," Foreign Agricultural Economic Report, NOS. 21-30.

⁷Allen LeBaron, Long-Term Projections of Supply and Demand for Selected Agricultural Products in Iran, Published by Utah Agricultural Experiment Station, Utah State University, Logan, Utah, 1970.

C_i , can be expressed as a function of income per family, X_{1i} , the family's total wealth, X_{2i} , and family size, X_{3i} . The equation can be formulated as follows:

$$C_i = A \cdot X_{1i}^{\beta_1} \cdot X_{2i}^{\beta_2} \cdot X_{3i}^{\beta_3} \dots \dots \dots (1)$$

One of the ways to fit an appropriate nonlinear relationship directly to the data is to seek an initial transformation of the data such that the relationship between the transformed data appears approximately linear, then the ordinary least square method can be applied.⁸ Equation (1) can be transformed into double-logarithmic form:

$$\log C_i = \alpha + \beta_1 \log X_{1i} + \beta_2 \log X_{2i} + \beta_3 \log X_{3i} + \xi$$

Where α and β_j ($j=1,3$) are parameters of this regression model, and ξ is the stochastic disturbance. In a time series analysis, $\log C_i$ indicates the rate of growth of consumption expenditures for a good for a given observation. $\log X_{1i}$ is the rate of growth of income of a given observation. $\log X_{2i}$ is the growth rate of wealth over time. Similarly, $\log X_{3i}$ is the rate of growth of family size. β_1 is the income elasticity of demand for a certain consumer good for a given observation over time. β_2 and β_3 are the expenditure elasticities for consumer goods with respect to wealth and family size, respectively. The term α captures other differences such as education level, tastes,

⁸J. Johnston, Econometric Methods, New York, McGraw-Hill, 1963, p. 44.

and availability of consumer goods, etc.

The statistical results estimated from cross-sectional data present the changes in average expenditure elasticities over time, but individual expenditure elasticities are suppressed. On the other hand, estimates from individual time-series data display individual estimates, but the information on changes in expenditure elasticities year-by-year are not presented. This is, of course, due to the constant coefficient's in the model used in this analysis.

The variables have a somewhat different meaning in the cross-sectional data analysis. In cross-sectional analysis, $\log C_i$ indicates the changes in consumption for a given good at a given time among different observations. Similarly, $\log X_{1i}$ is the rate of change in income level, $\log X_{2i}$ is the rate of change in wealth among the observations, and $\log X_{3i}$ is the rate of change in family size of different families. The β_j 's are the elasticities of consumption for certain goods with respect to different variables at a given time among different observations, i.e.

$$\frac{dC_i}{dX_{ji}} \cdot \frac{X_{ji}}{C_i} \quad (\text{where } i=1, \text{ sample size; } j=1,3). \quad \text{With } \beta_j > 0,$$

this implies that variable X_{ji} and consumption will change in the same direction. With $\beta_j < 0$, the relationship is negative. When the absolute value of β_j is greater than 1, it implies that consumption for a certain good, with

respect to X_{ji} , is elastic. That is, a one percent change in X_{ji} will induce more than a one percent change in consumption among observation at a given time. Otherwise, the relationship is trend inelastic.

The variables income and family size may be closely related. With empirical work, we can test if the relationship between these two factors is significant. This test was carried out and it was found that the multicollinearity was not high in the data under observation.

The panel of 53 farms are used for only cross-section analysis. Therefore, current values are used in the analysis. Since the panel of five farms was used in a time series analysis, it was necessary to eliminate the price effect by adjusting all values to 1970 prices. All zero values were also changed to 1, because zero values can not be entered in log calculations.

Hypotheses

According to Engel's Law, one would expect elasticities of expenditure for food in lower income group to be higher than those in higher income group. In the Taiwanese case, income levels have increased substantially over time. Therefore, the estimated β_j value will be hypothesized to decrease over time.

On the other hand, the income elasticities of expenditure for non-farm goods such as education, electric

appliances, etc. may increase over the same time period. Furthermore, the $\hat{\beta}_j$ value for durable goods or other non-farm goods may be higher than other consumer goods at a given time.⁹ Among different farm families, the higher income families may have lower $\hat{\beta}_j$ for necessary goods than those of lower income families when time series data are used.

Statistical Results of Cross-Sectional
Analysis of the 53 Panel Farms

The statistical results of the cross-sectional analysis of the panel of 53 farms are reported in Tables 21, 22 and 23. The elasticities of food consumption with respect to different variables are shown in Table 21. Several interesting points stand out in this Table. As might be expected, income elasticities of expenditure for staple foods are generally low throughout the seven year period. Wealth elasticities of demand for main food are close to zero, but family size elasticities are quite large during the entire period. No clear time changes are obvious from looking at the main food elasticities.

The expenditure elasticities for diet other than staple foods, also shown in Table 21, show a somewhat different pattern. Expenditures for diet other than staple food appear to be somewhat sensitive to all three independent

⁹ $\hat{\beta}_j$ means estimated value of β_j .

Table 21
Expenditure Elasticities for Food Consumption by
Panel of 53 Farm Families 1964-1970

Year	Staple Food				Diet Other Than Staple Food			
	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2
1964	0.09 (0.13)*	-0.06 (0.06)	0.99 (0.11)	0.68	0.26 (0.12)	0.15 (0.06)	0.24 (0.11)	0.63
1965	-0.08 (0.12)	0.02 (0.06)	1.04 (0.11)	0.68	0.16 (0.13)	0.19 (0.06)	0.33 (0.12)	0.49
1966	0.31 (0.14)	-0.09 (0.06)	0.82 (0.12)	0.61	0.41 (0.12)	0.09 (0.06)	0.32 (0.11)	0.57
1967	-0.05 (0.11)	-0.04 (0.06)	9.96 (0.13)	0.52	0.23 (0.12)	0.15 (0.06)	0.22 (0.14)	0.39
1968	0.15 (0.11)	-0.02 (0.05)	0.81 (0.11)	0.60	0.25 (0.11)	0.14 (0.05)	0.18 (0.11)	0.51
1969	0.13 (0.09)	-0.01 (0.05)	0.66 (0.13)	0.46	0.31 (0.11)	0.17 (0.06)	0.21 (0.16)	0.44
1970	0.11 (0.10)	0.01 (0.05)	0.76 (0.12)	0.54	0.34 (0.13)	0.13 (0.06)	0.27 (0.14)	0.49

Source: Estimated from Taiwan Farm Record-keeping Accounts.

*Standard errors.

variables: income, wealth and family size. As with staple food, however, no clear pattern of change in these various elasticities emerges over the years analyzed.

In Table 22 similar elasticities are calculated for expenditures on human investments and "other" consumer goods. As can be noted the income elasticities for human investments are quite high except for the year 1967. The wealth elasticities are quite low except for the years 1967 and 1970. The family size elasticities with respect to human investment show no consistent pattern. As with the data in Table 21 no consistent time trend is present for elasticities on human investment expenditures in Table 22.

The elasticities in Table 22 on "other" consumption items are particularly interesting. The income elasticities are especially large and show some tendency to increase over time. On the other hand the low wealth elasticities are rather surprising. Also the family size elasticities have consistently negative signs throughout the seven year period.

Expenditure elasticities for total consumption are presented in Table 23. As can be noted it appears that income elasticities of expenditures for total consumption have tended to increase somewhat over the time period covered. This is a reflection of the same changes in consumption patterns observed in Table 19 where APC's apparently shifted upward in the late 1960's. The wealth elasticities

Table 22
Expenditure Elasticities for Human Investment and "Other" Consumption
by Panel of 53 Farm Families 1964-1970

Year	Human Investment				Other Consumption			
	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2
1964	0.95 (0.32)*	-0.01 (0.16)	0.06 (0.28)	0.33	0.70 (0.32)	0.10 (0.14)	-0.11 (0.29)	0.25
1965	1.02 (0.30)	0.02 (0.15)	0.25 (0.29)	0.39	1.20 (0.31)	0.44 (0.15)	-0.51 (0.29)	0.59
1966	0.72 (0.38)	0.11 (0.18)	0.34 (0.33)	0.23	1.40 (0.43)	0.30 (0.20)	-0.23 (0.38)	0.43
1967	0.23 (0.33)	0.36 (0.16)	0.50 (0.36)	0.21	1.73 (0.47)	0.58 (0.23)	-0.38 (0.53)	0.48
1968	0.63 (0.29)	0.21 (0.14)	0.28 (0.28)	0.35	1.57 (0.36)	0.23 (0.17)	-0.23 (0.37)	0.53
1969	1.12 (0.24)	0.20 (0.13)	-0.29 (0.34)	0.47	2.57 (0.38)	0.08 (0.20)	-0.84 (0.55)	0.57
1970	0.59 (0.21)	0.34 (0.11)	-0.07 (0.24)	0.54	1.35 (0.33)	0.47 (0.17)	-0.32 (0.37)	0.61

Source: Estimated from Taiwan Farm Record-keeping Accounts.

*Standard Errors.

Table 23
Expenditure Elasticities for Total Consumption
by Panel of 53 Farm Families 1964-1970

Year	Income Elasticity	Wealth Elasticity	Family-Size Elasticity	\bar{R}^2
1964	.49 (.11)*	.01 (.05)	.39 (.09)	.70
1965	.58 (.09)	.08 (.05)	.40 (.09)	.79
1966	.62 (.10)	.03 (.05)	.40 (.09)	.77
1967	.57 (.10)	.08 (.05)	.42 (.12)	.71
1968	.60 (.09)	.05 (.04)	.25 (.09)	.76
1969	.74 (.07)	.08 (.04)	.17 (.10)	.84
1970	.65 (.08)	.10 (.04)	.24 (.10)	.81

Source: Estimated from Taiwan Farm Record-keeping Accounts.

*Standard errors.

presented in Table 23 again shows surprisingly small responses of consumption to changes in family wealth. As in previous tables in this Chapter, family size elasticities are of moderate size and show no particular time trend.

In Table 24 an attempt was made to calculate consumption elasticities of expenditure for staple food cash purchases as well as staple food consumption-in-kind. As can be noted in the Table, the adjusted R^2 (\bar{R}^2) for these estimates were generally quite low. That is, the equations specified explained only a very small part of variance in expenditures. No clear cut reasons for these low \bar{R}^2 could be identified. As a result, it is doubtful if the elasticity coefficients in Table 24 are very useful in identifying direction or magnitude of change in consumption patterns.

Some additional elasticity analysis is presented in Appendix B. An analysis of expenditures for housing showed associated elasticities to be quite unstable. Lumpy expenditures over time for housing are probably at least a partial explanation of these results. Data in Appendix B also indicate that the expenditure elasticities for hobbies, clothing and utilities with respect to the various variables have been quite low over the period of analysis.

The Effect of Level-of-Self-Sufficiency

Some writers on the topic of peasant agriculture have argued that consumption behavior is affected by the level-of

Table 24
Expenditure Elasticities for 53 Farms by Source of Staple Food
1964-1970

Year	Staple Food Purchased				Staple Food in Kind			
	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family-size Elasticity	\bar{R}^2
1964	-0.08 (0.56)*	-0.24 (0.29)	1.04 (0.50)	0.04	0.73 (0.61)	0.08 (0.31)	1.00 (0.54)	0.18
1965	0.48 (0.49)	-0.40 (0.23)	1.16 (0.45)	0.20	-0.44 (0.31)	0.37 (0.15)	1.23 (0.29)	0.33
1966	0.75 (0.53)	-0.42 (0.25)	0.65 (0.47)	0.14	0.07 (0.67)	0.40 (0.31)	0.53 (0.59)	0.09
1967	0.11 (0.48)	-0.34 (0.24)	0.40 (0.56)	0.05	-0.27 (0.76)	0.59 (0.39)	0.76 (0.88)	0.07
1968	0.63 (0.42)	-0.54 (0.23)	-0.44 (0.61)	0.10	-0.05 (1.08)	0.74 (0.53)	0.71 (1.18)	0.02
1969	1.22 (0.39)	-0.23 (0.21)	-0.09 (0.57)	0.16	-0.21 (0.85)	0.59 (0.46)	0.22 (1.24)	-0.02
1970	0.77 (0.44)	-0.26 (0.23)	-0.05 (0.51)	0.01	0.04 (1.09)	0.39 (0.57)	0.53 (1.25)	-0.03

Source: Estimated from Taiwan Farm Record-keeping Accounts.

*Standard Error.

self-sufficiency which families have in their food consumption bundle. That is, families which produce a large part of what they consume may be insensitive to economic forces because of their isolation from market influence. A very crude attempt to shed light on this question was carried out with data from the 53 panel farms. The farms were divided into two groups on the basis of the proportion of total food consumption which was produced on the farm. The proportion selected was 50 percent. It was found that 45 of the farm families produced over one-half of the value of food they consumed. Only 8 had ratios of less than .5.

Expenditure elasticities with respect to income, wealth, and family size were computed for these two sub-groups of farm families for the years 1964 and 1970.¹⁰ An analysis of these elasticities, however, did not provide any clear cut indication of substantial differences in consumption patterns between the two sub-groups of farms. A further breakdown of farmers into additional sub-groups with higher than .5 self-sufficiency ratios may have provided additional evidence on this question.

Analysis of Time Series Data from the
Panel of 5 Farms 1960-1970

To this point in the study aggregate data for a number

¹⁰The statistical results of this analysis are shown in Appendix D.

of farms have been analyzed. Aggregation and averaging, however, tend to hide the very heterogeneous consumption behavior of many of the farm families included in the samples. Some indication of the heterogeneous nature of these consumption patterns can be shown by time series analysis of individual farms. The five farmers who participated in the farm account record-keeping project from 1960 to 1970 provide the data for this analysis. Each farm had expenditure information for 11 years. This individual information was placed in the income elasticity model previously discussed. A summary of the time series results for each farm family are presented in Table 25. The rows of this Table list statistics on an individual farm, while the columns display statistics on different important expenditure classes.

A quick overview of the data in Table 25 demonstrates the large differences in consumption behavior among the five farm families. Following expectations, several farms ("B" and "E") had very low, but still positive, income elasticities of expenditures for staple food items. Surprisingly, farms "A" and "D" had negative signs on their income elasticities for staple food, while farm "C" had a very large positive elasticity. Similarly diverse elasticities can be noted among the five farms in the other four expenditure classes.

One reason for the large differences in expenditure elasticities among the farm families analyzed is the changing

Table 25

Income Elasticity of Consumption Expenditures of Five
Farm Families in Taiwan 1960-1970

Farm	Staple Food		Diet Other Than Staple Food		Human Investment		Other Consumption		Total Consumption	
	E ¹	\bar{R}^2	E	\bar{R}^2	E	\bar{R}^2	E	\bar{R}^2	E	\bar{R}^2
A	-0.16 (.27) ²	.53	.14 (.30)	-.02	-.21 (.67)	-.14	-.32 (.79)	-.22	-.07 (.19)	.57
B	.07 (.06)	.13	.28 (.21)	.49	1.65 (.65)	.45	1.77 (.65)	.50	.54 (.16)	.52
C	.73 (.18)	.73	.34 (.15)	.60	-1.89 (.82)	.24	.36 (3.72)	-.15	.30 (.19)	.46
D	-.30 (.13)	.44	-.03 (.11)	.54	.21 (.24)	.43	3.29 (.51)	.80	.83 (.15)	.74
E	.06 (.54)	-.11	.42 (.19)	.67	-.02 (.34)	.74	.34 (.82)	.42	.50 (.28)	.64

Source: Estimated from Taiwan Farm Record-keeping Accounts.

¹E indicates the income elasticity.

²Standard errors.

composition of the family itself. In several cases family size rose or fell significantly during the 11 year period. Some children became adults and thus altered family consumption patterns.

Another reason for sharp differences among families is the changing income pattern which some families have experienced. Family "D" for example had very large non-farm receipts in 1969 and 1970. This may have been due to family members entering the off-farm labor force while still maintaining a part-time rural residence. Without a good deal more work on the time series data it was impossible to sort out all of these unique family changes which resulted in the very heterogeneous results shown in Table 25.¹¹ It is also apparent, that more theoretical work is needed in order to adequately analyze time series data of this nature.

¹¹Some additional elasticities are presented in Appendix C.

Chapter VI

Summary and Conclusion

As was suggested in the Introductions Chapter, the principal objective of this study was to describe the changes in rural consumption patterns which have occurred in Taiwan over the 1960 to 1970 period. An attempt was also made to identify important factors which affect rural consumption behavior in Taiwan. An additional objective was to check the consistency of consumption measures calculated from cross sectional data drawn from a changing sample, with time series information based on two sets of panel-farm data. The last objective was to draw from the research findings any policy suggestions which might be important for other LDC's.

Data used in this study were drawn from a farm record-keeping project in Taiwan. Farmers participate in this project on a voluntary basis. For this reason, they may not represent average Taiwanese farmers. Participants have somewhat higher incomes and somewhat larger farms than average Taiwanese farmers.

Findings

The real income of these record-keeping farms increased significantly during the 1960's from NT\$41,763 in 1960 to NT\$52,500 in 1970. An important part of this increase in income came from off-farm sources. The average value of real total consumption of record-keeping families increased from NT\$33,762 in 1960 to NT\$42,133 in 1970.

Analysis of the data showed that consumption patterns changed substantially over the 1960-1970 period. Staple food expenditures decreased, but expenditures on other foods increased significantly over this time period. The average annual investment in human capital almost doubled during the decade. Consumption expenditures for "other" consumer goods, mainly consumer durables, increased very significantly among all income groups of farmers. Generally, the average propensity to consume decreased in the first part of the 1960's, but increased in the late 1960's.

Elasticity relationships between expenditure classes and three selected variables: family income, family wealth, and family size, were estimated from a double-logarithm equation. This was transformed from a nonlinear consumption function through the ordinary least square. Consequently, family income level was the most important factor in determining rural consumption in the 1960's. Most expenditures for different consumer goods were very sensitive to changes

in income, except staple food expenditures. The income elasticities of expenditures for human investment and consumer durables were very high and increased over time. Wealth did not appear to be a major factor in determining changes in consumption. The relatively low wealth levels of the families analyzed may have influenced this finding. Family size was an important factor in determining staple food expenditures over the eleven years. There was no consistent relation between family size and expenditures for other consumer expenditure classes, however. In part this may result from changes in age composition of the families studied.

In addition, the increased availability of consumer goods during the late 1960's appears to have been a very important determinant of consumption decision. The availability of new consumer goods such as electric appliances and other consumer durables may have altered consumers' tastes over time. The increase in the average propensities to consume in the latter 1960's may have been related to this.

The comparison of cross-sectional data and time-series panel data showed that the directions of change in consumption patterns were quite similar in both sets of data. It also showed that Taiwanese farm families have held food consumption relatively constant during the 1960's, but have

switched some food consumption from home produced to purchased foods. The expenditures on human investment and "other" consumer goods increased significantly over time.

The statistical results from the time-series analysis in this study were somewhat inconclusive because of the changing age composition of family, changes in family size, differences in consumers' time preference, and the various off-farm income patterns. Overall the time series farms showed very heterogeneous consumption behavior during the 1960's.

The general conclusions reached regarding the hypotheses specified in Chapter I are as follows:

1. Farm families in Taiwan have experienced significant changes in consumption patterns over the 1960-1970 period.
2. Total farm family income is a crucial determinant of consumption decisions. Family wealth and family size are not generally associated in a systematic way with changes in these consumption patterns.
3. Income elasticities of expenditure for staple consumer goods are relatively low over time. There are no clear cut time changes in the elasticities.
4. Income elasticities of expenditures for investment in human capital and for consumer durables were

- quite high and increased over the 1960's.
5. Adjustments in consumption patterns among farm families included in a series of cross-sectional data set were very similar to those observed in time-series panel data.
 6. The final hypothesis was, that a major increase in diversifications of consumer durables available for purchase in rural areas of Taiwan during the late 1960's substantially altered rural consumers' time preferences. This hypothesis was not directly tested in this study because of lack of detailed information. The fragmentary information available, however, hinted that such a relationship might have existed. Clearly, further research is needed on this question.

Policy Suggestions

The low average propensities to consume in the early and middle 1960's in Taiwan indicate the presence of substantial savings capacities during those years. The Taiwanese experience shows that rural savings are available for mobilization and use in rural areas as well as transfer to other sectors. Because of the relationship between consumption and savings, personal savings can be expanded by the contraction of consumption. Higher interest rates on savings apparently played an important part in stimulating

savings. On the other hand, high rates-of-return-to-investment are also very strong incentives to induce personal savings. High rates of return to on-farm investment in Taiwan has apparently played a significant part in stimulating differed consumption.

At the same time, the expansion in rural consumption appears to have provided a major market for industrial goods, and thus stimulated industrial growth and employment in Taiwan. The availability of new industrially produced consumer goods did, in turn, stimulate the purchase of consumer durables in rural areas. On the other hand, this expansion in rural consumption reduced the rural personal savings.

In addition, the changes in rural consumption patterns in Taiwan clearly show that higher human investments occur in rural areas when peasants are given the opportunity and incentives to make such investments. For this reason, it is very important to improve the health and educational facilities available in rural areas. Higher levels of education and better medical care increase the quality of rural labor. This in turn causes higher labor productivity. The higher labor productivities allow more human capital to be transferred to the non-farm sector.

Additional Research

In the past, neo-Keynesian consumption analysis has focused on the short run stability questions. For growth analysis, it is necessary to adjust neo-Keynesian consumption analysis to include the time dimension. It is also necessary to combine rural firms and households into one analytic unit. Most of the consumption analysis in the past has assumed that entrepreneurial investment decisions and consumption decisions were independently made. In a rural setting, these two decisions are fundamentally related. It is necessary, therefore, to include the rates of return to investments faced by the firm-household in the consumption analysis. It will also be necessary to include the effects of changes in availability of market goods on consumption decisions over time in consumption analysis. In addition, education expenditures are another very important faction in consumption decisions. More detailed analysis is needed on rates of return to human capital and how these rates of return affect consumption decision.

Most economists have addressed a good deal of attention to aggregate consumption questions in the last forty years. This study suggests that more work is needed on time series analysis of individual consuming units.

APPENDIX A

General Index of Prices-received-by-farmers, and Market
Rate of Exchange of U.S. Dollars Expressed
in New Taiwanese Dollars, 1960-1970

Year	General Index of Prices-received-by-farmers (1) 1970 = 100	Market Exchange Rate (2)
1960	31.0	42.26
1961	33.5	43.98
1962	79.3	46.99
1963	36.4	42.43
1964	39.7	45.88
1965	39.2	41.63
1966	39.0	41.00
1967	93.5	41.61
1968	98.2	41.12
1969	95.6	41.25
1970	100.0	41.02

Source: (1) Calculated from Monthly Statistics on Price Received & Price Paid by Farmers in Taiwan, published by Bureau of Accounting and Statistics, Provincial Government of Taiwan (PBAS), (Nantou, Taiwan: PBAS, December 1966 and December 1970).

(2) Council for International Economic Cooperation and Development (CIECD), Taiwan Statistical Data Book 1971, (Taipei, Taiwan: CIECD, 1971), p. 127.

Appendix B-1

Expenditure Elasticities for Expenditure on Hobbies and
Clothing by Panel of 53 Families 1964-1970

Year	Hobbies				Clothing			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
1964	0.72 (.38)*	0.12 (.19)	.23 (.34)	.28	.61 (.30)	.20 (.15)	.18 (.27)	.37
1965	.27 (.36)	.23 (.18)	.40 (.34)	.18	.92 (.31)	.12 (.15)	.35 (.29)	.41
1966	1.12 (.37)	.001 (.17)	-.13 (.33)	.23	.76 (.28)	.08 (.13)	.47 (.24)	.38
1967	.51 (.33)	.18 (.17)	.13 (.38)	.17	.29 (.36)	.22 (.18)	.15 (.42)	.06
1968	.56 (.40)	.18 (.19)	.16 (.41)	.14	.60 (.36)	.16 (.17)	.14 (.37)	.18
1969	.15 (.28)	.32 (.15)	.54 (.41)	.16	1.60 (.44)	-.05 (.24)	-1.05 (.64)	.22
1970	.48 (.44)	.13 (.23)	.44 (.50)	.12	1.05 (.33)	-.06 (.17)	-.35 (.38)	.25

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix B-2

Expenditure Elasticities for Expenditures on Housings and Utilities
by Panel of 53 Families 1964-1970

Item Year	Housings				Utilities			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
1964	1.22 (.39)*	.22 (.20)	.61 (.35)	.39	.88 (.25)	-.11 (.13)	.12 (.22)	.36
1965	1.06 (.30)	.26 (.15)	-.02 (.28)	.50	.23 (.15)	.06 (.08)	.05 (.15)	.22
1966	1.01 (.39)	.25 (.18)	.15 (.34)	.36	.20 (.21)	.02 (.10)	.30 (.19)	.09
1967	.94 (.52)	.10 (.25)	.55 (.59)	.15	.08 (.18)	.08 (.09)	.41 (.21)	.10
1968	1.39 (.50)	.59 (.24)	-.48 (.51)	.46	.28 (.21)	-.05 (.10)	.05 (.21)	.04
1969	1.53 (.40)	.17 (.21)	-.11 (.58)	.43	.30 (.17)	.04 (.09)	.42 (.25)	.22
1970	1.53 (.53)	.49 (.30)	.60 (.66)	.37	.33 (.20)	-.10 (.10)	.25 (.23)	.11

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix C-1

Expenditure Elasticities for Several Expenditure Classes
of Families Reflecting High Food Self-Sufficiency
in 1964 and 1970

Year Items	1964				1970			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
Staple Food	0.09 (.15)*	-0.06 (.07)	.99 (.13)	.63	.23 (.12)	-.04 (.06)	.80 (.13)	.56
Diet other than Staple Food	.33 (.13)	.12 (.06)	.28 (.12)	.61	.40 (.15)	.12 (.08)	.18 (.16)	.48
Human Investment	1.15 (.35)	-0.03 (.17)	-0.08 (.30)	.35	.39 (.74)	.46 (.12)	-.14 (.25)	.57
Other Consumption	.71 (.37)	.17 (.18)	.01 (.33)	.19	1.03 (.35)	.66 (.18)	.05 (.36)	.68
Total Consumption	.55 (.13)	.0006 (.06)	.39 (.11)	.70	.57 (.09)	.14 (.05)	.29 (.09)	.83

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix C-2

Expenditure Elasticities for Several Expenditure Classes
of Families Reflecting Low Food Self-Sufficiency
in 1964 and 1970

Year Item	1964				1970			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
Staple Food	.16 (.15)*	-0.23 (.17)	1.01 (.14)	.88	-0.03 (.18)	-0.11 (.15)	.52 (.25)	.60
Diet other than Staple Food	-.20 (.27)	.73 (.28)	.61 (.25)	.70	-0.08 (.15)	-0.09 (.12)	.77 (.20)	.72
Human Investment	.36 (.69)	1.31 (.72)	.36 (.62)	.25	.71 (.62)	-.10 (.48)	.16 (.82)	-.11
Other Consumption	.52 (.76)	.40 (.80)	-.76 (.69)	-.08	2.04 (.76)	-1.05 (.59)	-2.61 (1.01)	.55
Total Consumption	.13 (.21)	.37 (.22)	.31 (.19)	.65	.91 (.26)	-.18 (.20)	.18 (.35)	.69

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix D-1

Expenditure Elasticities for Expenditure on Hobbies and Clothing
by Panel of 5 Families 1960-1970

Farm	Hobbies				Clothing			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
A	.10 (.63)*	.37 (.77)	1.71 (2.31)	.35	-2.33 (1.34)	2.55 (1.62)	5.82 (4.89)	.12
B	.67 (0.38)	2.17 (0.78)	2.54 (2.57)	.65	1.60 (.69)	.34 (1.41)	5.75 (4.66)	.38
C	.09 (.26)	.10 (.10)	.65 (.23)	.72	-.48 (1.79)	.02 (.72)	1.30 (1.64)	-.29
D	.55 (.44)	1.00 (.44)	-2.07 (.89)	.43	.74 (.23)	.60 (.23)	-.61 (.47)	.70
E	.97 (.35)	-.33 (.23)	3.53 (2.25)	.51	.48 (.39)	-.06 (.26)	2.76 (2.51)	.24

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix D-2

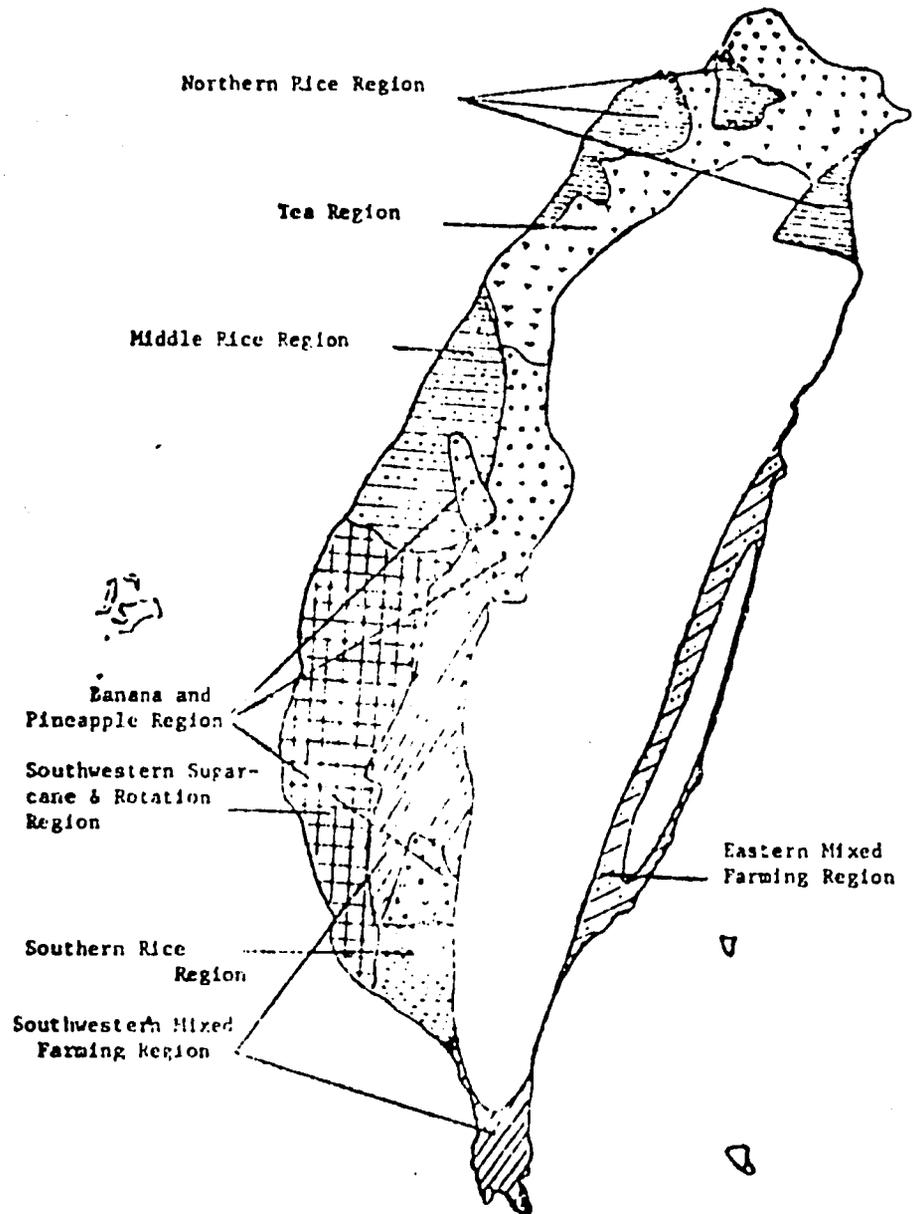
Expenditure Elasticities Expenditures on Housing and Utility
by Panel of 5 Families 1960-1970

Farm	Housings				Utility			
	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2	Income Elasticity	Wealth Elasticity	Family Size Elasticity	\bar{R}^2
A	1.03 (1.35)*	.60 (1.64)	13.33 (4.93)	.44	1.76 (.94)	-2.08 (1.14)	-1.85 (3.43)	.16
B	1.64 (.82)	-1.43 (1.68)	1.26 (5.57)	.14	.61 (.44)	-2.99 (.91)	-8.68 (3.02)	.47
C	-.20 (1.33)	.12 (.53)	1.28 (1.21)	-.07	-1.03 (.75)	.15 (.30)	.40 (.69)	-.11
D	1.23 (.29)	.69 (.29)	1.15 (.59)	.84	.18 (.34)	.25 (.34)	-.77 (.68)	-.15
E	1.74 (.82)	-.62 (.56)	1.29 (.35)	.14	.15 (.41)	.20 (.28)	5.15 (2.70)	.08

Source: Estimated from Taiwan Farm Record-Keeping Accounts.

*Standard error.

Appendix E. Map of Taiwan's Agricultural Regions



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