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**DETERMINANTS OF FINANCIAL SAVINGS
IN TAIWAN FARMERS' ASSOCIATIONS,
1960 TO 1970**

Chyau Tuan

NANKANG, TAIPEI, TAIWAN
REPUBLIC OF CHINA
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**NOVEMBER 1976
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TO MY PARENTS, CHENGWONG AND MANYON TUAN

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CHAPTER I

INTRODUCTION

Problem and Justification

In the last few years increasing attention has been directed at determining the role of financial markets in economic development.¹ Relatively little research, however, has focused on the part rural capital markets play in this process.² As a result, until recently, very little was known about the extent to which rural voluntary financial savings capacities existed. In part this lack of knowledge was due to the widely held assumption that because of low incomes and/or lack of economic sophistication among rural residents, little voluntary savings capacity existed in rural areas.

Fragmentary evidence from a few recent studies suggest that this assumption, at least in some cases, may be incorrect. Studies carried out in South Vietnam, Uganda, Ecuador, Korea, Zambia and Bangladesh provide circumstantial evidence that significant rural savings capacities may exist.³ Even stronger evidence has been provided, on the Japanese and Taiwanese cases.⁴ For Japan, Mizoguchi argues that during the 1950's and 1960's rural savings capacities were remarkably high and that a good deal of this savings found its way into financial markets. In Taiwan Ong and Chin found that vary substantial savings capacities existed at the farm level during the 1960's. As will be reported on later in this study, a substantial part of these savings also found their way into financial markets.

Almost no research has been carried out in developing countries on the determinants of voluntary savings at the institutional level. In many respects Taiwan is an excellent case for exploring this problem. Because the Farmers' Association

Credit Department (FACD) is the primary financial institution servicing rural people in Taiwan, any study of rural financial savings must heavily emphasize the associations. More than half of the rural townships have only FACD's as their financial agent. It is also estimated that about 60 percent of the rural financial savings are deposited in the FACD's. As a financial institution, the FACD provides more financial saving opportunities to the rural people than do other banking organizations.

Objectives

In this study, attention is focused on the determinants of FACD financial savings in Taiwan over the 1960 to 1970 period. The specified objectives of the study are as follows:

- (1) To document the growth and change of FACD savings during the 1960's and to relate these changes to the overall development of the rural capital market in Taiwan.
- (2) To identify the relationship between the activities performed by the Farmers' Association (FA) and the mobilization of rural savings. This will include:
 - (a) The development of models to identify and evaluate the variables significantly affecting the level of aggregate provincial and regional FACD savings.
 - (b) The development of a model to identify and evaluate the factors, especially those institutional features, significantly affecting the level of savings in each FACD.
- (3) To draw policy conclusions from the finding of this study which might be helpful to Taiwan policy makers or planners in other developing countries.

Hypotheses

The hypotheses to be tested in the study are:

- (1) Aggregate savings in FACD's are a function of farm family agricultural production levels, real returns on deposits in FACD's, and levels of supporting activities of the FACD's. This hypothesis will be tested by using country-wide time series data (1960-70).
- (2) Savings in individual FACD's are a function of farm family disposal income, image or overall evaluation (rank) of the FA, competition from other financial agencies, levels of FA and FACD supporting activities, and attitude of the FACD

personnel toward attracting rural savings. This hypothesis will be tested by examining 1970 cross-sectional data at the township level.

(3) The FACD savings are hypothesized to be related to regional economic conditions. It is also assumed that demand and time deposits of the FACD might respond differently to changes in financial or non-financial determinants. These hypotheses will be evaluated by comparing the results of various statistical models.

A detailed discussion of all of these hypotheses will be given in Chapter IV.

Organization

The study consists of eight chapters. Following this introduction, the second chapter reviews the relevant literature related to financial development, voluntary savings and its determinants. Also, results from empirical studies of rural savings in Taiwan are included.

The third chapter documents historical developments of Taiwan's agricultural financial system and investigates the role of Farmers' Associations in the overall rural financial market. The changes and structure of FACD savings are also emphasized.

The fourth chapter discusses the methodological framework used in this study, e.g., the general findings from the author's field survey, the make up of the general analytic model, the source and nature of the data employed in the statistical analysis, the specified operation models and statistical methods used.

The fifth chapter through the seventh chapter present the results of the statistical analysis. The findings from provincial, regional and township models are discussed in that order. The comparisons of provincial models, of regional models, and of three levels of models also are given.

The last chapter summarizes the results, utilizes the findings of the analysis to draw economic implications and policy conclusions, and suggests topics for future research.

NOTES TO CHAPTER I

1. Raymond W. Goldsmith, *Financial Structure and Development* (New Haven: Yale University Press, 1969), pp. 44-48, 372-409; Edward S. Shaw, *Financial Deepening in Economic Development* (New York: Oxford University Press, 1973), p. 71; and Ronald I. McKinnon, *Money and Capital in Economic Development* (Washington, D.C.: The Brookings Institution, 1973) pp. 1-4.
2. One Exception is Dale W. Adams, "Rural Savings and Small Farmer Credit Programs", *Economic and*

Sociology Occasional Paper No. 129, Department of Agricultural Economics and Rural Sociology, The Ohio State University, February 1, 1973.

3. The following papers presented at the "Spring Review of Small Farmer Credit", sponsored by the Agency for International Development, Washington D.C. July 12-13, 1973 present such evidence: Agricultural Development Bank, Republic of Vietnam, "The Rural Banking System in Vietnam With Credit for Small Farmers"; D. C. Frederickson, "The Cooperative Credit Scheme in Uganda"; R. H. Keeler, *et. al.*, "Evaluation of the Directed Agricultural Credit Program in Ecuador"; R. B. Morrow and O. E. White, "Farm Credit in Korea"; R. A. J. Roberts, "The Role of Money in the Development of Farming in the Mumbwa and Katete Areas of Zambia"; and M. Solaiman and A. Huq, "Small Farm Credit in Bangladesh".
4. For example see: Toshiyuki Mizoguchi, "Consumption Functions and Saving Functions for Japanese Farmer's Families in Post-War Japan", *Rural Economic Problems*, Vol. 4, No. 1 December 1967, pp. 20-35; Marcia Min-Ron Lee 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; Lein-In Amy Chin, "Changes in Rural Consumption Patterns in Taiwan 1960-1970", unpublished Masters Thesis, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1973.

CHAPTER II

REVIEW OF LITERATURE

Financial Savings, Financial Institutions, and Economic Growth

Based on analysis of some 30 developed and developing countries Goldsmith concluded that financial institutions have a significant impact on the economic growth of a country. He concluded that the relative size of a country's financial structure as compared to its national wealth and product, the rapidity with which the financial structure expands in nominal and real terms, and the types of operation and geographic distribution of financial institutions influence the speed and character of economic growth.¹

Shaw and McKinnon, with a very similar point of view, broke new ground by arguing for the use of domestic capital markets to stimulate economic performance. Their studies emphasized the freeing of domestic financial markets to allow interest rates to reflect the true scarcity of capital. They also argued that appropriate steps can be taken in the monetary sector to overcome the vicious circle of inflation and stagnation. Hence, the rural capital market, the rural financial institutions and their operation should receive serious attention.²

Adams argues for balanced development of rural capital markets which includes mobilizing substantial rural voluntary savings. In turn this would (1) provide rural residents with consumption and savings signals which are more in line with social objectives, (2) help rural capital markets to move toward self-sufficiency, as well as expand the volume of loanable funds, and (3) stimulate overall rural economic performance. He argues that this can be accomplished through aggressive saving policies

which provide attractive incentives for rural people to save in a financial form, as well as establishing readily available, secure places for rural residents to deposit savings.³

Financial Savings and It's Determinants

During the last two decades, a number of aggregate studies have been conducted on various aspects of savings in developed countries. Generally speaking, there have been two approaches used in the study of savings. The first is the macro-economic approach which has focused on determinants of aggregate savings. The second is the financial savings approach which has attempted to identify the factors affecting financial deposits. This has included studies of "portfolio balances" and the "wealth adjustment process". The savings decision is explained in this approach as a choice among various asset forms. Due to the nature of this study, the main focus of the review of literature will be on the factors affecting voluntary financial savings. Studies pertaining to financial or FACD savings of farm families in Taiwan will also be included.

As suggested earlier, little research has been conducted on the rural financial savings in the developing countries. A number of empirical studies and substantial economic literature, however, is available on overall savings in developed nations. Some economists argue that analysis of savings in developed countries is extremely meaningful and helpful for study of less developed countries.⁴

Major determinants of financial savings are included in the review of literature to give direction to the development of the models. The determinants most commonly mentioned in the literature are: (1) the level of income; (2) interest returns from the deposits (savings); (3) availability or development of financial institutions; (4) the levels of supporting activities of the institution; and (5) other factors.

(1) The Level of Income:

Most monetary theories and related empirical tests have indicated a positive relationship between financial saving and the level of income and/or output in the economy at the aggregate level.⁵ Regardless of the reasons for an individual holding financial savings, income has been included as an influential factor at the micro level.

Findings by Feige, Jordan, Cohen and Kaufman also strongly suggested that personal income or permanent personal income, either absolute levels or percentages, are an important determinant of financial savings at the bank level.⁶

(2) Interest Rate

Viewpoints pertaining to the effect of interest rates upon financial savings are polarized.⁷ Eckaus argues that there are usually both "substitution" and "income" effects associated with a change in the interest rate, and that the net effect is hard to predict.⁸ Feige and Lee found an insignificant interest rate effect on aggregated financial assets, but attributed this interest insensitivity to the aggregation.⁹ Friend also argued that if a study is narrowly directed at the individual components of financial savings, interest rates might affect the level of that type of saving.¹⁰

However, Chase, Penson, Cohen and Kaufmen, and Jordan argued that interest rates as well as opportunity cost (interest return from other financial assets) are significant determinants of savings at the household or *bank (institution)* level.¹¹ Shaw and McKinnon, based on their empirical studies of several developing countries, also suggested that a lagging economy may have a sensitive interest response, if the savers are offered positive real interest rates.¹² Saving-income ratios might have risen as long as inflation is controlled. McKinnon also indicated that real interest rates have more influence upon time deposits than demand deposits because a saver's chief motive for time savings is the interest earned.

(3) Availability and Development of Financial Institutions:

Many studies indicate a positive association between availability of financial institutions and mobilization of savings. Institutional availability is expected to improve the collection of savings by decreasing transaction cost.¹³

The studies of Jordan, Feige, Cohen and Kaufmen, previously mentioned, have found that the number of banking offices is a significant determinant of financial savings.

(4) Supporting Activities of the Institution:

In addition to rates of interest paid and transaction cost incurred by savers, the institutional supporting activities were also indicated as significant determinants of savings attraction by various studies. The supporting activities generally agreed to stimulate savings are preferential treatment to savers, deposit insurance, and extent of advertising.¹⁴

Additional institution services such as efficient service, longer open-hours and attractive buildings are felt to affect the level of savings of an institution. Since the effects of these non-pecuniary returns are difficult to quantify, few of them have been tested statistical.

(5) Regional Effect:

The previously discussed factors are usually agreed to be determinants of the level of savings mobilized by the financial institutions at either institutional or more aggregated levels. However, regional shifts due to differences in regulations (if any), general economic conditions, and communication (travel) conditions are also mentioned in the studies by Feige and Gupta.¹⁵

The Determinants of FACD Savings in Taiwan

Although several quantitative studies have investigated macro level demand and supply of money in Taiwan recently, no similar study has analyzed the voluntary savings of the farm sector at either micro or macro levels. Hence, this section can only summarize the relevant results of a few descriptive studies.

A number of studies have looked at various FACD activities in Taiwan.¹⁶ They have suggested that the rural savings deposits in FACD are associated with: (1) interest return from deposits in FACD, (2) income of Farmers, (3) changes in consumption or saving propensities, (4) number of other financial institutions present in the area, (5) monetary or fiscal policy, (6) overall economic conditions (e.g., inflation, etc.), (7) quantity of FACD loans, (8) degree of industrialization,¹⁷ (9) financial position and image of the FACD, (10) special savings promotion efforts by the FACD¹⁸ i.e., saving campaign, frequent contact with farmers by FACD staff; and (11). quality of overall management of the FA, especially effectiveness of the extension programs. Except items (1) to (6) and (8), the other factors are closely associated with individual features of the FACD. As previously noted, no indepth investigation have been carried out to test the validity of these factors.

NOTES TO CHAPTER II

1. Goldsmith, *op. cit.*, pp. 346-347 and 390-401.
2. Shaw, *op. cit.*, pp. 80-92; McKinnon, *op. cit.*, pp. 68-70, 116.
3. Adams, *op. cit.*, pp. 18-20.
4. R. D. Lambert, "The Social and Psychological Determinants of Savings and Investment in Developing Societies", in *Industrialization and Society*, ed. by B. F. Hoselitz and W. E. Moore (New York: UNESCO-Mouton, 1963) pp. 116-132; and R. D. Lambert and B. F. Hoselitz, ed., *The Role of Savings and Wealth in Southern Asia and The West* (Paris: UNESCO, 1963).
5. M. Friedman, "The Supply of Money and Changes in Prices and Output", *The Relationship of Prices to*

- Economic Stability and Growth: Compendium of Papers Submitted by Panelists* (U.S. Congress, Joint Economic Committee, 1958), pp. 241-256; also: M. Friedman, ed., *Studies in the Quantity Theory of Money* (Chicago: University of Chicago Press, 1965), Ch. 1.
6. E. J. Feige, *The Demand for Liquid Assets: A Temporal Cross-Section Analysis* (Englewood Cliffs, New Jersey: Prentice-Hall, 1964) pp. 3-9; Jerry L. Jordan, *The Market for Deposit-Type Financial Assets*, Unpublished Ph.D. Dissertation, University of California at Los Angeles, March, 1969; and B. C. Cohen and G. G. Kaufman, "Factors Determining Bank Deposit Growth by State: An Empirical Analysis", *Journal of Finance*, Vol. XX, No. 1, March 1965, pp. 59-70.
 7. D. B. Suits, "The Determinants of Consumer Expenditure: A Review of Present Knowledge," in *Impacts of Monetary Policy* ed. by the Commission on Money and Credit (Englewood Cliffs, N. J.: Prentice-Hall, 1963) p. 41; also L. R. Christensen: *Saving and the Rate of Return*, Social Systems Research Institute (SSRI) Workshop Series No. EME 6805, The University of Wisconsin, 1968; and John T. Boorman, *Money Supply, Money Demand, and Macro-economic Models* (Boston: Allyn and Bacon, Inc., 1972) pp. 255-66.
 8. R. S. Eckaus, "Notes on Financial Intermediation, Savings and Monetary Controls", unpublished paper, Economics Department, Massachusetts Institute of Technology, 1972.
 9. E. L. Feige, *op. cit.*, pp. 16-42; Tong Hun Lee, "Substitutability of Non-Bank Intermediary Liabilities for Money", *Journal of Finance*, Vol. XXI, No. 3, September, 1966, pp. 441-57.
 10. Irwin Friend, "Determinants of The Volume and Composition of Saving", *Impacts of Monetary Policy* (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1963), pp. 674-76.
 11. Samuel B. Chase, Jr., "Household Demand for Savings Deposits, 1921-1965", *The Journal of Finance*, Vol. XXIV, No. 3, September, 1969, pp. 643-58; J. B. Penson, Jr., "Demand for Financial Assets in the Farm Sector: A Portfolio Balance Approach", *American Journal of Agricultural Economics*, Vol. 54, No. 2, May 1972; Cohen and Kaufman, *op. cit.*, p. 73; and Jordan, *op. cit.*
 12. Edward S. Shaw, *op. cit.*, p. 73; Ronald I. McKinnon, *op. cit.*, pp. 14-16, 37-41.
 13. In this study, it was assumed that service charge was an exogenous variable. Transaction cost associated with the financial assets (deposits, etc.) then only included travel to the institution (the time and money savers spend, in other words).
 14. Chase, Jr., *op. cit.*, Feige, *op. cit.*, p. 31, and Jordan, *op. cit.*
 15. Feige, *op. cit.*, K. L. Gupta, "Household Savings in Financial Assets - A Case Study of India", *Indian Economic Journal*, Vol. 17, April-June 1970, pp. 500-14.
 16. Taiwan Provincial Department of Agriculture and Forestry (PDAF), *A Study on The Demand and Supply of Capital of Farm Families in Taiwan* (Nantou, Taiwan, China: PDAF, 1961); Taiwan Provincial Department of Agriculture and Forestry (PDAF), *A Study on Cash-Flow of Farm Families in Taiwan* (Nantou, Taiwan, China: PDAF, 1972); Joint Committee of Rural Reconstruction (JCRR), *A Study on Farm Families Liability* (Taipei, China: JCRR, 1970); Y. K. Mao, *Survey on FACD Operation* (Taipei, China: Department of Agricultural Economics, National Taiwan University, 1972); M. S. Kao, "The Linkage Among Services of Farmers' Association", *Information of Farmers' Association* (Taiwan), No. 12, December, 1971, pp. 47-48; S. H. Chiang, "Suggestions on the Policy of Legalized FACD", *Farmers' Friend* (Taiwan), Vol. 23, No. 2, February, 1972, pp. 41-47; I. S. Chang, "How to develop FACD Business", *Farmers' Friend* (Taiwan) Vol. 23, No. 5, May, 1972, pp. 43-47; S. I. Liao, "An Analysis of Demand and Supply for Capital of Farm Families on Taiwan", *The Quarterly Journal of Taiwan Land Credit* (Taiwan), Vol. 7, No. 2, June, 1970, pp. 1-46.
 17. In the more industrialized regions of Taiwan, the features of the fringe area are more significant. More farmers sold their farm land and more rural residents had off-farm working opportunities.
 18. In addition to the Taiwan studies mentioned, the same was apparently true (item 9 and 10) in Japan. See:

Rural Credit Division, Joint Committee of Rural Reconstruction (JCRR), *Reports on Japanese Agricultural Finance* (Taipei, China: JCRR, 1971).

CHAPTER III

BACKGROUND AND DOCUMENTATION

Some background on economic conditions, capital markets, financial policy and the organization of the Farmers' Association in Taiwan are necessary for a understanding of FACD savings.

Economic Conditions of Farmers in Taiwan

From 1960-1970, the average annual growth rate of agricultural production in Taiwan was 4.9 percent.¹ The value of agricultural production, over the same period, increased approximately 1.8 times (Table 1). Agricultural production also has become more commercial in recent years. In 1952 only 30 percent of the total farm output resulted in cash income, while 60 percent of farm expenditure were in cash. These two ratios increased, however, to 64 percent and 77 percent respectively by 1967.²

Real farm family income almost doubled from 1952 to 1967, the last year for which national estimates are available.³ During the 1960-1970 period, the changes in prices paid and received by farmers were similar (Table 1). Therefore the production motives of farmers were probably not significantly affected by inflation.

According to farm record-keeping statistics, (the detail description of this record-keeping project is presented in Chapter IV, Methodology, Section I-1, source of data), the year-end data for the 1960-1970 period has shown a growth of cash on hand. It also show relation increase in institutional and non-institutional savings as compared to changes in total disposal income and fixed assets. Total farm family disposal income and fixed assets increased 1.6 and 1.9 times respectively from 1960-1970. At the same time cash on hand increased 3.9 times, bank and non-institutional savings increased

Table 1 General Economic Conditions of Farm Families in Taiwan, 1961-1970

Year	Value of Agricultural Production	General Index of Prices Received	General Index of Prices Paid ^a	Number of Farm Families	Cultivated Land Per Farm Families ^c	Net Farm Family Income ^b
	Current NT\$million	Percent	Percent		Hectares	Current NT\$
1961	24,427	100.65	98.63	800,835	1.09	37,950
1962	24,833	95.86	99.26	809,917	1.08	38,113
1963	26,056	103.07	101.65	824,560	1.06	41,757
1964	31,205	108.59	104.62	834,827	1.06	40,094
1965	32,157	107.47	105.38	847,242	1.05	43,114
1966	33,970	109.79	108.11	854,202	1.05	48,716
1967	37,209	112.56	112.03	868,731	1.04	50,985
1968	40,631	118.26	117.87	877,114	1.03	56,854
1969	39,479	115.19	120.27	887,112	1.03	47,949
1970	43,219	120.43	123.11	880,274	1.03	52,549

^a Index Base: 1961-1963 average = 100.

^b Incomes of farm record-keeping families:

Net farm family income = (gross farm family income) - (Expenses)

^c One hectare equals 2.47 acres.

Source: Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Taiwan Agricultural Yearbook*, 1971 ed. (Nantou, Taiwan, China: PDAF, 1971). Council for International Economic Cooperation and Development (CIECD). *Taiwan Statistic Data Book*, 1971 ed. (Taipei, China: CIECD, 1971). Taiwan Provincial Department of Agriculture and Forestry (PDAF). *Report of Farm Record-Keeping Families in Taiwan, 1961-1970* eds. (Nantou, Taiwan, China: PDAF, 1962-1971).

3.2 time during the same period (Table 2).

Agricultural Capital Markets in Taiwan

Many institutions and agencies are involved in rural credit-savings activities in Taiwan (Figure I). A part of these agencies are specialized agricultural credit institutions in the sense that their primary purpose is agricultural banking.

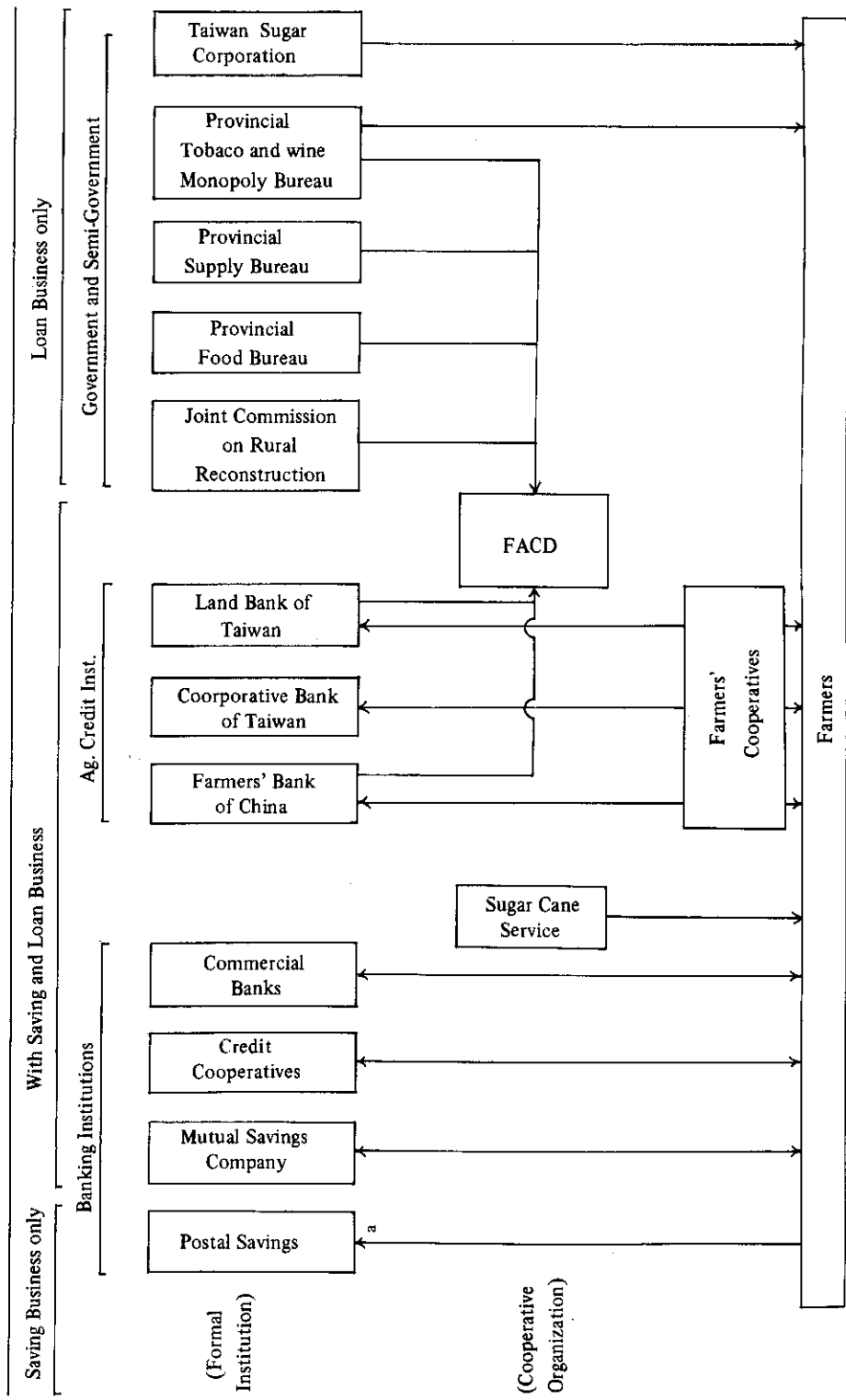
This category includes the Credit Department of Farmers Associations, the Sugar Cane Service, the Land Bank of Taiwan, the Farmers' Bank of China, and Cooperative Bank of Taiwan. Although not significant in the amounts of loans made, general banking institutions also provide credit to farmers, farmers' cooperatives and agricultural business. These banking institutions are commercial banks, non-farm credit cooperatives and the mutual saving companies. Besides these banking agencies, other government or semi-government agencies also provide credit to the farmers. Although some of these agencies only grant loans to special groups of farmers, some also cover all farmers and the amounts of loans extended by them are quite significant. The Provincial Food Bureau, the Taiwan Sugar Corporation, the Tobacco and Wine Monopoly Bureau, the Provincial Supply Bureau, and the Joint Commission on Rural Reconstruction (JCRR) are included in this group.

Except for government, semi-government agencies and the Sugar Cane Service, all other loan granting institutions have their own saving activities. Postal saving is a "one-way" financial agent (having no loan business) but is an important saving institution in rural Taiwan.

The Taiwan Sugar Corporation, the Commercial banks, the credit cooperatives and the mutual savings companies deal directly with farmers (Figure 1). The Land Bank of Taiwan, the Farmers' Bank of China, the Tobacco and Wine Monopoly Bureau, and the Cooperative Bank of Taiwan serve the farmers both directly and indirectly. The Provincial Food Bureau, the Provincial Supply Bureau, and JCRR only have indirect credit ties with the farmers. All those which have indirect contact with the farmers use the FACD's as their intermediaries.

Institutional agricultural credit provided to Taiwan farmers has been increasing very rapidly in recent years (Table 3). The importance of the farmers' associations tends to be understated in this table since the FACD allocated substantial amounts of funds (in forms of redeposits and reserves, etc.) as balances for other agencies. From 1961 to 1971, the total value of agricultural loans increased 550 percent; loans

Figure 1 The Formal Agricultural Capital Market in Taiwan



^a The arrows indicate the direction of cash-flows.

Table 2 Average Portfolio of Farm Record-Keeping Families in Taiwan, 1960-70

Year	Total Disposal Income	Total Liquid Assets	Cash on Hand	Bank Deposit, etc. ^a	Other Liquid Assets ^b	Total Tixed Assets ^c	Record-Keeping Families ^d
In Current NT\$							Number
1960	33,828	24,689	1,157	3,240	20,292	161,405	95
1961	37,950	27,176	1,220	3,908	22,048	193,297	207
1962	38,113	29,374	1,857	4,362	23,155	184,244	223
1963	41,357	30,742	2,170	4,253	24,319	194,113	277
1964	40,094	32,573	2,011	5,462	25,100	160,156	535
1965	43,114	36,450	2,424	7,034	26,992	181,458	501
1966	48,716	43,800	3,061	8,264	32,475	233,725	430
1967	50,985	45,506	3,479	9,105	32,922	244,422	402
1968	56,854	51,466	4,343	10,199	36,922	311,470	416
1969	47,948	44,418	3,799	11,413	29,206	325,466	411
1970	52,550	44,404	4,284	10,893	29,227	302,030	404

^aAccounts, bonds receivable and prepaid notes.

^bFarm product in store, farm working equipment, growing crops in field, livestock and poultry, by-products and processing products.

^cFarm machinery, buildings, land, furniture and household equipments, orchard and trees.

^dBefore 1963, the farm record-keeping families were located in the western rice regions. Since 1964, the project was expanded to cover the whole island.

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

Table 3 Year-end Outstanding Balance of Agricultural Loans in Taiwan by Lending Agencies
1961-1971, in Current Million NT\$

Agency	1961	1963	1965	1967	1969	1971
Total ^a :	3,307	4,730	8,604	11,649	15,606	17,042
Agriculture Credit Agency	1,844	3,044	6,636	9,169	12,039	14,020
Farmers' Association	722	459	348	1,136	1,364	1,391
Land Bank	627	1,436	3,670	3,859	4,852	4,854
Cooperative Bank	494	1,148	2,119	3,566	4,495	5,125
Farmers' Bank	-	-	-	609	1,327	2,650
Banking Agencies	413	201	309	458	698	643
Commercial Banks	110	201	309	458	698	643
Credit Cooperatives	241	-	-	-	-	-
Mutual Savings Companies	62	-	-	-	-	-
Government and Semi-Government ^b	1,050	1,486	1,659	2,022	2,869	2,379
Provincial Food Bureau	147	236	309	518	1,168	709
Taiwan Sugar Company	496	527	474	495	539	491
Monopoly Bureau	10	15	-	-	-	-
Provincial Supply Bureau	0.7	0.2	0.2	0.1	1	0
JCRR	396	708	875	1,001	1,150	1,169

^a May not equal to the sum of the sub-items due to rounding.

^b Figures include a few loans from agencies other than those listed.

Source: Nien-Tsing Lu, Agricultural Credit in Taiwan (Taipei, China: Land Bank of Taiwan, 1960), pp. 23-26 (in Chinese); and "Loan Statistics of Agricultural Credit Institutions in Taiwan", published quarterly by the Farmers Bank of China.

from agricultural credit agencies increased 900 percent; loans from other banking agencies increased 150 percent; and loans from government and public business increased 220 percent (During the same period the index of prices paid by farmers increased 25 percent, therefore the increase in the real balance of loans was very significant).

Although no complete macro statistics show the structure of farmers institutional savings a study by Liao indicated that financial savings of rural people were mainly deposited with the FACD's, the Cooperative Bank and the Land Bank; their savings being approximately 62 percent, 16 percent, and 10 percent respectively (Table 4).⁴ But according to the author's subjective evaluation, postal savings could be more important than what Liao suggested. The magnitude of rural savings in the postal savings system may be as much as one-third the savings in FACD,⁵ which would make it the second largest saving institution in rural Taiwan.

From Liao's findings, the Cooperative Bank and Land Bank accounted for one-fourth of total rural financial savings in 1967 (Table 4). However, the facilities of both banks, especially in the rural area, are far less than FACD and postal savings.⁶

These facts suggest that the prevalence of postal savings or loan business of these two banks (60 percent of total agricultural loans each year) contributes to the mobilization of rural savings. The volume of postal savings, even with no loaning business and other non-pecuniary returns, may be explained by lower transaction cost due to its convenient location. The number of postal savings units in the rural area are triple the number of cooperative banks.

The loan business of the Cooperative Bank and the Land Bank may be the most important factor attracting rural financial savings. Because of their distance from the farmer and thus higher transaction costs their competitive position with the postal savints and FACD has been adversely affected.

However, even the total rural savings in these three institutions (it was approximately one-third of total savings according to Liao's study and author's estimate) were less than savings in the FACD's. The features of FA i.e., services offered by other departments, farmers' familiarity with it and FACD loaning, etc. may have contributed to the FACD's savings business.

Agricultural Capital Market Policy

Generally speaking, the agricultural finance policies in Taiwan during the last

Table 4 Percentage Distribution of Loan Extended and Deposits Received by Various Institutions in Taiwan, 1967^a

Institutions	Loan	Deposits
	<u>Percent</u>	
Specialized Agricultural Banking Institutions		
Farmers Bank of China	5.22	
Land Bank of Taiwan	33.13	9.85
Cooperative Bank of Taiwan	30.61	15.65
FACD's	9.75	61.62
Subtotal	78.71	87.12
Other Banking Institutions^b		
The First Commercial Bank of Taiwan	1.71	} 2.89
Hua-Nan Commercial Bank	1.00	
Chang-Hua Commercial Bank	1.22	
Cooperative Associations	-	4.81
Mutual Loans and Savings Companies	-	0.84
Postal Savings System	-	2.70
Subtotal	3.93	11.24
Government Agencies		
JCRR	8.59	-
Provincial Food Bureau	4.45	-
Taiwan Sugar Cooperation	4.25	-
Sugarcane Service	0.07	-
Subtotal	17.36	-
Total	100.00	98.36^c

^a1967 was chosen because it was the only year recent for which both loans and savings data are available.

^bThere were some banks only located in metropolitan cities, and were not investigated by Liao's study.

^cThe rest 1.64 percent of savings was deposited in private business according to Liao's study.

Sources: Farmers Bank of China, *Informations of Farmers Bank of China*, unpublished statistics (Taipei, China: Farmers Bank, 1971); Liao, *op. cit.*

twenty years were affected strongly by overall development and monetary stability considerations. Aside from a few cases of channeling additional funds into the agricultural credit system, the rural capital market has received little preferential treatment. This in itself differentiates Taiwan from many other developing countries.

Since 1949 policy makers in Taiwan have been very aggressive in adjusting interest rates in response to changing economic conditions. Very high nominal rates of interest were one of the techniques used to control substantial inflationary pressures in the 1950's. These rates gave positive real interest returns on savings deposits. In general, interest rates on credit also have moved up and down with the changes in rates paid on savings.

These high rates were enough to offset cyclical inflation patterns so that the currency, savings and gross national product (GNP) ratio rose from about 11 percent in the early 1950's to about 47 percent by 1970, which is very high by standards of developing nations.⁷ Therefore, lending capacity of the organized banking sector substantially increased during this period. Few developing countries, except Korea and Indonesia, achieved financial growth thru similar monetary policies.

Nominal deposit and lending rates of interest in Taiwan fell during the rapid financial growth of the 1960's. The average interest rate on time deposits was reduced from 17.04 percent in 1960 to 9.72 percent in 1970. Deposits of shorter maturities were kept lower (Table 5). The "standard" interest rate on secured loans, to which loan rates are related fell from 18 percent in 1960 to 12.6 percent by 1970. This fall in nominal rates did not result in a fall in real rates. The measured real rate of interest during the 1961-1970 period on the average time deposits averaged more than 8 percent (Table 5). Due to frequent changes of nominal interest rates (7 times in 1950-1960 period and 12 times in 1961-1970 period) and the complicated interest structure, the average interest rates presented in Table 6 may reflect only a portion of the change.

The net result of these interest rate policies have been (1) significant financial incentives for individuals to mobilize their savings in the institutional capital market, and (2) cost of credit have helped to efficiently ration funds among credit users. The increase in FACD deposits which have covered the FA's credit needs were an important result of this interest rate policy.

Since the national fiscal policy was thought to have little impact upon the institution's function of generating deposits, FACD saving business never received much

Table 5 Average Annual Interest Rates on Various Types of Savings in Taiwan, 1953-1970

Year	Average Interest Rate on			Prices ^d Increase Rate (4)	Real Interest Rate On		
	Total Sav- ings ^a (1)	Time Sav- ings ^b (2)	Demand Savings ^c (3)		Total Savings (1)-(4)	Time Savings (2)-(4)	Demand Peopsits (3)-(4)
	<u>Percent</u>						
1953	11.55	18.90	6.75	36.88	-25.33	-17.98	-30.13
1954	8.70	10.80	5.40	-7.20	15.90	18.00	12.60
1955	8.70	10.80	5.40	9.58	- 0.88	1.22	- 4.18
1956	8.25	10.80	3.90	9.04	- 0.79	1.76	- 5.14
1957	7.91	10.50	3.24	6.89	1.02	3.66	- 3.65
1958	7.91	10.20	2.88	1.11	6.80	9.10	1.77
1959	11.54	17.04	2.88	10.16	1.38	6.88	- 7.28
1960	11.53	17.04	2.88	35.26	-23.73	-18.22	-32.38
1961	8.87	15.72	2.16	4.52	4.35	11.20	- 2.36
1962	8.08	13.95	1.44	0.63	7.45	13.32	0.81
1963	7.34	12.66	1.44	2.40	4.94	10.26	- 0.96
1964	6.78	11.00	1.44	2.92	3.86	8.08	- 1.48
1965	6.78	10.80	1.44	0.72	6.06	10.08	0.72
1966	6.51	10.08	1.44	2.59	3.92	7.49	- 1.15
1967	6.40	9.84	1.44	3.62	2.78	6.22	- 2.18
1968	6.72	9.72	1.44	5.21	1.51	4.51	- 3.77
1969	6.72	9.72	1.44	2.03	4.69	7.69	- 0.59
1970	6.72	9.72	1.44	2.36	4.36	7.36	- 0.92

^a Simple arithmetic average of all categories of deposits.

^b Simple arithmetic average of 1-3 year time deposits.

^c Interest rate of passbook saving.

^d Index of prices paid by farmers.

Source: Economic Research Department, the Central Bank of Chia (CBC), *The Republic of China, Taiwan Financial Statistics Monthly*, July, 1972 (Taipei, China: CBC, July, 1972); and Council for International Economic Cooperation and Development (CIECD), *Taiwan Statistical Data Book*, 1970 edition (Taipei, China: CIECD, 1971).

**Table 6 Institutional and Non-Institutional Sources of Total Loans
in Taiwan, Selected Years 1949-1971**

Source	Year					
	1949	1952	1960	1967	1970	1971
	<u>Percent</u>					
Institution	17.3	36.0	56.7	78.4	63.0	59.4
Non-Institution	82.7	64.0	43.3	21.6	37.0	40.6
Traders and Commission Agents	15.0			2.2	2.2	
Relatives and Friends	14.3			19.4	34.8	
Landlord	53.2	—	—	—	—	—
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: H. Y. Chen and R. A. Bailey, *Agricultural Credit in Taiwan*, Unpublished Paper of Agricultural Financial Center, The Ohio State University, 1966, p. 46; Taiwan Provincial Department of Agriculture and Forestry (PDAF), *A Study on the Demand for and Supply of Capital of Farm Families in Taiwan*, (Nantou, Taiwan, China: PDAF, 1961), p. 17; Taiwan Provincial Department of Agriculture and Forestry (FDAF), *A Study on Cash-Flow of Farm Families in Taiwan* (Nantou, Taiwan, China: PDAF, 1972) pp. 20-21; Joint Committee of Rural Reconstruction (JCRR), *A Study on Farm Families Liability* (Taipei, China: JCRR, 1970), pp. 3-4; and Liao, *op. cit.*, pp. 20-21.

attention as a means of stabilizing and developing the economy. For instance, the FACD has no "legal position" as a bank. They are still in the stage of preliminary type of unit-bank and without a "head" bank to assist their operation and financial position. Further, FACD checks have limited acceptance, and interest return from savings deposits in FACD's over two years of duration are not tax exempt as is true in regular banks. It is generally recognized that these discriminant regulations have impeded the effort of FACD to mobilize rural savings.

Informal Rural Capital Markets

Although no complete statistics are available on the non-institutional capital markets in Taiwan findings from some partly related studies⁸ supply useful background information. It can be noted in Table 6 that the ratio of non-institutional loans to total farm loans declined from 1949 to 1967 and then increased to approximately the 1960 level by 1971. It seems reasonable to presume that a substantial portion of financial transactions were carried out in the non-institutional markets in rural Taiwan. Beside general borrowing or lending among farm families, rural "Huis", an informal rotating credit association, are also a general means of channeling rural capital. Because of the lack of aggregated data, however, evaluating the magnitude of these transactions is impossible.

The Farmers' Association in Taiwan

The Farmers Associations (FA's) in Taiwan are general purpose, multi-service farmers' cooperatives. The present federated system of the farmers' associations is a result of the amalgamation of many farm and rural organizations that had been developed in Taiwan since 1900. Presently, the FA's are organized at three administrative levels: (1) the township FA's which are unit organization, 328 in number (1970 figure); (2) the prefectural FA's, 20 in number, are the federations of the township FA's at the prefectural level; and (3) one Provincial FA, which is organized as the federation of the prefecture FA's at the Provincial level.⁹

The organizational or business area of the farmers association coincides with the administrative boundary at the respective levels. The number of township FA's is less than the number of townships. In 1970 there were 345. Those farmers living in the townships without FA's can, if they wish, participate in the FA of the adjacent township, (Table 7).

Table 7 Numbers of Farm Families, FA Members, Township FA's, FACD's and Townships^a in Taiwan, 1960-1970

Year	Farm Families	Members	Associate Members	Total Members	Township FA's	FACD's	Townships
1960	785,592	512,929	249,224	762,153	317	288	361
1961	800,835	526,116	260,023	786,139	317	290	361
1962	809,917	519,020	251,062	770,082	324	292	361
1963	824,560	543,596	266,110	809,706	331	292	361
1964	834,827	573,035	272,623	845,658	342	294	361
1965	847,242	565,456	276,117	841,573	341	294	361
1966	854,203	587,893	283,815	871,708	341	297	361
1967	868,731	600,233	286,449	886,682	341	296	361
1968	868,039	612,036	289,850	901,886	329	294	345
1969	878,082	588,977	285,469	874,446	328	294	345
1970	872,130	601,148	298,312	899,460	328	292	345

^aAfter the end of 1967, excluded the statistics of Taipei city.

Source: Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Taiwan Agricultural Yearbook*, ed. 1961-1970 (Nantou, Taiwan, China: PDAF, 1961-1971), Taiwan Provincial Department of Agriculture and Forestry (PDAF). *Statistic Yearbook of Farmers' Associations*, ed. 1961-1971 (Nantou, Taiwan, China: PDAF, 1961-1971); Bureau of Accounting and Statistics, Provincial Government of Taiwan (BAS). *Taiwan Statistical Abstract, No. 30* (Nantou, Taiwan, China: BAS, 1971).

Full-time farmers, those whose farm income is half or more of total receipts, are eligible to be "regular members", or "voting members". Part-time farmers or rural residents can apply as "associate members", or "non-voting members". The latter can be elected as supervisors (the number of which can't exceed one-third of the legal number) but cannot hold any other office of the FA. It is believed that about 95 percent of the farm families in Taiwan currently participate in the FA.¹⁰

The organizational pattern of a township farmers' association in Taiwan consists of five departments with a general manager as head.¹¹ The first department is responsible for administrative affairs; the second, marketing and selling (supplies); the third, agricultural extension services; the fourth, book-keeping; and the fifth, credit services. Except for the first and the fourth departments which handle office routine, the second, third and fifth departments carry out the service activities of the association (Figure 2).

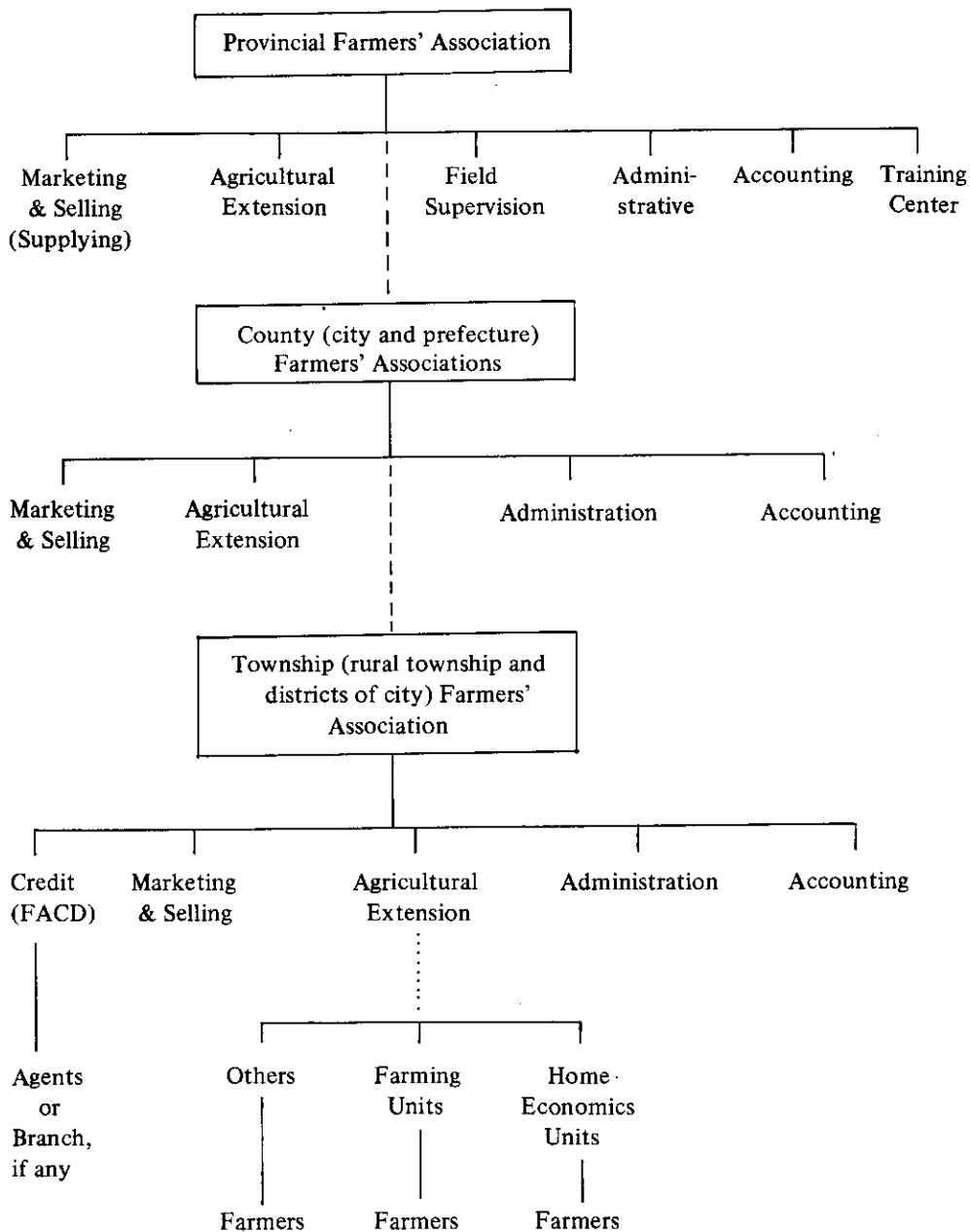
The marketing functions of the FA's can be classified into two major categories: self initiated economic services and government-entrusted economic services. The former are conducted by the FA's to serve their member-farmers with such activities as cooperative purchasing and marketing, warehousing, processing. While the latter includes the distribution of fertilizers, pesticides, feeds; the collection and purchasing of rice and other agricultural products on behalf of the governments.

The agricultural extension work of the FA's is mainly educational. It provides training programs to increase agricultural production and to improve living conditions. This includes farm extension programs for adults, education of farm youth in preparation for future farming, and home economics for rural women. Generally, extension works closely with the other department of the associations.

The credit service of the farmers' associations aim to encourage farmers to deposit their money in the FACD's and to supply farmers with loans for farming operations and daily needs. Not all FA's have credit activities, in 1971, only 292 of the 328 FA's had credit departments. However, as previously mentioned in more than 60 percent of rural townships the FA credit department is the only banking institution accessible to rural people.¹² Only township FA's are engaged in the credit business. Prefectural and provincial federations do not have credit facilities.

It is generally recognized that strong complementary relationships existed among services of FA's, because of its organizational elements, and geographical distributions.¹³ Farmers' savings in FACD can be borrowed¹³ by other farmers to finance their

Figure 2 Three Levels of the Organization of the Farmers' Association in Taiwan



production and living necessities. Also profits from FACD credit activities are used for improving cooperative marketing, supply, sale and extension activities. The activities of other departments also attract savings to the FACD. The close linkage among services rendered by FA's have made FACD the most important institution in financing rural Taiwan.¹⁴ Table 8 shows the magnitude of several aspects of FA business in credit, marketing, sales, and extension. The rapid growth of credit business is especially worthwhile to note.

The FACD and Rural Capital Market

Being the most important banking facility in the rural area, the FACD performs the functions of a regular bank. It receives deposits, extends loans, handles remittances, makes collections and keeps custody of accounts for the township treasury. The loan funds of the FACD's come largely from members' deposits and investments. As mentioned previously FACD's also act as agencies for other financial institutions in making and servicing loans (refer to Figure 1).

Each FACD establishes a credit committee, which appraises and rates member's credit standing based on information such as township records on real estate, farm visits by the credit department personnel, and records of previous transaction, etc.¹⁵ Therefore, FACD's supply the most convenient and flexible loans compared to other institutions regardless of size and nature. Each FACD can decide its own policy rather than follow instructions from a head-office. From 1960 to 1970, the growth of FACD loans value was impressive, with an average annual growth of 22 percent (Table 9).

Savings in FACD's come from three sources: member, associate member, and other. The largest source is from associate members. They deposited about half of the total saving in FACD. Members deposit 30 percent and others deposit 20 percent (Table 10). The increase of FACD savings was substantial during the period 1960-1970. The average annual growth rate was 22 percent for total savings (Table 9), and 19 percent, 23 percent, 31 percent for member, associate member, other respectively (Table 10).

There have been five categories of deposits supplied by FACD's in rural Taiwan: time deposits, demand deposits, notice deposits, government agents deposits, and other. (Table 11) The first two categories constitute an average of 90 percent of total deposits. Time deposits consist of short-term deposits (1, 3, 6, 9 months),

Table 8 Selected Farmers Association Data in Taiwan, 1960-1970

Year	Number of Employer	Agriculture Extension Expenditure Per Member (NT\$)	Income From Marketing Functions Per Member (NT\$)	Average Savings Per Member (NT\$)	Average Savings Per Member (NT\$)
1960	7,892	95.8	66.2	953	933
1961	8,098	104.0	734.7	1,334	943
1962	8,518	109.6	797.0	1,787	1,738
1963	8,781	97.5	776.9	2,291	2,175
1964	8,880	86.7	828.3	3,264	2,751
1965	9,373	100.9	1,168.7	3,654	3,415
1966	8,696	109.2	1,103.8	3,756	3,572
1967 ^a	9,215	120.7	1,253.5	4,309	3,979
1968	9,288	139.4	1,442.8	4,620	4,403
1969	11,051	163.2	1,278.9	5,140	4,972
1970	10,825	169.7	1,315.6	5,530	5,108

All monetary terms are in current value.

^aAfter the end of 1967, information for the City of Taipei is excluded.

Source: Calculated from Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Statistic Yearbook of Farmers' Associations*, edd. 1961-1971 (Nantou, Taiwan, China: PDAF, 1961-1971).

**Table 9 Amount and Indexes of Savings and Loans in FACD,
with Annual Growth Rates, 1960-1970**

	Savings			Loans		
	Amount	Index	Annual Growth Rate	Amount	Index	Annual Growth Rate
	<u>NT\$1,000</u>		<u>Percent</u>	<u>NT\$1,000</u>		<u>Percent</u>
1960	726,428	100	—	711,238	100	—
1961	1,048,978	144	44.0	741,646	104	4.0
1962	1,376,757	190	31.9	1,338,215	188	80.8
1963	1,855,079	255	34.2	1,760,864	248	31.9
1964	2,761,057	380	49.0	2,326,083	327	31.9
1965	3,075,146	423	11.3	2,873,854	404	23.5
1966	3,274,542	451	6.6	3,113,614	438	8.4
1967	3,820,804	526	16.6	3,528,109	496	13.2
1968	4,166,435	574	9.1	3,971,153	558	12.5
1969	4,494,606	619	7.8	4,347,899	611	9.5
1970	4,973,995	685	10.7	4,594,350	646	5.7
1960-70 Average Growth Rate			22.0			22.0

Savings and loans are in current values.

Source: Calculated from Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Statistic Book of Farmers' Associations*, edd. 1961-1971 (Taichung, Taiwan, China: PCAF, 1961-1971).

Table 10 Sources of Savings in the FACD, with Annual Growth Rates, 1960-1970

Year	Member			Associate Member			Other		
	Amount	Percent of Total Savings	Growth Rate	Amount	Percent of Total Savings	Growth Rate	Amount	Percent of Total Savings ^a	Growth Rate
	Million NT\$ ^b	Percent	Percent	Million NT\$	Percent	Percent	Million NT\$	Percent	Percent
1960	291	40	-	335	46	-	101	14	-
1961	404	39	39	544	52	62	107	10	6
1962	486	35	20	711	52	31	180	13	68
1963	671	36	38	956	52	34	228	12	27
1964	798	29	19	1,393	50	46	569	21	150
1965	873	28	9	1,510	49	8	692	22	21
1966	989	30	13	1,569	48	4	716	22	4
1967	1,166	31	18	1,880	49	20	775	20	8
1968	1,260	30	8	2,046	49	9	860	21	11
1969	1,347	30	7	2,263	50	11	884	20	3
1970	1,579	31	17	2,411	50	7	984	19	11
1960-70 Average			19			23			31

^a The total may not equal to 100 due to rounding.

^b In current values.

Source: Same as Table 9.

**Table 11 Percentage Distribution of Deposits in FACD,
by Savings Categories, 1960-1970**

	Time Deposit	Notice Deposit	Demand Deposit	Gov't Deposit	Other Deposit ^b	Total
1960	66.91	1.40	31.38	— ^a	0.31	100
1961	70.25	1.19	28.00	—	0.56	100
1962	70.55	2.25	23.27	—	3.93	100
1963	70.24	2.23	22.30	—	5.23	100
1964	64.08	1.96	21.15	8.48	4.33	100
1965	62.53	1.74	20.22	11.45	4.06	100
1966	62.11	1.43	22.42	10.59	3.45	100
1967	60.56	2.10	25.33	8.87	3.14	100
1968	58.66	2.32	24.78	11.98	2.26	100
1969	59.26	2.26	24.70	10.55	3.23	100
1970	60.90	1.45	24.68	8.15	4.82	100

^aNo figures available on the years 1961-1963.

^bMost of this was deposits by FA staffs.

Source: Same as Table 9.

1 year, 2 years, and 3 years saving deposits; while demand deposits include checking deposit (non-interest-bearing) and pass-book deposit.

The annual growth rate of time deposits were slightly higher than demand deposits, with growth rates of 21 percent and 20 percent respectively during the 1960-1970 period. The growth rates of other categories were also substantial (Table 12). The interest rate on each sub-item of the FADC deposits. i.e., pass-book deposit, 1-month time deposit, etc., are the same as for deposits in other banks. However, since the FADC has no "legal position", 2 year and 3 year time deposits in FADC having no preferential treatment (tax-exempted interest return) which other banks receive.¹⁶ As a matter of fact, the "actual interest rate" on these two types of FADC savings are slightly lower than those offered by other banks.

Table 12. Average Annual Savings Deposits in FACD, by Savings Categories, with Annual Growth Rates, 1960-1970

Year	Time Deposits (Million NT\$)	Annual Growth Rates (%)	Notice Deposits (Million NT\$)	Annual Growth Rates (%)	Demand Deposits (Million NT\$)	Annual Growth Rates (%)	Governmental Deposits (Million NT\$)	Annual Growth Rates (%)	Other Deposits (Million NT\$)	Annual Growth Rates (%)
1960	486	-	10.2	-	228	-	-	-	2.2	-
1961	737	51.6	12.5	20.0	294	28.9	-	-	5.8	300.0
1962	971	31.8	31.1	58.3	320	8.8	-	-	54.1	900.0
1963	1,303	34.2	41.5	32.2	414	29.4	-	-	97.0	79.6
1964	1,769	35.8	54.1	31.7	584	41.1	234	-	119.6	23.7
1965	1,923	8.7	53.6	-1.0	622	6.5	352	50.5	124.8	4.3
1966	2,034	5.8	46.8	-12.7	734	18.0	347	-1.5	113.1	-9.4
1967	2,314	13.8	80.3	71.8	968	31.8	339	-2.3	120.1	6.2
1968	2,444	5.6	96.9	20.7	1,033	6.7	499	47.7	94.1	-21.6
1969	2,663	9.0	101.7	4.9	1,110	7.5	474	-5.0	145.1	54.0
1970	3,029	13.7	72.0	-29.2	1,228	10.6	406	-14.5	240.0	65.4
Average 1960-70		21.0		40.7		19.9		12.5		140.2

All deposits are in current values.
Source: Same as Table 9.

NOTES TO CHAPTER III

1. Council for International Economic Cooperation and Development (CIECD), *Taiwan Statistical Data Book* 1971 ed. (Taipei, China: CIECD, 1971), p. 134.
2. Joint Committee of Rural Reconstruction (JCRR), *Taiwan Farm Income Survey of 1967*, (Taipei, China: JCRR, January, 1970).
3. *Ibid.*
4. Liao, *op. cit.*
5. The underlying reason is that depositors of postal savings are mainly the housewives and children. But Liao's survey was generally family-heads. The evidence for my conclusion was derived from statistics of the postal savings. These showed one-fourth of the depositors were from farm families in 1970. According to the report: Bureau of Accounting and Statistics, Provincial Government of Taiwan (BAS), *The survey of family income and expenditure in Taiwan* (Nantou, Taiwan, China: BAS, 1970), the average amount of farm family financial savings was about half of what of non-farm families. So, the author estimated farmers' postal savings as one-eighth of total postal savings or, NT\$ 1,500 million. The FACD savings for the same period was NT\$ 5,000 million.
6. In 1967, there were 41 branches of the Land Bank with 7 being located in Taipei City. There were also 80 branches and agents of the Cooperative Bank with 6 of them being located in Taipei City. Most of the others were located in the larger townships and cities.
7. See McKinnon, *op. cit.*, p. 114 for detail discussion in monetary policy of Taiwan. Also see: R. J. Irvine and R. F. Emery, "Interest Rates as an Anti-Inflationary Instrument in Taiwan", *The National Banking Review*, Vol. 4 NO. 1, Sept. 1966, pp. 29-39; and Anand G. Chandavarkar, "Some Aspects of Interest Rate Policies in Less Developed Economics, The Experience of Selected Asian Countries", International Monetary Fund, *Staff Papers*, Vol. 18, March, 1971, p. 83.
8. For instance, Liao's study indicated that the average non-institutional lending per farm family was NT\$ 2,664; institutional savings were NT\$ 12,724; the average borrowing from non-institutional sources was NT\$ 3,900 in 1967. According to another study on farm record-keeping families, the average institutional savings was NT\$ 8,173 per (full-time) farm family. Average lending per farm family was NT\$ 1,404; and the amount receivable per family for "Huis" was NT\$ 940. JORR investigated the details on "Huis" but failed to get much numerical data. However, this study indicated that "Huis" are popular in rice farming areas with approximately 50 percent of the farmers participating in "Huis". In vegetable and other crops farming area, about 33 percent participate. In fruit farming area, 27 percent; and the least is sugar cane area, only 8 percent. See: PDAF (1972) *op. cit.*, p. 13, and JCRR (1970) *op. cit.*, p. 13, 16.
9. Townships include: village, town, cities under jurisdiction of prefecture as well as district of metropolitan cities. Prefecture here include: hsien (or county), city. In 1970, there were 305 villages and towns, 8 cities under jurisdiction of prefecture, and 32 districts of 4 major metropolitan cities: Taichung, Taiwan, Kaohsiung, and Keelung, (the City of Taipei was excluded from the study).
10. According to H. Y. Chen's estimate. See H. Y. Chen and R. A. Bailey, *op. cit.*, p. 11.
11. Because of the "grass-root" character of township FA's, almost all staff came from that same township and from

farm families.

12. Postal Savings, which only performs saving business, was not counted in making this calculation.

13. M. S. Kao, *op. cit.*

15. For details, see: Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Handbooks on Business of Farmers' Association*, Vol. II (Credit and Insurance), (Nantou, Taiwan, China: PDAF, 1967).

16. Income tax is applied to all interest yields earned from deposits in the financial institution, except 2 and 3 year maturity of time deposits. This is one of the means the government uses to encourage savings in Taiwan.

CHAPTER IV

SURVEY FINDINGS, DATA SOURCES, AND ANALYSIS FRAMEWORK

This chapter presents models later used to test the relationship between the level of financial savings and its determinants. Independent variables were first selected on the basis of economic theory and empirical results. The validity of their use was then confirmed through a field survey. A summary of a portion of the field work, sources of secondary data, and statistical methods employed are also discussed in this chapter.

Formulation of Models

1) *General Model*

a) Suggested Variables

The variables which on theoretical grounds might be included in the general financial savings function were reviewed in the second section of Chapter II. As a summary, the change in savings level in the institution might be explained by a model such as the following:

$$S_i = f(Y, I_i, A_v, S_a, R_g) \quad (1.1)$$

where: S_i = level of i^{th} deposits
 Y = measured or permanent income
 I_i = interest yield on the i^{th} deposits.
 A_v = availability of financial institution (convenience).

This is sometimes explained as the transaction costs of traveling to

financial institutions.

S_a = supporting activities:

- a. deposit insurance
- b. advertising
- c. preferential treatments to savers
- d. other non-pecuniary returns

R_g = regional effects, which are usually represented by dummy variables or separately fitted functions.

Each of the first four variables were expected to make positive contributions to the level of savings.

b) Confirmation of Variables Through A Survey

A field survey was conducted by the author to better understand the relationships between the functions of the FA or FACD and the level of deposits attracted. The results of the survey were used to confirm the importance, in the Taiwan setting, of the above mentioned variables. A mail survey was developed and mailed early in July 1972 to all 292 FACD's with credit services. Of these, 231 useable questionnaires were returned, a response of 79 percent. Interviews with 58 farm families in 20 townships were also conducted to identify the factors which affect their level of savings in FACD.¹ These findings are summerized and presented in this section. Detailed statistics from these surveys can be found in Appendix A.

According to the frequency mentioned by FACD staff or farmers in the survey, the following factors were thought to influence FACD deposits. They were:

(1) Familiarity with the institution

Friendship between farmers and FACD staffs and farmer's feeling of being "in a group" were most frequently mentioned by FACD staffs. Farmers ranked it the first in importance. A secure place to deposit money is apparently very important in the minds of farmers when they make financial savings decisions.

(2) Convenience

The location convenience of the financial institution for users was thought to be an important factor in determining amounts of rural savings mobilized. This factor was ranked second in importance by both the FACD staffs and farmers interviewed.

This implied that transaction costs were an influential factor in determining the level of farmers' saving in FACD.

(3) FACD loan business

The loan business of the FACD was also mentioned as a major determinant of savings by more than half of the FACD respondents. Some 85 percent of respondents indicated that the FACD loan business was one of the factors which stimulated farmers to deposit savings.² Except for being ranked fourth in Region 1, (for a description of the regions, refer to Appendix B), in terms of requery reported, it was ranked third elsewhere. This factor was also ranked third by farmers.

(4) Other FA services (supporting activities)

FACD personnel generally agreed that services extended by Farmers Associations attracted savings to the FACD.³ This factor ranked third in Region 1, fourth in Region 2, and fifth in Region 3. Regional variations were due to differences in competition from other institutions, quality of extension or marketing services, and transportation facilities available.

(5) Better management, service and FACD image

This factor was frequently mentioned by FACD personnel in Region 1 (ranked third), but was ranked fourth in the other two regions. Farmers responses also suggested this was an important factor.

It was assumed that FACD staff efforts to attract deposits stimulated rural savings. Therefore, factors which were found to be influential in the level of FACD savings are synthesized with the theoretically suggested variables, and the model (1.1) expanded to:

$$S_i = f(Y, I_i, A_v, S_a, R_g, F_a, L, E, M, R, A, C) \quad (1.2)$$

where: F_a = Farmer familiarity with the institution
 L = FACD loan business
 E = FA extension programs
 M = FA marketing functions
 R = FA/FACD management, services and image
 A = Special efforts/aggressive attitude of FACD staffs

C = Competition from other institutions.

However, as variable S can be replaced by E and M, and variables A_v and F_a lack testable data,⁴ the general model (1.2) was modified to:

$$S_i = f(Y, I_i, R_g, L, E, M, R, A, C) \quad (1.3)$$

All definitions remain the same. The three levels of aggregation were analyzed: provincial, regional and township analysis. A detailed discussion of the operational models was given in section II.

2) Sources of Data

The basic data sources of the general model (1.3) are statistics collected by the Provincial Farmers' Association (PFA), the Provincial Department of Agriculture and Forestry (PDAF), the Central Bank of China and other government agents. Due to a lack of township level data on value of agricultural production, it was necessary to use farmers' disposal income calculated from a farm record-keeping project. This farm record-keeping project was initiated by PDAF in 1953 and switched to township FA's in 1960. Until 1963 the farm record-keeping families were mainly distributed in the western rice cropping regions. However, in 1964 it was expanded to cover the entire island, with some 400 farm families participating in the project.

The farm record program provides rather comprehensive information on farm production (inputs and output) and farm family income, expenses, assets, and liabilities. Participation in the project is voluntary. Thus, individuals who participate are probably more progressive, better educated and better capitalized than the average farmer.

Some primary data were also analyzed from the survey responses discussed in the preceding section.

3) Description of the Variables Used

(1) Farm family disposal income

This variable was calculated from farm records, and employed in township level and provincial level analysis. It included farm receipts and non-farm receipts. Farm receipts (in cash and in kind) included income from crop and crop products, fishery receipts, and other farm receipts. Non-farm receipts included income from property,

off-farm labor, sideline business, and others. All values are expressed in current new Taiwan dollars (NT\$).

(2) Total value of agricultural production (income index)

PDAF statistics supplied the figures on valued aggregate agricultural production and farm family numbers.⁵ This variable was used as a proxy for income in the provincial and regional levels analysis. It included yearly production of common crops, special crops, horticultural crops, silk production and animal products.

In terms of theoretical consideration, this variable is not a perfect substitute for income which already has been generally recognized as a common explanatory variable of financial savings.⁶ However, without available income statistics, it was cautiously used to estimate coefficients of this variable. The variable was expressed on a per farm family basis in current NT\$.

(3) Real interest return

Interest rates are set by the Central Bank of Taiwan. As a result, nominal interest rates on deposits are the same for each financial institution.⁷ Since 1949, policy makers in Taiwan have been very aggressive in adjusting interest rates, sometimes making changes month by month in response to changing economic conditions. Very high nominal rates of interest were one of the techniques used to control substantial inflationary pressures from 1949 to 1960. This policy generally resulted in a positive real interest return on savings deposits.⁸ Pricewise the economy has been quite stable since 1960. Thus, nominal interest rates have declined. Nominal interest rates in the savings function are therefore, adjusted by a price index to give real interest rates. The definition of real interest return is: (nominal interest rate – inflation rate).⁹

Nominal interest rates are usually different for various types of deposits. Unfortunately, the magnitudes of these different types of savings are not available from FACD statistics. Hence, "nominal interest rate" defined in this study is a simple arithmetical average of interest rates of the sub-items within the given category.

The interest returns employed in the study are defined as follows: real interest return on total savings = average nominal interest rate on total savings minus the inflation rate; real interest return on time savings = average nominal interest rate on time deposits minus the inflation rate; real interest return of demand savings = average nominal interest rate on demand deposits minus the inflation rate.

(4) Level of savings (deposits)

The FA Statistical Yearbook supplied the yearly level of savings by saver (member and associate member) and by category (demand deposits, notice deposits, and time deposits etc.) on the aggregate provincial or county basis for the period 1960-70.¹⁰ Unpublished township statistics also were available for 1970. This variable was expressed in per member terms in current NT\$.

(5) Level of Loans

The level of loans on the provincial, county, or township level is published in the FA Statistical Yearbook. It includes all types of loans made to rural people as well as those from FACD's. This variable was expressed in per member terms in current NT\$.

(6) Level of extension expenditures

FACD extension programs include production activities, counseling home economics, cultural or youth activities, and various direct subsidies. These were assumed to have stimulated rural voluntary savings in this study. The total expenditures on these extension activities were employed for representing the contribution of extension programs. The statistics on this variable were reported by FA Statistical Yearbook. These were expressed in per member terms in current NT\$.

(7) Income from FA marketing business

Like the previous variables, the FA yearbook presented this statistic. For many townships, the FA not only supplied marketing facilities and production inputs but also consumer goods. The level of these activities and their contribution to channeling saving were assumed to be equivalent to FA income from these sources. This variable was expressed in per member terms in current NT\$.

(8) Degree of competition from other financial institutions

This variable was represented by the number of competing financial institutions in the area per member. The previously discussed survey supplied the figures on a township basis. This data was only used for the township level analysis.

(9) Rank

This variable was used to represent the management, credibility or image of a FACD, and was only included in the township level model. The "rank" of the township Farmers' Association was annually evaluated by the Provincial Farmers' Association (PFA). It was determined by its profit – creating ability (of FACD and other department of FA), efforts of extension activities, insurance selling, and overall management of the FA.¹¹

The PFA graded and assigned 21 ranks to all township FA's in 1970, from the 1st to the 21st rank.¹² For the statistical models, the ranks were converted to scores. The higher the rank, the higher the score assigned. The 1st (best) ranked FA gained a score of 21, the 2nd rank FA gained a score of 20, etc. It was assumed that the difference in overall operation and management could be measured and presented by interval measurements, the rank. It was also assumed such difference can be represented by the difference in the score.

(10) Efforts of FACD

The author also investigated in his interviews the individual FACD's attitude toward attracting rural savings. This factor was presented in the form of a dummy variable with the values 0 and 1 being assigned. The FACD's believing they were effective in soliciting savings were assigned a value of 1; otherwise, 0 was assigned. This variable was only employed in the township level analysis.

Operational Models

The general model (1.3) previously mentioned analyzed savings of the FACD at three different levels, the township level, the regional level, and the provincial level. The details are discussed in the following sections.

1) Analysis – Provincial Level

a) Model TTS-1

Hypothesis:

Total savings in FACD's (including demand, time, notice and other deposits in all FACD's) changes in the same direction as changes in (a) total value of agricultural

production, (b) real interest return of the deposits, (c) level of FA extension expenditures, (d) FA income from marketing activities, and (e) total loans extended by FACD. The marginal effects of the factors are assumed to be constant.

Model:

$$TTS_i = f(E_i, L_i, M_i, Y_i, TTI_i)$$

where i refers to the i^{th} year, $i = 1, \dots, 11$ (1960-1970).

TTS = total savings in FACD per member

E = extension expenditures per FA member

L = total loans per FA member

M = FA total income from marketing business per member

Y = total value of agricultural production per farm family

TTI = average real interest rate on total savings

b) Model TTS-2

Hypothesis:

This hypothesis is the same as that for model TTS-1, except Y is replaced by Y_1 , farm family disposal income.

Model:

$$TTS_i = f(E_i, L_i, M_i, Y_{1i}, TTI_i)$$

where all variables remain the same as model TTS-1, except Y_1 , implied farm family disposal income.

c) Model TMS-1 and DMS-1

Hypothesis:

The demand deposits (passbook savings and checking account savings) and time deposits (in fact, it includes all sub-items of time and saving deposits) have different responses to changes of the independent variables. Other variables remain the same as in Model TTS.

Model

$$TMS_i = f(E_i, L_i, M_i, Y_i, TMI_i) \quad \text{TMS-1}$$

$$DMS_i = f(E_i, L_i, M_i, Y_i, DNI_i) \quad \text{DMS-1}$$

where:

TMS = total FACD time savings per member

DMS = total FACD demand savings per member

TMI = average real interest rate on time savings

DMI = average real interest rate on demand savings

Other symbols remain the same.

d) Model TMS-2 and DMS-2

Hypothesis:

Identical to the hypothesis laid out for model TMS-1 and DMS-1, except Y is replaced by Y_1 .

Model:

$$TMS_i = f(E_i, L_i, M_i, Y_{1i}, TMI_i) \quad TMS-2$$

$$DMS_i = f(E_i, L_i, M_i, Y_{1i}, DMI_i) \quad DMS-2$$

where all variables remain the same as Model TMS-1, DMS-1, except Y_1 implied farm family disposal income replaces Y.

2) Analysis – Regional Level

The higher the degree of aggregation, the more information lost. For investigating and evaluating the existence of the regional effect, a regional level analysis is used. According to the similarities in agricultural population, production level, financial service and transportation condition, the island was divided into three regions (see Appendix B), and the separate equations fitted for each region.

a) Model TTS

Hypothesis:

The aggregated total savings in FACD's are changing in the same direction as the change in (a) total value of agricultural production, (b) real interest return, (c) FA extension expenditures, (d) FA income from marketing activities and (e) total loans by FACD. Regional effects are hypothesized, and separate savings functions are fitted for each of the three regions. The assumption of constant marginal effect of the factors included in the provincial model is relaxed for the regional model, and

quadratic savings functions are employed. The time effect, the difference between years, is assumed to be represented by a variable intercept term. The time-series and cross-sectional county data, therefore, are pooled in the regional level analysis.

Model:

$$TTS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, TTI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, TTI_i^2, TD_i)$$

where:

$$TD_i = 1 \text{ if the observation relates to year } i, i = 1, 2, \dots, 11.$$

$$= 0 \text{ otherwise}$$

a subscript j represents the jth county

$$j = 1, 2, \dots, 7 \text{ in the regions 1 and 2}$$

$$= 1, 2, \dots, 6 \text{ in the region 3.}$$

Other variable definitions remain the same as provincial level model TTS-1, except the quadratic terms are introduced for each correspondent factor.

b) Model TMS and DMS

Hypothesis:

The demand deposits and time deposits have different responses to changes in independent variables. Others remain the same as model TTS.

Model:

$$TMS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, TMI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, TMI_i^2, TD_i)$$

$$DMS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, DMI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, DMI_i^2, TD_i)$$

The variable definitions remain the same as for regional model TTS and provincial models TMS, DMS.

3) Analysis – Township Level

Because the analysis at an aggregated level cannot investigate the influence or features of an individual FACD, i.e., overall management, image or efforts etc., upon savings level in the FACD, an analysis of individual FACD's was performed. Because of data availability, the township analysis has different features from either the provincial or regional analysis. The time length which the analysis covered is only the year 1970, not the 1960-1970 period. The number of observed township FACD's

is 16. All of these townships participated in farm record-keeping programs in 1970 and they were also located in the region two.¹³ The provincial and regional analysis is based on the aggregate statistics of all 292 FACD's. The variable extension expenditures cannot be included, because the township level statistic for this variable was not available. Interest rate is also excluded because there was no change in real interest return during the year analyzed.

a) Model TTS

Hypothesis:

The total savings in individual FACD's are functions of (1) Farm family income,¹⁴ (2) image or overall operation and management of FA (represented by the rank score of FA), (3) loans extended, (4) competition from other financial institutions, (5) efforts by FACD to attract farmers' savings (represented in the form of a dummy variable), and (6) FA income from marketing functions.

The marginal effects of independent variables, except the dummy variable, are assumed not constant.

Model:

For 1970 a single equation model was estimated for the total savings:

$$TTS_j = f(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

where j refers to the jth township:

R = rank of the township FA

C = competition from other financial institutions, i.e.,

(number of other competing financial institutions of FACD)/(member of the FA)

Y_j = farm family disposal income.

A = dummy variable. If the FACD made special efforts to attract saving, value 1 is given; otherwise, 0 is given.

Other definitions of variables remain the same as regional model TTS.

b) Model TMS and DMS

Hypothesis:

Time savings and demand savings may respond differently to changes in the determinants set in the preceding Model TTS. The marginal effects of them, except the dummy variable, are also assumed variable.

Model:

The 1970 single equation model was estimated.

$$TMS_j = g(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

$$DMS_j = h(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

Where:

TMS refers to time savings

DMS refers to demand savings

Others remain the same.

Statistical Methods

1) General State

The objectives of fitting data into appropriate statistical models are: (1) to estimate the magnitudes of the responses of FACD savings levels to their determinants, (2) to test whether these determinants have significant influences on FACD savings, and (3) to investigate whether there are regional effects, and if there are different savings determinants between demand and time savings.

The statistical techniques used in this study were primarily stepwise ordinary least squares regression (OLS) method. The significance of independent variables and their joint capability to explain variation in the dependent variable were tested alternatively by the t statistic and the F statistic. Usually covariance analysis and a following F-test can be performed to test whether some or all of the parameters are the same for regression equations estimated from different sets of data.¹⁵ But in this study the differences in functions among regions will be evaluated by comparing the sign, size, and statistical significance of the corresponding regression coefficients in each function. That is, a variable which is significant in the function for one region, but not significant in the function of another region would indicate a difference in functions between the regions. Differences in signs or a sizeable difference between the size of corresponding coefficients also may suggest a difference in functions between the regions. Differences between time savings and demand savings functions within a region will be evaluated by a similar method.

2) Turning Point and Marginal Effect

The analysis at the regional level and township level employed the quadratic function form to fit the relationship between the level of savings and the levels of its determinants. It was assumed that the contribution of each additional unit increase in an independent variable (income, interest rate etc.) may be varied. Even the direction of the effect might be changed as soon as reaching the extremum,¹⁶ or turning point. The study used the first-derivative test and marginal function to determine the turning point and the marginal effect. They being:

(1) If the partial derivative of a (saving) function is $\frac{\partial S}{\partial Y} = f'_Y(Y, L, E, L, M)$ at a point $Y = C$ is $f'_Y(C) = 0$, then this point is the turning point of factor Y . Beyond the point $Y = C$, the direction of marginal effect of Y does change. (In this study, condition $C > 0$ was provided).

(2) The partial derivative of factor Y to dependent variable S , i.e. $\frac{\partial S}{\partial Y}$, is the marginal function of Y to S . The marginal effect of Y upon S is then the sum of constant term and the coefficients of the Y 's in the marginal function.

For example, if an estimated saving function is: $S = 3 - 0.5Y^2 + 0.1Y + 0.3E$ then $\frac{\partial S}{\partial Y} = 0.1 - Y$.

Set $\frac{\partial S}{\partial Y} = 0$ and solve for Y , then $Y = 0.1$.

Where the marginal effect of Y is $(0.1 - Y)$, and the turning point is at $Y = 0.1$, i.e., the marginal effect of Y is negative for all $Y > 0.1$.

NOTES TO CHAPTER IV

1. This was a purposive selection. In each township, a better-off, an average, and a poor farm families were selected. Dr. T. S. Tsong and students at National Chung-Hsing University helped the author to perform these interviews.
2. The FACD personnels and farmers generally agreed that preferential treatment to savers requesting loans was the most reasonable interpretation of the loan effect. Some FACD's even adopted a "no-saving-no-loan" policy to solicit savings. In addition farmers also deposited their borrowed money in FACD's for short periods.
3. The influence of FA supporting activities are usually in forms of: (1) FACD saver may expect some preferential treatment in the FA activities, (2) The activities may stimulate appreciation of FA and deepen farmers' "in-

- group" feeling, and (3) Due to those activities farmers may visit FA's more often, and incur less transaction (travel) cost for savings activities.
4. FACD's have no deposit insurance or advertising program. So, E and M can substitute for S. On the other hand, because E and M can promote farmers' familiarity with FACD's and reduce travel cost of making transaction in FACD, the effect of A_v and F_a are partly covered by E and M.
 5. Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Taiwan Agricultural Yearbook*, 1960 to 1970 editions (Natou, Taiwan, China: PDAF, 1961-1971).
 6. Using this proxy variable implies we are defining: current farm family income = farm income = total value of agricultural production per farm family, but not (farm income) + (non-farm income). Non-farm income was not available. However, in rural areas farm income does constitute the major portion of farm family income. Non-farm income, if any, usually came from transitory sources.
 7. The figure was supplied by the Central Bank of China (CBC), *The Republic of China, Taiwan Financial Statistics Monthly* (Taipei, China: CBC, July, 1971).
 8. Refer to section 3 of the preceding chapter (capital market policy); also: R. J. Irvine and R. F. Emery, *op. cit.*, pp. 29-39.
 9. Inflation rate here was represented by the index of prices-paid-by-farmers. The rate at year t was defined as:
$$P = \frac{(\text{index of prices paid by farmers in the year } t) - (\text{index of prices paid by farmers in the year } t - 1)}{(\text{index of prices paid by farmers in the year } t - 1)}$$

Index of prices-paid-by-farmers-in-Taiwan includes 26 items of productive goods and 48 daily necessities for living. The data are reported from 40 sampled townships throughout the island and calculated by Taiwan Provincial Bureau of Accounting and Statistics. It is known as the most complete rural consumer prices index in Taiwan. Since this study assumed that rural savers make their saving decision on the basis of comparing nominal interest return and consumer price change, the real interest return which savers are supposed to respond to is then defined as the difference between nominal interest rate and changing rate of prices paid by farmers in the study.

The change of prices paid by farmers also had a similar pattern as change of prices received by farmers, and no substantial difference when compared to wholesale price changes during the last decade.
 10. Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Statistical Yearbook of Farmers' Associations*, 1960-1970 editions, (Nantou, Taiwan, China: PDAF, 1961-1971).
 11. The criteria used were: (1) Ratio of the sum of profits (from all departments) and current deduction for reserves (for depreciation, for bad debt, and for business) to FA gross income; (2) Amount of accumulation on reserves and owned capital; (3) Amount of loss; (4) Amount of supervisory expenses; (5) Amount of overdue loan; (6) Number of employees in extension department; (7) Existence of livestock insurance business; (8) The amount of livestock insured.
 12. The source is Provincial Farmers Association (PFA), *Report on Evaluation of Farmers' Associations in 1971* (Taichung, Taiwan, China: PFA, 1971).
 13. Since statistics on time and demand deposits were only available in the 1970 unpublished Provincial Farmers Association report, the information on efforts of the FACD staff and competing institutions were drawn from survey findings. Statistics on the value of agricultural production on a township basis was also not available. Therefore, the author employed "farm family disposal income" supplied by record-keeping data which only included 36 townships in 1970.
 14. The variable "farm family income" used in the level analysis, was calculated from the farm record-keeping families.

15. To test the hypothesis that the regression coefficients for a determinant are the same for each of the two groups, dummy variable technique and a "t" test might also be used. However, covariance analysis is suggested by many economists. In fact, covariance analysis may be used (a) to test difference in intercepts (slopes assumed constant for all classes), (b) to test differences in slopes between classes, (c) to test the difference in the complete relationship between classes (that is, ignoring the distinction between intercepts and slopes and considering the relation as a whole). For more detailed information, see: Gregory C. Chow, "Test of Equality Between Subsets of Coefficients in Two Linear Regressions", *Econometrica*, Vol. 28, 1960, pp. 591-605; Franklin M. Fisher, "Test of Equality Between Sets of Coefficients in Two Linear Regressions, An Expository Note", *Econometrica*, Vol. 38, March, 1970, pp. 361-66; J. Johnston, *Econometric Methods*, ed. 2, (New York: McGraw-Hill W., 1972), pp. 192-207; Potluri Rao and Roger L. Miller, *Applied Econometrics*, (California: L. Wadsworth Pub. co., 1971), pp. 141-152.
16. Only relative (or local) extremums were discussed in this study.

CHAPTER V

PROVINCIAL LEVEL DATA ANALYSIS

As discussed in Chapter IV, the quantitative analysis of this study was performed at three levels of aggregation: the provincial, the regional and the township levels. Each was individually analyzed because of the expectation that time savings, demand deposits or total savings may respond differently to the determinants depending on level analyzed.

The statistical results of the provincial level are reported in this Chapter. The regional analysis, township analysis and the comparisons of the three levels will be given in Chapters VI, VII, and VIII.

It was noted in Chapter IV that two types of provincial models were used. Type I models employed agricultural product value (Y) as the income variable, and type II models employed farm family income (Y_1). These two variables are *both* available *only* at the provincial level. Since only information on Y is available at the regional level the results of the provincial analysis should indicate if Y can appropriately substitute for Y_1 in the regional model.

As laid out in the preceding chapter, the group I models are:

$$TTS_i = f(E_i, L_i, M_i, Y_i, TTI_i) \quad TTS-1$$

$$TMS_i = f(E_i, L_i, M_i, Y_i, TMI_i) \quad TMS-1$$

$$DMS_i = f(E_i, L_i, M_i, Y_i, DMI_i) \quad DMS-1$$

Group II models are:

$$TTS_i = f(E_i, L_i, M_i, Y_{II}, TTI_i) \quad TTS-2$$

$$TMS_i = f(E_i, L_i, M_i, Y_{1i}, TMI_i) \quad TMS-2$$

$$DMS_i = f(E_i, L_i, M_i, Y_{1i}, DMI_i) \quad DMS-2$$

where:

TTS = Total savings per member (NT\$)

TMS = Time savings per member (NT\$)

DMS = Demand deposits per member (NT\$)

E = FA extension expenditures per member (NT\$)

L = FACD total value of loans per member (NT\$)

M = FA total income from marketing business per member (NT\$)

Y = Income variable represented by total value of agricultural product per farm family (NT\$)

Y_1 = Farm family disposal income (NT\$)

TTI = Average real interest rate of total savings (one-hundredth of 1 percent, or 0.01%)¹

TMI = Average real interest rate on time savings (0.01%)

DMI = Average real interest rate on demand deposits (0.01%)

Subscript i represents the i^{th} year, where $i = 1, \dots, 11$ (1960-70). All monetary terms are in current values.

Findings of Models Group I

The estimates of the models are reported in Table 13. Means, standard errors and ranges of the variables are also listed in Table 14.

Results for the first group of models (TTS-1, TMS-1 and DMS-1) show that FACD loans per member (L) had a significant positive effect upon both aggregated total savings and time savings. Each FACD loan dollar stimulated total savings and time savings by .71 and .48 respectively. FACD loans per member however, did not significantly affect demand deposits (Table 13).

Likewise, the income variable Y had a significant positive effect on aggregated total, time, and demand savings with coefficients being 0.125, 0.064 and 0.040, respectively. An increase in income contributes slightly more to generating time deposits than demand deposits at the provincial level (Table 13).

Extension expenditures per member (E) and income from FA marketing per member (M), each have a significant negative effect on generating time and total

Table 13 Results of Provincial Models for Total Savings, Time Savings, and Demand Deposits, 1960-1970

Model	Variables							Adjusted R ² (\bar{R}) ² (d.f.=5)	Standard Error of Y, X
	Intercept	Extension Expenditure per Member (E)	FACD Loan per Member (L)	Income from FA Marketing & Selling per Member (M)	Income (Y, Y ₁) ^a	Real Interest Rate TT (TMI) DM			
Total Savings (TTS-1)	-2142.62** (535.47) ^b	-5.64** (1.77)	0.71** (0.09)	-0.79** (0.30)	0.125** (0.025)	0.03 (0.03)	0.99**	81.37	
Time Savings (TMS-1)	-657.93 (752.67)	-3.74** (1.44)	0.48** (0.07)	-0.76** (0.24)	0.064** (0.021)	0.07** (0.03)	0.99**	66.95	
Demand Savings (DMS-1)	-1024.69** (356.74)	1.09 (1.18)	0.08 (0.06)	-0.11 (0.20)	0.040** (0.017)	-0.02 (0.02)	0.98**	53.95	
Total Savings (TTS-2)	225.66 (682.85)	-1.31 (3.71)	1.07** (0.13)	-0.34 (0.89)	0.007 (0.026)	0.05 (0.08)	0.98**	196.75	
Time Savings (TMS-2)	488.13 (387.37)	-1.53 (2.10)	0.67** (0.07)	-0.61 (0.51)	0.007 (0.015)	0.08* (0.04)	0.98**	112.04	
Demand Savings (DMS-2)	-423.29* (250.49)	2.50* (1.38)	0.20** (0.05)	-0.16 (0.32)	0.010 (0.010)	-0.02 (0.03)	0.96**	71.43	

** Significantly different from zero at 5 percent level.

* Significantly different from zero at 10 percent level.

^a Y was used in the Models TTS-1, TMS-1, and DMS-1; Y₁ was used in the Models TTS-2, TMS-2, and DMS-2.

^b Standard Errors.

Table 14 Value of Means, Standard Errors, and Ranges of the Variables Used in Provincial Models

Variable	Mean	Standard Errors of Variables	Range between min. and max. observations
TTS	3,330.96	1,553.02	453.13 – 5,529.98
TMS	2,081.44	874.88	637.76 – 3,367.30
DMS	794.78	377.38	299.12 – 1,364.91
E	117.87	27.76	86.66 – 169.65
L	3,089.87	1,500.27	933.20 – 5,107.89
M	1,033.32	276.95	666.18 – 1,442.79
Y	38,044.0	6,490.9	28,691.7 – 48,050.4
TTI	183.55	861.91	-2,373 – 745
TMI	618.09	845.69	-1,822 – 1,332
DMI	-402.36	949.59	-3,238 – 81
Y ₁	44,719.0	7,176.77	33,828 – 56,854

Except variables TTI, TMI, DMI in unit of 0.01%, all other terms are in value of NTS.

savings. The coefficients are -5.64, -3.74 for extension and -0.79, -0.76 for marketing on total and time savings respectively. These two factors did not significantly influence the level of demand deposits (Table 13).

Real interest return positively influenced aggregated time savings, but had no effect on demand or total savings at the provincial level (Table 13). This result seems reasonable since in fact only time savings are interest earning assets. The insignificant response of total savings to changes in interest rates may be attributed to the aggregation of demand, time and other savings which have a different response to interest returns.

Findings of Models Group II

The estimated results for the second group of models showed that loans are the predominant factor in determining both aggregated total savings and separated time and demand savings. Loans are also the only significant determinant of total savings. The coefficient of 1.07, implies that every one dollar increase in loans will stimulate 1.07 dollars of total savings. As for demand and time savings, the coefficients associated with the loan variable are smaller, being .67 and .20 respectively (Table 13).

The real interest return is found to have a significant effect on time savings only at the 10 percent significance level. Extension expenditures significantly affected only demand deposits at the 10 percent significance level (Table 13). Farm family income and FA income from marketing were both found to have no significant effect on generating either total, time, or demand savings (Table 13).

Comparison of Models Group I and Group II

It was found that the direction of change of the variables was similar for the two groups of models. But the sizes of the regression coefficients and their significance were found to be different (Table 13). They were:

- (1) The loan effect (L) was larger in the models TTS-2, TMS-2 and DMS-2, with regression coefficients one and one-half times those of the first group of models.
- (2) Except for demand deposits, variable Y, represented by farm family income in the second group of models, had smaller regression coefficients than for the first group of models since $Y_1 > Y_2$. Each coefficient was also not significantly different from zero in the second group of models.

(3) FA marketing selling activities (M) did not significantly affect total, time or demand savings in the second group of models, but have a significant effect in the first group of models.

(4) The extension effect (E) had a moderate positive effect on demand deposits in the second group, but the extension responses of total and time savings had a significant and negative effect in the group I.

(5) Real interest (R) had approximately the same coefficients in the two groups of models. Also the interest rate had a significant effect upon the time savings for each of the two types of models.

Therefore, a difference existed between these two groups of models. Based on the statistical consideration, estimated models for group I had a smaller standard error of estimate (standard error of $Y \cdot X$), and all factors significantly affected the FACD savings. The models of the second group, had a larger standard error of estimate. The amount of loans significantly affected the total, time and demand savings. In addition, only interest return for time savings and extension expenditures for demand savings were found to make a significant contribution. The variable M and Y_1 did not make any significant contribution to either total, time or demand savings based on the findings for group II models.

It was noted in the Chapter IV, that Y did not consist of non-farm sources of farm family income. But based on these comparisons the first group of models better represents the changes of FACD savings. This suggests that using Y, value of agricultural product, as the proxy for the income variable in this study is justified.

NOTES TO CHAPTER V

1. For example, an annual interest rate of 5% is presented as 500 (0.01%).
2. Correlation coefficient of Y and Y_1 was 0.93.

CHAPTER VI

REGIONAL LEVEL DATA ANALYSIS

As previously mentioned in Chapter IV, this study was divided into three mutually exclusive regions on the basis of farming population, total value of agricultural product per farm family, and services available from financial institutions (Appendix B).

Region 1, a fringe area, had the lowest proportion of farming population (21 percent), the highest value of agricultural product per farm family and the most extensive financial services from the non-FACD banking system. Hence, the FACD was confronted with keen financial competition in this region.

Regions 2 and 3, mainly farming areas with a similar proportion of farm populations, were mainly agricultural areas producing crops such as rice, sugar cane, sweet potatoes, tea, bananas and pineapple, etc. But, Region 2 possessed more "wealth" than Region 3. Also, Region 2 had a greater coverage of FACD's. About 92 percent of the townships in Region 2 have FACD facilities, compared to 78 percent of Region 1 and 77 percent of Region 3. Region 2 also had better transportation facilities.

As specified in Chapter IV, the regional aggregated savings models are:

$$TTS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, TTI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, TTI_i^2, TD_i)$$

$$TMS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, TMI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, TMI_i^2, TD_i)$$

$$DMS_{ij} = f(E_{ij}, L_{ij}, M_{ij}, Y_{ij}, DMI_i, E_{ij}^2, L_{ij}^2, M_{ij}^2, Y_{ij}^2, DMI_i^2, TD_i)$$

where:

$$TD_i = 1 \text{ if the observation relates to year } i, i = 1, 2, \dots, 11.$$

= 0 otherwise

The subscript j represents the j^{th} county, $j = 1, 2, \dots, 7$ in Region 1 and 2, $j = 1, 2, \dots, 6$ in Region 3. Other definitions of variables remain the same as defined for the provincial models, except quadratic terms are introduced for each corresponding independent variable, and the value units become NT\$1,000.

It is assumed that no slope or coefficient difference exists among the years.¹ However, variable intercept terms are used to represent the possible time effect.

The quadratic equations were estimated by stepwise ordinary least square (OLS) regression for each of the regions. The results and related statistics are shown in Tables 15 through 20. The regional models discussed in this chapter show that the variables specified had a significant effect on the level of the dependent variables: total savings, time savings, and demand deposits.

Findings in Region 1

The total savings level was significantly affected by time effects in 1964 and 1967, represented by variables TD5 and TD8 respectively (Table 15). Since the value of agricultural production was higher than average for 1964, this increase may also include some income effect. In 1967 for the same reason (Table 1), time may have affected the level of total savings.

Total savings were also affected by FACD loan and FA marketing activities. The coefficients for both the linear and the quadratic terms of these two factors were significantly different from zero at the 5 percent significance level (Table 15).

For extension expenditures both linear and quadratic terms were significant at the 10 percent level. The significant negative quadratic term for extension expenditure, E^2 , implies a decreasing marginal effect of extension expenditures as a per member basis (Table 15). That is, as extension expenditures per member (E) increases from 0.1 to 0.101 (since the unit is NT\$1,000, the implied increase is one NT dollar), the increase in total savings is NT\$ (6.03 - 24.70 x 0.1) or NT\$3.56. It also implies that after reaching a maximum point the effect on savings of an increase in extension expenditures would be negative. This may be attributed to possible competition for FA resources between departments of credit and department of extension above a given scale of operation.² As can be seen in Table 16 and Figure 3 the value of the turning point is 0.28 or NT\$280.³ Since this was much larger than the average value of variable E it suggests that a positive marginal effect existed for

Table 15 Results of Region 1 Models for Total Savings, Time Savings, and Demand Deposits, 1960-1970

Models	(1960)	(1961)	(1962)	(1963)	(1964)	(1965)	(1966)	(1967)	(1968)	(1969)	(1970)	L	E	M
	Intercept	TD2	TD3	TD4	TD5	TD6	TD7	TD8	TD9	TD10	TD11			
TTS	-0.41 (0.41)	0.09 (0.22)	0.07 (0.21)	0.24 (0.20)	0.51** (0.20)	0.17 (0.20)		0.37** (0.21)	-0.16 (0.24)	-0.28 (0.25)	0.78** (0.11)	6.03* (4.78)	1.95** (0.49)	
TMS	-0.38* (0.28)			0.13 (0.19)	0.32* (0.20)		-0.27* (0.20)	-0.17 (0.21)	-0.24 (0.22)	-0.62** (0.26)	-0.64** (0.28)	0.67** (0.10)	4.49 (4.75)	0.92** (0.48)
DMS	-0.09 (0.10)	0.11* (0.07)		-0.11** (0.06)	-0.09* (0.06)			0.21** (0.06)	0.07 (0.06)			0.25** (0.03)	0.21 (1.44)	0.37** (0.16)
	Y	(TT, TM, DM)I	L ²	E ²	M ²	Y ²	(TT, TM, DM)I ²	R ²	Std. Err. of Y.X					
TTS	-0.0007 (0.0011)	0.000047 (0.000078)	0.024** (0.011)	-12.35* (9.34)	-0.83** (0.24)			0.96** (d.f.=16,60)	0.44					
TMS	0.0024 (0.0044)	0.000197 (0.000143)	0.006 (0.010)	-9.51 (9.27)	-0.15 (0.24)	-0.000011 (0.000016)		0.93** (d.f.=16,60)	0.44					
DMS	-0.0006 (0.0014)	0.000011 (0.000027)	-0.002 (0.003)	-1.19 (2.82)	-0.32** (0.07)	0.000008* (0.000005)		0.91** (d.f.=14,62)	0.14					

*significantly different from zero at 10 percent level.

**significantly different from zero at 5 percent level.

A variable with no coefficient in the table is the result of that independent variable not entering under stepwise regression procedure.

most of the observations included in the study.

It can also be noted in Table 15 that an increasing marginal loan effect existed. For every additional dollar of FACD loan generated, total savings increased by $(0.78 + 0.048L)$ dollars. There was also a decreasing marginal savings effect associated with FA marketing and selling activities. Every additional dollar of income from FA marketing and selling activities was estimated to generate $(1.95 - 1.66M)$ dollars of total savings. As derived from Table 15, as soon as the value of M exceed the turning point 1.18 or NT\$1,180,⁴ the level of total savings in the FACD will be reduced from an increase in M.

The income variables, Y and Y², showed no significant relationship with aggregated total savings at the regional level. As will be shown later, increased income affected only FACD demand deposits. This seems contrary to what is generally believed. However, if part of the income effect is included in the contribution of the time variables, income would still affect the *level* of total savings (Table 15).

The real-interest-return variable also showed no significant contribution to increases in total savings (Table 15). This may have been due to aggregation of different type of savings which had differential responses to interest rate changes.

(2) Time savings:

Using 1960 as a base, the time savings in Region 1 increased through 1964, but decreased in 1966, 1969 and 1970 due to time effects. This is shown by a positive coefficient of variable TD5 and the negative coefficients for dummy variables TD7, 10 and 11 in Table 15. No significant trend was found in the level of time savings.

FACD loan and marketing functions showed a positive influence on time savings with constant marginal effects. Every additional dollar of lending (L) or marketing income (M) was estimated to generate NT\$0.67 and NT\$0.92 in time savings respectively. The income, real interest return and the extension expenditures, however, showed no significant effect on time savings in this region (Table 15).

(3) Demand deposits:

The per capita demand deposits in this region showed a decrease in the level for 1963 and 1964, but an increase in the level in 1961 and 1967 relative to the 1960 level (Table 15). The time effect in these years was significant. Again the amount of FACD loans also stimulated demand deposits, but to a smaller degree when

compared to time savings (Table 15). A significant positive income effect existed for the demand deposits function for the Y^2 variable (Table 15). The marketing function (M) had a similar effect on demand deposits as it had for the previously discussed total savings. However, the marginal effect becomes negative for M when the value of the variable is larger than the turning point 0.58, it being less than the mean (Tables 15 and 16). This suggests that a sizeable proportion of the observations have a negative marginal effect. The liquid assets such as checking account, pass-book account etc. were drained by FA sales. Extension and interest effects were not significant for demand deposits in Region 1 (Table 15).

Findings in Region 2

(1) Total savings

All services rendered by the Farmers Association (L, E, M,) in Region 2 had a significant effect on total, time and demand savings. Compared to the 1960 level, total savings significantly increased in 1961, 1964 and 1970 (Table 17). This fact was mainly due to the good harvests in these years, especially 1964.

FACD loan and FA marketing activities each contributed significantly to attracting total savings. The loan effect and FA marketing generally had a positive influence on total savings⁵ (Table 17). Unlike the results for Region 1, real interest return was significant but negative. As real interest return increased, other factors held constant, the aggregated total savings which included time, demand and other deposits decreased (Table 17). As suggested earlier, this was due to the aggregation of savings. The effect of the income variables were not significant (Table 17). As suggested earlier this may have been due to the capturing part of the income effect.

(2) Time savings:

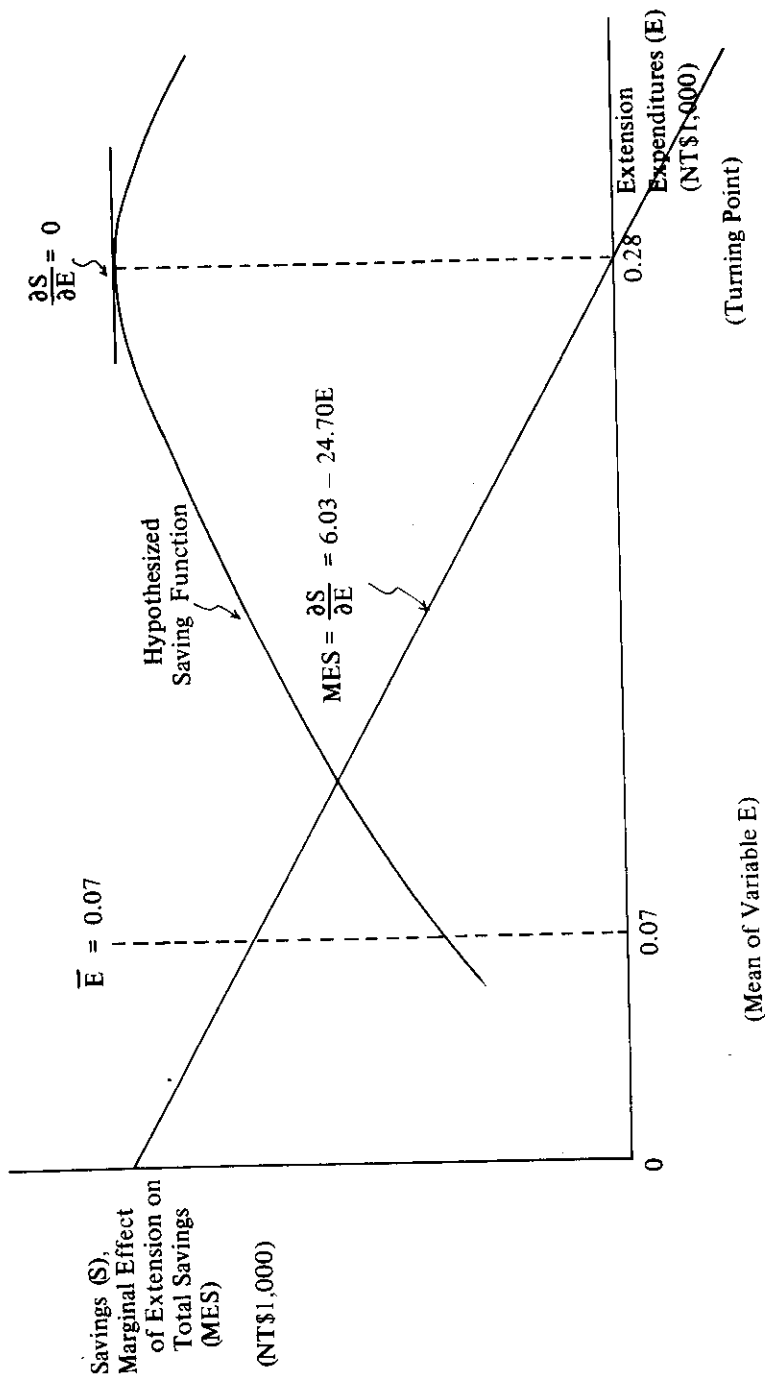
The estimated time savings function for Region 2 showed all factors significantly influenced aggregated savings (Table 17). In other words, income, FACD loans, FA extension and marketing selling levels positively affected time savings before their values became larger than the turning points: $Y = 36.6$; $L = 12.0$; $E = 0.09$; $M = 2.2$ (the value unit is NT\$1,000). The interest effect was also significant and positive. Time effects for 1961, 63, 64 were significant. These three years were found to have a significant increase in the aggregated time savings level, compared to 1960 (Table 17).

**Table 16 Means, Standard Errors, and Ranges of the
Variables Used in Region 1 Models**

Variable ^a	Mean	Standard Error	Range between Minimum and Maximum Observation
		<u>NT\$ 1,000</u>	
L	2.58	2.13	0.39 – 10.27
E	0.07	0.05	0.029 – 0.45
M	0.67	0.49	0.03 – 2.09
Y	74.62	59.06	30.48 – 268.51
TTS	3.01	2.24	0.30 – 11.47
TMS	2.14	1.73	0.12 – 8.64
DMS	0.63	0.47	0.14 – 2.06

^aInterest rates used are the same as those in Table 14.

Figure 3 Graphical Illustration of Marginal Effect of Extension on Total Savings in Region 1



(Mean of Variable E)

Table 17 Results of Region 2 Models for Total Savings, Time Savings, and Demand Deposits, 1960-1970

Model	(1960)	(1961)	(1962)	(1963)	(1964)	(1965)	(1966)	(1967)	(1968)	(1969)	(1970)	L	E	M				
Intercept	TD2	TD3	TD4	TD5	TD6	TD7	TD8	TD9	TD10	TD11								
TTS =	-4.47** (2.18)	1.37** (0.57)	0.70 (0.52)	0.72 (0.43)	0.81** (0.35)	0.17 (0.31)		-0.12 (0.28)		0.58** (0.28)	1.27** (0.21)		36.76 (25.27)	0.94** (0.45)				
TMS =	-6.88** (1.99)	0.98** (0.32)		0.45* (0.24)	0.60** (0.26)	-0.25 (0.22)		0.18 (0.25)	-0.13 (0.25)	0.33 (0.26)	1.08** (0.17)		44.16** (21.09)	1.22** (0.36)				
DMS =	0.24 (0.66)	0.15 (0.12)		0.04 (0.10)	0.23 (0.14)	0.13 (0.14)	0.20 (0.16)	0.47** (0.18)	0.42** (0.19)	0.41** (0.19)	0.53** (0.20)	0.19** (0.07)	4.86 (8.86)	-0.33** (0.15)				
Y	(TT,TMI,DM)											L ²	E ²	M ²	Y ²	(TT,TMI,DM) ²	R ²	Std.Err. of Y.X
TTS =	0.076 (0.089)	-0.000466** (0.000208)		-0.038* (0.020)		-153.65 (137.60)	-0.24* (0.14)	-0.0011 (0.0010)					0.90** (d.f.=16,60)	0.57				
TMS =	0.139* (0.071)	0.000078 (0.000131)		-0.045** (0.016)		-239.18** (111.17)	-0.23** (0.11)	-0.0019** (0.0008)					0.86** (d.f.=17,59)	0.46				
DMS =	-0.003 (0.030)	-0.000041 (0.000035)		0.004 (0.007)		-17.15 (46.52)	0.04 (0.05)	-0.00014 (0.00035)					0.86** (d.f.=18,58)	0.19				

* significantly different from zero at the 10 percent level.

** significantly different from zero at the 5 percent level.

A variable with no coefficient in the table is the result of that independent variable not entering under stepwise regression procedure.

Table 18 Means, Standard Errors, and Ranges of the Variables Used in Region 2 Models

Variable ^a	Mean	Standard Error	Range between Minimum and Maximum Observation
		<u>NT\$ 1,000</u>	
L	3.48	1.94	0.62 – 7.44
E	0.08	0.02	0.048 – 0.154
M	0.83	0.44	0.31 – 1.10
Y	36.65	8.78	20.94 – 56.74
TTS	3.25	1.77	0.53 – 7.87
TMS	2.15	1.23	0.19 – 5.22
DMS	0.92	0.52	0.32 – 1.97

^aInterest rates used are the same as those in Table 14.

(3) Demand deposits:

Demand deposits from 1967 through 1970 had a significant upward trend (Table 17). This indicates the farmers' growing need to hold liquid assets like demand deposits in this region. The influence of FACD loans were moderate in stimulating demand deposits. Every additional dollar of loan is expected to create 0.18 dollars of demand savings (Table 17). Another notable factor is the negative effect of FA marketing activities (M) on demand savings at this region. This fact may be attributed to the farmers' larger dependence on selling activities of the FA. In other words, in this region farmers' savings in the form of demand deposits which generally included checking and pass-book accounts were drained by FA's sales activities rather than increased by its marketing activities. All quadratic terms are insignificant, suggesting that both FA loan and marketing levels may have linear relationship with the aggregated demand savings (Table 17).

Findings in Region 3

As can be noted in Table 19, the time variable in 1961-1964 significantly affected the increase in level of total savings. However, during 1965-1970 the time effect on total savings, and during the 1961-1970 period the time effect on time and demand deposits, were not significant. This may suggest a decreasing rate of increase in total savings level in this region in and after year 1965.

FACD loans (L) positively affected both total and time savings, with no significant affect on demand deposits. FA extension programs (E) show no significant affect upon total, time and demand savings (Table 19). Fewer extension activities are expected in poor and mountainous areas due to lack of funds and less contact between farmers and the FA's.

FA marketing activities positively contributes to attracting total and demand savings before reaching the maximum point, but had no significant effect on generating time savings (Table 19). The turning points were 1.22 or NT\$1,220 for total savings, or 1.75 implying NT\$1,750 for demand deposits. Beyond this point FA marketing programs were competitive for farmers' cash, demand deposits, etc. However, the the value of both turning points were much larger than the average value of variable M (Table 20). This implied that marketing effects were generally positive.

The income factor (Y) significantly affected both time and demand savings (Table

Table 19 Results of Region 3 Models for Total Savings, Time Savings, and Demand Deposits, 1960-1970

	(1960)	(1961)	(1962)	(1963)	(1964)	(1965)	(1966)	(1967)	(1968)	(1969)	(1970)	L	E	M	
Intercept	TD2	TD3	TD4	TD5	TD6	TD7	TD8	TD9	TD10	TD11					
TTS =	-0.74** (0.26)	0.82** (0.21)	0.49** (0.19)	0.34* (0.18)	0.55** (0.17)							-0.08 (0.17)	1.23** (0.16)	-0.60 (1.61)	0.78* (0.45)
TMS =	-0.91** (0.38)	0.20 (0.23)		0.29 (0.22)	-0.26 (0.20)	-0.20 (0.21)		-0.09 (0.26)	-0.34 (0.74)			1.13** (0.19)	-2.00 (2.01)	0.04 (0.55)	
DMS =	0.25 (0.18)		-0.07 (0.11)		-0.12 (0.12)	-0.09 (0.11)	-0.18 (0.12)	-0.16 (0.13)				0.007 (0.13)	1.08 (1.06)	1.05** (0.31)	
Y	(TT,TM,DM)	L ²	E ²	M ²	Y ²	(TTI,TM,DM) ²	R ²	Std.Err. of Y.X.							
TTS	0.018 (0.030)	-0.000188** (0.000071)	-0.014 (0.025)	-0.32** (0.15)	-0.00075 (0.00062)		0.95* (d.f.=13,52)	0.35							
TMS	0.057 (0.038)	0.000063 (0.000116)	-0.023 (0.030)	-0.13 (0.18)	-0.0017** (0.0008)		0.89** (d.f.=16,49)	0.41							
DMS	-0.049** (0.021)	-0.000011 (0.000037)	0.022 (0.016)	-0.30** (0.10)	0.0011** (0.0005)		0.69** (d.f.=14,51)	0.23							

*significantly different from zero at the 10 percent level.
 **significantly different from zero at the 5 percent level.
 A variable with no coefficient in the table is the result of that independent variable not entering under stepwise regression procedure.

**Table 20 Means, Standard Errors, and Ranges of the
Variables Used in Region 3 Models**

Variable ^a	Mean	Standard Error	Range between Minimum and Maximum Observation
		<u>NT\$ 1,000</u>	
L	2.24	1.52	0.19 – 5.90
E	0.08	0.04	0.015 – 0.141
M	0.76	0.46	0.18 – 2.82
Y	26.75	9.32	10.08 – 57.47
TTS	2.22	1.54	0.22 – 5.96
TMS	1.54	1.23	0.12 – 3.75
DMS	0.56	0.42	0.08 – 2.02

^aInterest rates used are the same as those in Table 14.

19). The increasing marginal influence, represented by positive Y^2 and negative Y , on aggregated demand deposits implies that beyond a given point, the "income effect" of demand deposits becomes positive. Family incomes larger than approximately 22.27 or NT\$22,270 had positive effects upon the level of demand deposits.⁶ This suggests that a sizeable proportion of the observations have a positive marginal effect. The negative relationship to time savings may be interpreted as a substitution between time savings and demand deposits. As the result, the increase of total savings in FACD was not significant.

Real interest return was significant but had a negative effect on aggregated total savings in this region, as was true in Region 2. No effect existed for either time or demand savings (Table 19).

The Comparison of Results Among Regional Models

These results of the regional models were used to evaluate regional differences. They were:

(1) Time effect on total savings were found to be positive for all three regions. However, total savings levels were not equally affected by the time variable except for the year 1964. The significant increase in the total savings level for each of the three regions in 1964 was mainly due to the unusual good harvest on the island. In fact, the growth rate of agricultural production in that year was more than 12 percent, twice as high as the average. Hence, the effect of time was significant for different years for each region. Demand and time savings were also not equally affected by the time variable. Time effects on them were negative in some cases. This may be due to the changing preference for holding various types of assets.

(2) The regression coefficients of FACD loans (L) were found to be significant and positive for total savings in each of the three regions. They were 0.78, 1.27 and 1.23 for Regions 1, 2 and 3 respectively. However, the quadratic term of loan (L^2) was only statistically significant in Regions 1 and 2, they being 0.024 and -0.38 respectively (Table 21).

For time savings, the coefficients of loans were also found to be significant and positive in all three regions, they being 0.67, 1.08 and 1.13 for Regions 1, 2 and 3 respectively. The quadratic term (L^2) was significant only in the Region 2, with coefficient -0.045 (Table 21).

For demand savings, the coefficients for loans were found to be significant and

Table 21 Marginal Effects of the Significant^a Variables^b in the Regional Models

	E	L	M	Y	I
Region 1					
TTS	6.03-24.70E	0.78+0.048L	1.95-1.66M		
TMS		0.67	0.92		
DMS		0.25	0.37-0.64M	8(10 ⁻⁶)	
Region 2					
TTS		1.27-0.076L	0.94-0.48M		-0.000466
TMS	44.16-478.36E	1.08-0.09 L	1.22-0.56M	0.139-0.0038Y	108(10 ⁻⁸)I
DMS		0.18	-0.33		
Region 3					
TTS		1.23	0.78-0.64M		-0.000188
TMS		1.13		-0.0034Y	
DMS			1.05-0.60M	-0.049+0.0022Y	

Source: Table 15.

^a At the 10% significant level.

^b Dimensions:

E, L, M, Y in NT\$1,000

I in 1/100 of 1%

positive in Regions 1 and 2, with value of 0.25 and 0.18 respectively.

Region 3 had the largest marginal loan effect, with values of 1.23, 1.13 for total savings and time savings respectively (Table 21). Perhaps less opportunity existed to borrow from other financial institutions in the Region 3. Hence, loans from the FACD are more attractive.

The responses of demand savings and time savings to loan variables were different. The coefficient of the latter was approximately three to six times larger than the former. Both were positive. Besides, the effect of loans on demand savings was found to be non-significant for Region 3.

(3) FA extension expenditures (E) were found to significantly affect the level of total savings in Region 1, but were statistically insignificant in Regions 2 and 3. The coefficient of quadratic term (E^2) was only significant in Region 1 (Tables 21 and 15).

The regression coefficients for extension expenditures on time savings were found to be significant and positive in Region 2. The quadratic term was also significant (Tables 21 and 17).

A regional difference in the "extension" response existed. The savings of the mountainous area, Region 3, were not significantly affected by extension expenditures. It may be the result of inconvenient transportation and the lack of extension funds. But since FACD's in the Region 1 faced the keenest competition from other institutions, the importance of extension programs in generating savings may have been recognized by the FA, and efforts were made to maximize the efficiency of extension activities. This may also explain why Region 1 had a higher "turning point" than Region 2 (Table 22).

(4) The coefficients of FA marketing functions (M) were found to be significant and positive in total savings for all three regions. They were 1.95, 0.94 and 0.78 for Regions 1, 2 and 3 respectively. The coefficients of the quadratic term for marketing (M^2) were significant in all three regions, being -0.83 , -0.24 and -0.32 in Region 1, 2 and 3 respectively (Tables 15, 17 and 19).

The regression coefficients of marketing (M) for time or demand savings were found to be significant in all three regions. The corresponding quadratic terms (M^2) were significant in Region 2 for time savings and in Regions 1 and 3, for demand deposits. Therefore, the differences between regions or between types of savings were found to be significant. From Table 21, it can be noted that except for time

Table 22 Turning Points of Significant Variables^a in the Regional Models

	E	L	M	Y
<u>Region 1</u>				
TTS	0.28 (0.07+0.05) ^b		1.18 (0.67+0.49)	
TMS				
DMS			0.58	
<u>Region 2</u>				
TTS		16.70 (3.48+1.94)	2.00 (0.83+0.44)	
TMS	0.09 (0.08+0.02)	12.00	2.20	36.60 (36.65+8.78)
DMS				
<u>Region 3</u>				
TTS			1.22 (0.76+0.46)	
TMS				
DMS			1.75	22.30 ^c (26.75+9.32)

Source: Tables 16, 17.

^aIn NT\$1,000 basis.

^bThe mean of the variable plus one standard error of the variable.

^cAfter the turning point, the effect becomes *positive*.

savings in Region 1 and demand deposits in Region 2, the marginal effects of this factor were varied. The turning points were 1.18, 2.00 and 1.22 for total savings in the Region 2 (Table 22). The higher turning points in Region 2 may be the result of rural people's larger dependence on FA marketing activities. The negative effect of marketing functions on demand deposits in Region 2 may suggest that FA sales did reduce the level of those higher liquid assets.

(5) The regression coefficients for income Y and Y^2 were found to be insignificant for total savings in all three regions. However, as previously mentioned, it may be due to the time variables picking up this affect. Therefore, additional income increased the level of total savings rather than the marginal propensity to save.

For time savings, the coefficient of Y was significant in Region 2 alone, with value 0.139. However, the quadratic term, Y^2 was found to be significant in Regions 2 and 3, with coefficients -0.0019 and -0.0017 respectively.

As for demand deposits, the coefficients of Y were found only to be significant in Region 3. The coefficients of Y^2 were found to be significant in both Regions 1 and 3, with value of 8×10^{-6} and 0.0011 respectively (Tables 15, 17 and 19).

(6) The coefficients of real interest yield (TTI) were found to be significant for total savings in Region 2 and 3, with values of -466×10^{-6} and -188×10^{-6} respectively.

As for time savings, the coefficients of TMI were insignificant in all three regions. But the coefficient of TMI^2 was found to be significant in Region 2, with a value of 59×10^{-8} . Besides, for demand deposits, the coefficients of interest variable were found to be insignificant in all three regions (Table 15, 17 and 19).

The regional difference, again, can be found in the regression coefficients. The responses of demand and time savings to change in the real interest rates were also found to be different.

As has been previously noted, the rate of interest did not significantly affect FACD savings in the Region 1, but did in Region 2 and 3. This difference may be caused by keener competition from other institutions in Region 1. The interest rates were the same for deposits in the FACD or in the other financial institutions. So the increase of interest return may mainly contribute to an increase in farmers' deposits in other banks. Time deposits in the FACD were not tax-exempted as is true for other banks.

In the Region 2, interest rates positively affected time savings, implying that

the increase in rate of interest increased the level of savings. In Region 2 and 3, a significant, negative interest effect on total saving were noted. This may be due to the aggregation of time, demand and other savings which may have different interest responses. The magnitude of marginal effect of interest return upon total savings in the Region 2 was about two and half times larger than of Region 3 (Table 21).

It seems reasonable to presume that a negative interest effect may be associated with deposits which return little or no interest. Since the real interest return on those deposits, i.e., checking or pass-book savings accounts etc. was negative in Taiwan during the last 10 years, it is clear that most rural people hold those deposits for motives other than interest earnings. Hence, as the interest rate decreased, opportunity costs were lowered for holding non-interest earning asset like checking account, cash, or pass-book savings.

NOTES TO CHAPTER VI

1. The author tested models which allowed variable slopes of corresponding factors for different years. The results showed no evidence to support the necessity of employing those models.
2. Theoretically, these two departments are independently operated, but the credit departments supply part of the extension funds, and the extension staffs help to encourage or solicit savings. These departments usually also shared FA facilities such as office space, equipment, etc.
3. This was calculated from data in Table 15. For the expression $\frac{\partial TTS}{\partial E} = 6.03 - 24.70 E$, the partial derivatives were set equal to zero and solved for E. The term E was expressed in NT\$1,000.
4. This was calculated from data in Table 15. The marginal function of M to TTS was found to be $\frac{\partial TTS}{\partial M} = 1.95 - 1.66M$. The partial derivative was set equal to zero and solved for M. M was expressed in NT\$1,000.
5. Following the procedure described in footnotes 3 and 4, it was found that after the turning points: L = 16.7 and M = 2.0 each being larger than the means of the variables, the effects become negative.
6. From Table 19, it is found that the marginal function of Y to DMS was $\frac{\partial DMS}{\partial Y} = 0.049 + 2x(0.0011)Y$. Set $\frac{\partial DMS}{\partial Y} = 0$ and solve for Y, Y = 22.27. This implies that turning point is NT\$22,270, which is less than the mean of Y.

CHAPTER VII

TOWNSHIP LEVEL DATA ANALYSIS AND COMPARISONS AMONG THE DIFFERENT LEVELS OF ANALYSIS

The survey findings indicated that the image held by the individual of FACD's definitely affected the farmers decision to make savings deposits. With the aggregated feature of the provincial and regional data, however, no way existed to investigate the factor in the previous stages of the analysis.

For the individual FACD level analysis, a new factor, rank score,¹ or proxy variable for image or management of a given FACD was introduced. Due to the lack of data the township level analysis only included 16 individual FACD's in Region 2. This represented approximately one-tenth of the FACD's in that region.

Farm family income data were available for the farm record-keeping farmers in the sampled townships. This data were used as the income variable in the analysis.

As was specified in Chapter IV, the township models are:

$$TTS_j = f(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

for total savings

$$TMS_j = g(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

for time savings

$$DMS_j = h(Y_j, R_j, A_j, L_j, C_j, M_j, Y_{ij}^2, R_j^2, L_j^2, C_j^2, M_j^2)$$

for demand savings

where:

R is the rank score of the individual FACD

A measures the efforts of the FACD to attract rural savings

$A = 1$ if the FACD puts special effort on attracting savings
 $= 0$ otherwise

C is the degree of competition, represented by the number of competing institutions in a given township; divided by the total member of FAs.

R^2 , C^2 are quadratic terms of R and C respectively, a subscript j refers to the j^{th} township.

Other independent variables remain the same as in the regional models. Y_1 is expressed in NT\$; L , M and TTS , TMS , DMS are in NT\$1,000, Y_1 remains the same as in the provincial models group II: $TTS-2$, $TMS-2$, and $DMS-2$.

Findings of Township Level Analysis

The statistical results of the estimated quadratic equations, are summarized in Table 23.

Loans (L) were found to significantly contribute to the generation of both total and time savings in the FACD, with linear term coefficients of 1.03 and 0.91 respectively. This suggests that the marginal effects on total or time savings were constant.

FA marketing functions (M) also significantly affected the level of total and time savings at the individual FACD level. These findings suggest a constant marginal effect since the coefficients of the linear terms of M in each of the models were significant. The difference in the loan and marketing effects, in terms of size, on total and time savings were comparable with the outcome of corresponding Region 2 models.

The efforts of the FACD staff (A) in attractings deposits, the rank of FA (R), the number of competing institutions (C), and the increase of farm family income did not have a significant influence on deposits in the sampled FACD's.

No evidence was found that the level of demand deposits was significantly affected by any of the explanatory variables. The joint effect of explaining the variation in demand deposits, represented by adjusted multiple correlation coefficient, \bar{R}^2 , was also insignificant.

Comparison of The Results From Provincial, Regional and Township Analysis

Because of the differences in the functional form and the variables employed, a direct comparison among the provincial, regional, and township models are not

Table 23 Results From Township Level Analysis, by Types of Savings

Model	Intercept	Y ·	R	A	L	C	M
TTS =	5.55 (8.21)	-0.0004 (0.0003)	0.46 (0.66)	-	1.03** (0.47)	588.83 (757.56)	0.87* (0.56)
TMS =	6.51 (8.99)	-0.0002 (0.0003)	0.51 (1.00)	-	0.91** (0.19)	-10599.60 (9985.78)	1.54* (0.83)
DMS =	-10.87 (14.94)	0.0004 (0.0004)	0.16 (0.98)	1.17 (2.02)	-0.46 (0.53)	267.81 (1338.27)	1.83 (2.50)
	Y ²	R ²	L ²	C ²	M ²	R ²	Std. Err. of Y.X
TTS	0.00 (0.00)	-0.02 (0.03)	0.009 (0.026)	-	-	0.95** (d.f.=8,7)	1.23
TMS	0.00 (0.00)	-0.02 (0.04)	-	3870107.0 (384114.0)	-	0.87** (d.f.=8,7)	1.64
DMS	0.00 (0.00)	-0.006 (0.040)	0.04 (0.03)	-	-0.54 (0.54)	0.49 (d.f.=10,5)	1.30

Where * refers to significantly different from zero at 10% level, while.
 ** refers to significantly different from zero at 5% level.
 - refers to that independent variable not entering stepwise procedures.

**Table 24 Means, Standard Errors, and Ranges of the Variables
Used in Township Models**

Variable ^a	Mean	Standard Error	Range	
		<u>NT\$1,000^b</u>		
L	8.43	4.29	18.86	- 1.99
C	0.0012	0.0005	0.0020	- 0.0006
M	1.17	0.77	3.66	- 0.36
Y ₁	49.48	15.13	81.60	- 29.73
R	13.19	4.43	20	- 5
TTS	9.36	5.80	24.88	- 1.41
TMS	5.70	4.51	17.30	- 0.92
DMS	2.71	1.82	7.59	- 0.36

^aDummy variable A was not included.

^bVariables R and C are not in monetary terms.

possible. However, the following comparison of marginal effects are beneficial to illustrate the impact of the level of aggregation (Table 25).

(1) Income variable, Y , shows a significant positive effect on time, demand and total savings in the provincial level analysis. But, the income variables did not significantly affect total savings in any of the regions of the regional analysis. Although income effects were small, they significantly influenced demand deposits of Region 1, time savings of Region 2, and both time and demand savings of Region 3.

The importance of the income variable, however, is partially included in the time variable. Time, in part, is a proxy for income. Therefore, income did contribute to the increase in the level of savings even though the coefficients associated with factor Y were statistically insignificant. It may also be partly due to aggregation of the data.

The income variable Y_1 was found to have a smaller effect on the dependent variable than was the case when Y income variable was used. All time, demand and total savings showed no significant responses to change of income on either provincial or township levels. Obviously, this was the result of employing an alternative income variable.

(2) Real interest return did not significantly affect total savings or demand deposits at the provincial level. As might be expected, only time savings responded positively to the change in real interest rate.

As for the regional models, real interest returns contributed significantly to total savings in Regions 2 and 3. A 1 percent increase in real interest rate caused a NT\$ 46.60 and NT\$18.80 decrease in total savings per member at Region 2 and 3 respectively.² However, the interest effect on time savings for Region 2 was also positive.³

Because of the positive influences from interest upon time deposits at the provincial level and in Region 2 of the regional analysis, it may be reasonable to conclude that insignificant or negative interest responses on total savings at provincial or regional levels are due to the aggregation of the deposits with different responses to interest rate changes. A change in interest return will change the opportunity cost of holding non-interest-earning assets such as cash, checking account and passbook savings in the same direction as the change in interest rate. As a result, the holding of those assets will change in the opposite direction, i.e., the increase of interest return will cause a decrease in the level of those assets.

Table 25 Marginal Effects of the Significant^a Variables in the Provincial, Regional, and Township Models

Level of Analysis	Variables ^b				
	E	L	M	Y, Y ₁ ^c	I
Provincial					
TTS-1	-5.64	0.71	-0.79	0.125	
TMS-1	-3.74	0.48	-0.76	0.064	0.07
DMS-1				0.040	
TTS-2		1.07			
TMS-2		0.67			0.08
DMS-2	2.50	0.20			
Region 1					
TTS	6.03-24.70E	0.78+0.048L	1.95-1.66M		
TMS		0.67	0.92		
DMS		0.25	0.37-0.64M	16(10 ⁻⁶)	
Region 2					
TTS		1.27-0.076L	0.94-0.48M		-466(10 ⁻⁶)
TMS	44.16-478.36E	1.08-0.09 L	1.22-0.56M	0.139-0.0038Y	108(10 ⁻⁸ I)
DMS		0.18	-0.33		
Region 3					
TTS		1.23	0.78-0.64M		-188(10 ⁻⁶)
TMS		1.13		-0.0034Y	
DMS			1.05-0.60M	-0.049+0.0022Y	
Township					
TTS		1.03	0.87		
TMS		0.91	1.54		
DMS					

Source: Tables 13, 15, 17, 19, 23.

^aAt the 10 percent significance level.

^bProvincial level variables E, L, M, Y, Y₁ were expressed in NT\$; regional level variables E, L, M, Y were expressed in NT\$1,000; I was expressed in 0.01 percent in both cases. For township level, variables E,L,M were expressed in NT\$1,000; Y₁ was expressed in NT\$.

^cProvincial models TTS-2, TMS-2, DMS-2 and township models used Y₁ as income variables.

(3) The effects of extension expenditures per member, E, were found to be significant but negative on total and time savings at the provincial level. However, according to the regional analysis, it significantly influenced total savings in Region 1 and time savings in Region 2. In both situations, the marginal effects are positive and decreasing. The value of the turning points are larger than the means of this variable. This implied the effect was positive in average cases.

Since the extension activities are usually affected by regional features, the "return" from the same amount of expenditure may vary by region. The results from the regional analysis, then, provides an important dimension to the results.

(4) The loan effect was a significant variable for the provincial, regional and township models. Generally speaking, the "loan response" of time savings is larger than response of demand deposits. Demand deposits at the provincial level, township level and in Region 3, were not significantly affected by the level of loans.

The effect of loans on the dependent variable in models of each level of analysis was similar. By observing the mean and the standard error of the variable, it is clear that the marginal effects of loans generally were positive. It is also concluded, based on the findings from the three levels analyzed, that FACD loans are the most significant common factor in stimulating rural savings at FACD.

(5) FA marketing and selling business, M, had a negative influence upon total and time savings at the provincial level. However, this contradicts the findings from the regional and township analysis. Except for the negative influence on demand savings for Regions 1 and 2, FA marketing activities are generally found to positively affect time and total savings in Regions 1 and 2, as well as total savings and demand savings in the Region 3.

Because of the different production, economic and transportation conditions of the regions, the farmers in various regions depend differently upon cooperative marketing, supply of production inputs, sales of consumer goods, etc. Therefore, the regional difference in FA marketing activities can not be ignored, and the findings from aggregated provincial models may be less meaningful than findings from regional models.

In summary, it was found that the effects of loan and interest were insignificantly influenced by the level of aggregation. But the effects of income (agricultural production value), extension and marketing functions were substantially affected. This may be due to the regional features usually affecting agricultural production,

extension activities and marketing functions. The most aggregated provincial models could not consider those effects.

NOTES TO CHAPTER VII

1. As already noted in Chapter 4, "Rank" of a FA is the overall evaluation given by provincial FA yearly to each FACD. The author applied "Score" values to the rank.
2. From the estimates in Table 25, it was found that one unit (0.01 percent) increase in TTI caused the decreases of 466×10^{-6} and 188×10^{-6} (thousand NT) dollars on TTS in Region 2 and 3. It implies that TTI increased 1 percent, TTS decrease NT\$46.60 and NT\$18.80 in Region 2 and 3 respectively.
3. From coefficients in Table 25, it was found that one unit (0.01 percent) increase in TMI can increase 108×10^{-8} I (thousand NT) TMS. It implies that TMI increased 1 percent TMS increased NT\$0.108 x I.

CHAPTER VIII

SUMMARY AND POLICY IMPLICATIONS

The central purpose of this study was to identify the major determinants of voluntary financial savings deposits in the Farmers Association Credit Departments (FACD's) in Taiwan during the 1960's. The FACD's were selected for study because of their overall importance in rural capital market activities. It was thought that the highly successful savings mobilization efforts of these associations could provide valuable insights into the role which voluntary financial savings might play in agricultural development. An attempt was also made in the study to treat the question of whether rural capital market growth leads, accompanies, or follows agricultural development.

The study was carried out at three different levels of aggregation: the provincial, the regional, and the township levels. Three measures of financial savings were used in the analysis: time deposits, demand deposits and a sum of both of these, total deposits.

The statistical analysis showed that several FACD activities were important determinants of the amounts of savings deposits. At all three levels of analysis the volume of loans extended by the FACD's was a major determinant of savings. The "loan effect" probably had several different components. First, a general expansion in economic activity in an area requires more operating expenditures and thus loans. This, in turn, causes an expansion in funds held in checking as well as savings accounts to meet these additional cash needs. Second, the general expansion in economic activities associated with more loans probably creates additional income, some of which ends up in savings accounts. Third, the increase in contact with FACD's caused by the loan activities may induce farmers to increase their savings. In some

cases savings deposits may be strongly encouraged by FACD's in order for a farmer to obtain access to credit. Other Farmers Association (FA's) activities were also closely associated with amounts of savings deposited. Extension expenditures and level of marketing activities by FA's were both positively associated with savings at all three levels of analysis.

As might be expected, income levels were positively associated with FACD savings deposits. Year-to-year variations in farm income were major determinants of deposits. The real rate of interest offered on time deposits was also positively related to FACD time savings. The effect of interest rates on demand deposits were generally insignificant due to other motives for holding funds in that forms.

In the regional analysis the differences in services available from financial institutions other than FACD's significantly affected savings. FA members living close to large urban centers apparently have more alternative places to deposit financial savings than do farmers further removed from cities. The FACD savings response to real interest rate change and extension efforts were most significantly influenced by these regional effects.

Policy Implications for Taiwan

Few observers would argue with the conclusion that FACD credit-savings activities have played a very important role in facilitating agricultural growth in Taiwan. FACD's have mobilized a large amount of rural financial savings, loaned these savings plus other funds efficiently and relatively equitably, and also generated enough profits on credit-savings activities to provide a firm financial foundation for the FA's. Despite the successes achieved to this point, however, some changes in policy would allow FACD's to improve their activities. Most importantly, the legal position of the FACD's should be clarified. This would include official recognition of FACD's as financial institutions, legal recognition of FACD checking services, and tax exempt status for interest earnings on FACD savings deposits.

In addition, the FACD's should be integrated into a single system which is formally tied to national capital markets. This might include a single national bank which would be the focal point for all FACD's. This would facilitate the flow of funds among FACD's-horizontal integration-as well as vertical integration of FACD's with other banking facilities. With a formally organized system it should be possible to develop a deposit insurance program to further increase the confidence of rural

savers in the stability of FACD's. The national bank could also provide additional training and consulting services aimed at modernizing FACD financial activities.

Taiwanese policy makers also ought to seriously consider developing more aggressive rural financial savings mobilization programs. In addition to the deposit insurance and tax concession already mentioned, this might include lotteries tied to financial savings and absorption of some rotating credit association activities into FACD's. It might also be possible to develop incentives for FACD managers so that he is rewarded for his ability to mobilize rural savings.

Policy Implications for Other Developing Countries

Rural financial markets in Taiwan, especially FACD's have been successful on at least three counts. First they have tied together rural savers and borrowers on a wide spread scale. Second, they have brokered funds between savers and borrowers on low margins. And, third, saving and credit activities have had a favorable impact on equity considerations; rural capital market policies have not discriminated against the rural poor.

Some students of the Taiwanese experience have concluded that other developing countries have little to learn from what went on there after World War II. Chinese entrepreneurial talents and large doses of foreign assistance are often cited as causing the Taiwanese case to be unique. This study suggests, however, that the successful development of rural capital markets in Taiwan was largely due to appropriate policies, policies which can be largely applied in other developing countries. The positive approach toward rural savings adopted by Taiwanese policy makers was a key element in this regard. This positive approach was operationalized by aggressive use of interest rates to mobilize savings. In large measure these attractive interest rates allowed FACD's and other units of the rural capital market to offer strong inducements for rural people to defer consumption. This deferred consumption was then recycled through capital markets to borrowers who found themselves short of capital. In large measure rural capital markets in Taiwan were allowed to become largely self financing. This, in turn, provided strong financial foundations on which to build the highly successful FACD's. It is doubtful if this success story would have been possible if low interest rate policies on credit and savings, widely used in other developing countries, had been adopted in Taiwan.

Suggestions for Further Research

This study only covered a portion of the rural capital market in Taiwan. Additional research should focus on the savings functions of postal savings and other commercial banks which service rural areas. In addition, much more information is needed on the functioning of the informal credit-savings system in Taiwan. Why has the Hui been so popular in rural areas? What has happened over time to informal saving credit activities? Have they increased or decreased in volume? How does formal credit-saving activities via FACD's affect informal capital markets?

It is clear that financial deposits in FACD's are only one of a number of different forms in which rural people hold their assets. More information is needed on the nature of overall savings portfolios held by rural people. How they change that portfolio in response to various policy changes. This includes much more emphasis on how on-farm investment-consumption decisions are related to financial savings decisions.

Finally, more research is needed on how deposit insurance programs and special savings inducement activities like lotteries affect financial savings.

APPENDIX A

A SUMMARY OF DATA COLLECTED DURING THE FIELD SURVEY

This Appendix is divided into two parts. The first part presents data from all FACD respondents by regions and from record-keeping townships respectively. The second part presents data from interviews with farm families.

FACD Data

From the 292 survey questionnaires mailed to the FACD's, 231 useable responses were returned. Twenty nine of the respondents participated in the record-keeping projects in their township (RP FACD's). A response of 79.1 percent and 80.5 percent for all FACD's and RP FACD's were returned respectively. Questions asked and responses obtained were:

Question 1. If it is possible, could you give an estimate of the proportion of deposits in your department to available farm family savings in a financial form?¹

222 of the FACD's gave estimates. Thirty seven percent of them reported they received 50 percent of financial savings available in that township, while 26 percent of the FACD's estimated it to be 60 percent. The median was 60 percent. This implied that more than half of the FACD's responding received 60 percent or more of available financial savings from 1971-1972 (Table 26). Region 2, had a relatively higher percentage of rural savings mobilized. This may be due to more prevalent FACD's compared to other financial institutions (Table 33, Appendix B).

For RP FACD's, the median was 60 percent; 14 respondents estimated that they received 60 percent or more deposits, 10 of them estimated it as 50 percent or less, 5 FACD's did not respond. These results are consistent with Liao's findings.²

Question 2. According to your experiences what factors have had an influential

Table 26 Estimated Percentage of Rural Financial Savings Received by the Surveyed FACD's 1971-1972

	Percentage of Savings Received								
	10	20	30	40	50	60	70	80	90
	<u>Number of FACD</u>								
Region 1	1	1	2	2	23*	10	9	1	0
Region 2	1	1	7	1	42	36*	19	22	1
Region 3	0	3	3	0	17*	13	3	4	0
Total	2	5	12	3	82	59*	31	27	1
RP FACD's	0	1	1	0	8	7*	1	5	1

*shows the median.

effect upon the level of savings in your FACD? (You may assign 1, 2, 3, . . . to the item which you believe as the most important factor, the second important factor, the third important factor, . . . etc.)

Items with a close meaning were combined into five general factors (Table 27). Convenience and familiarity with the institution were found to be the two most important factors which make rural residents deposit at the FACD.

The loan business of the FACD was ranked third in terms of frequency mentioned by the respondents.

The effects of FA activities and other FACD services were also indicated frequently by the staffs. These activities were found to have more of an influence in Region 1 than in the other regions. Perhaps the FACD's faced heavier competition in this region. As a result, an aggressive supporting activity of FA is necessary to attract savings.

The other factors specified by the FACD were:

1. Opportunity Cost: high risk or private lending (4)
2. Transitory Income: sharply increased non-farm income and crop land selling (4)
3. Services of FA or FACD: the longer open hours (4)
new office building (1)
cooperative marketing (1)
tax return service (1)
4. Explicit government support: (1)

Where the figures within parentheses are the frequency mentioned.

The responses from RP FACD's were similar as compared to the overall picture.

Question 3. If any, please indicate the institutions which closely competed with your department in the savings business. (The institutions in adjoining townships can be included, if necessary).

The results (Table 28) show that postal savings, commercial banks, and the mutual savings were the three most frequently mentioned institutions competing for savings. The cooperative bank and the land bank, surprisingly, were seldom mentioned. The results from RP FACD's were also similar as compared to the overall findings (Table 28).

Question 4. Have you made any special efforts in attracting savings? The responses from regions 1 and 3 were the same, both with 91 percent positive response.

Table 27 The Frequency of Factors Mentioned by the FACD Staffs

Factor/Item Indicated	Frequency Mentioned				
	Region 1	Region 2	Region 3	Total	RP FACD
<u>Convenience</u>					
Convenient Location of FACD	35 (2) ^a	97 (2)	27 (2)	159 (2)	13 (2)
FACD Staffs depositing for Farmers	16	60	11	87	5
<u>Familiarity with the Institution</u>					
Feeling of "Own-organization" and "In-group"	39	95	30	164	14 (1)
Friendship between Farmers and FACD Staffs	41 (1)	98 (1)	39 (1)	178 (1)	11
FACD Staff are mostly Natives	11	49	12	72	6
<u>Loan Business</u>	17 (5)	75 (3)	26 (3)	118 (3)	11 (3)
<u>Other FA Services</u>					
Appreciation to Services of Farmers' Association	21 (3)	51 (4)	17 (5)	89 (5)	4
Traditional Close Linkage and Corporation Between Farmers and FA	19	50	19	88	7 (4)
<u>Better Service and Management of the FACD</u>	21 (3)	51 (4)	22 (4)	94 (4)	7

^aThe figures in parentheses are the order of importance of the Factor.

Table 28 Competitors to FACD's, 1972

Name of the Institution	Frequency Mentioned by FACD Staffs				
	Region 1	Region 2	Region 3	Total	RP FACD
Postal Savings (357, 258) ^a	41	116	35	192	24
Credit Cooperatives (176, 65)	24	30	11	65	5
Commercial Banks (184, 134)	34	84	17	135	19
Mutural Savings (98, 82)	28	63	33	124	14
Cooperative Bank (37, 28)	11	15	7	33	6
Land Bank (34, 29)	8	10	2	20	3
Other Public Banks (31, 24)	0	0	1	1	0
Trust/Insurance Co. (19, 12)	0	0	3	3	0

^aThe first figure within parentheses is number of offices; the second one refers to the number of offices outside the 4 major cities. Both figures excluded the offices in City of Taipei.

In region 2, however, only 74 percent exerted special effort to attract savings. The RP FACD's did not have an aggressive savings business (Table 29).

Question 5. What factor(s) discouraged your efforts in attracting savings? The "most discouraged" factor identified by Regions 1, 2 and 3 respectively was advantageous legal position of other banks, less profit due to fewer demand deposits, and farmers have no custom to save in a financial form. The heavier competition from other banks in Region 1, less-profit from agricultural production in Region 2 during recent years, and inconvenient transportation in Region 3 might contribute to these results.

Other factors mentioned were lower income and recent bad harvest (5), poor looking office (2), inconvenient transportation (2), farmers lack of knowledge in financial savings (2), the savings received by this FACD was already too much to operate profitably (1) - where the figures within parentheses are frequency mentioned. The results from the RP FACD's were similar (Table 30).

Question 6. What factors make rural residents deposit in other financial institutions? Assign 1, 2, 3, . . . to the most important, second important . . . factors you believed).

The findings indicated that the discriminant regulations applied to FACD's, i.e., taxable interest return from 2 or 3 more years of savings deposits and restricted FACD check, etc., were the most influential reason farmers deposit in other available banks. The savings campaign and aggressive savings attraction, the friendship with staffs in those banks were also mentioned by the respondents as the important factors. Regional differences were not significant (Table 31). The responses from the RP FACD's were also found to have no substantial differences.

The other factors mentioned by the respondents were: good image and stronger credibility of other banks (2), and less-enthusiastic staffs in FA extension and marketing departments (1). The figures in the parentheses are the frequency mentioned.

Interviews With Farm Families

By purposive selection, 58 farm families in approximately 20 townships were interviewed. These families belonged evenly to three economic categories: better off than average, and worse than average. The findings are summarized (figures within the parentheses are the frequency that items have been mentioned):

Table 29 Special Efforts in Saving Business, by Regions

Response	Number of FACD				
	Region 1	Region 2	Region 3	Total	RP FACD
Yes	50 (91%) ^a	98 (74%)	40 (91%)	188 (81%)	23 (79%)
Yes, but few	4 (7%)	28 (21%)	3 (7%)	35 (15%)	5 (17%)
None	1 (2%)	6 (5%)	1 (2%)	8 (4%)	1 (4%)
Total	55 (100%)	132 (100%)	44 (100%)	231 (100%)	29 (100%)

^a Percentage in Total.

Table 30 Factors Discouraging FACD Saving Business As Indicated by FACD Staffs

Region	Less Profit Due to Fewer Demand Deposits	High Operating Cost	Lack of Saving Custom	Advantages of Other Banks ^a	Less Lending Opportunity	Agricultural Disaster Loss	Bad Reputation of FA
1	20	18	14	24	10	2	4
2	49	48	41	38	30	6	3
3	13	12	18	13	9	3	2
Total	82	78	73	75	49	11	9
RP FACE	5	2	3	4		1	

^a Tax exemption on the saving deposits (2 and more than 2 years saving deposits), unlimited circulation of the banks' checks, and the stronger credibility due to their non-unit-bank character.

Table 31 Factors Causing Farmers to Deposit in the Other Banks

Region	Tax-Exempted Saving Deposits	Unlimited Check Circulation	Convenience	Loans ^a	Convenient to Other Family Member ^b	Friendship with employee	Solicited by the Band(s) ^c	Easier to keep Confidential
	(Number Mentioned)							
1	45(1) ^d	42(2)	12	14(5)	14(5)	23(4)	44(2)	13(6)
2	125(1)	95(2)	43	53(4)	44(6)	46(5)	75(3)	35
3	39(1)	30(2)	13(5)	17(4)	15(5)	17(4)	32(2)	11
Total	209(1)	167(2)	68	84(5)	73(6)	86(4)	151(3)	59
RP FACD's	24(1)	21(2)	4(6)	2	8(4)	6(5)	15(3)	2

^a Bank loans are usually larger in size.

^b The other family member may be working in the different township or urban area.

^c For instance, effective use of mobile office to attract savings, gift extended, and other pecuniary encouragement.

^d The figure in parentheses are referred to the importance of that factor in terms of frequency mentioned.

1. Forty-nine of the fifty-eight families had deposits in financial institutions at the time of interview. Among these 49 families, 41 deposited their money only in FACD, 6 families deposited in FACD as well as other institutions, 2 of them only deposit their money in other institutions.

2. The reason(s) depositing in FACD were indicated as:

Familiarity with the institution

- I am familiar with FA and its staff (6)
- FA is our own organization, we shall support it (18)
- I am used to depositing in FACD (3)
- I am a member of the staff (2)

Convenience

- It is more convenient to deposit in FACD (24)
- Only FACD available here (2)

Loan business

- It is easier to get loans from FACD, if you are the depositor. (13)

Supporting activities

- FA usually helps me in daily life (5)
- Having deposits in FACD will give me more convenience (preferential treatment) dealing with the FA (5)
- I have contact with the FA very often because of non-credit business (2)

Better management, service and image

- The FA/FACD has a good reputation (5)
- Warmth and efficiency of the staffs (7)

Percuniary advantages from FACD

- We can share the profits from the FACD credit business (in the form of gifts) (1)

The results coincide with the saving "determinants" mentioned by the FACD staffs discussed in the preceding section. Convenience of FACD depositing, familiarity with the institution, and FACD loan obtaining were indicated as the first three important factors in both cases.

3. The reason(s) farmers also deposit their money in other institutions were indicated as:

- Has been encouraged by friends working in those institutions (3)

- That bank is convenient for depositing (1)
- Checks of that bank are easier to use than FACD's (1)
- None (1)

4. The reasons which farmers deposited their money only in other institutions were mentioned as:

- FA here is non-creditable, with bad image (2)
- FACD personnel unfriendly to customers (1)

5. The reasons that those 9 farm families have no institutional savings at all were found to be:

- Low income (3)
- Interest yield from institutional saving is too low (1)
(This farm family does lend money to privates)
- No confidence to any financial institution (1)
- 4 of them gave no comments

APPENDIX B

THREE AGRICULTURAL FINANCE REGIONS IN TAIWAN

For investigating the regional effects on FACD savings in this study, the island was divided into three different regions, based upon farm population, agricultural production, financial services available and transportation facilities, (Tables 32 and 33).

The first region consists of Taipei prefecture (county), Taoyuan prefecture, Sinchu prefecture, Keelung City, Taichung City, Tainan City and Kaohsiung City. This region includes almost all suburban farming areas and has the features of the fringe area: farm population constituting a minor portion of residents, more commercial agriculture (in Taiwan, this means more horticultural crops and livestock production), more financial institutions available and better transportation. Therefore, the FACD usually is not the monopolist in the rural area because of alternating saving institutions.

The second region, which includes the prefectures of Taichung, Changhwa, Yunlin, Chiayi, Tainan, Kaohsiung and Pingtung, is the most important farming area in Taiwan. With only 38 percent of total area, the region produces more than 60 percent of total agricultural production and supports approximately 60 percent of total farming population in Taiwan. With much fewer competing financial institutions, 92 percent of the townships have FACD facilities compared to 78 percent in region 1 and 77 percent in region 3. Approximately 60 percent of population in this region are farmers, but with the less convenient transportation than in region 1.

Region 3 is a farming area in terms of farming population, but with much lower agricultural production compared to region 2. It has the lowest agricultural production per farm family because of its geographic characteristics (this region contains the

Table 32 Farming Populations, Financial Services and Transportation Facilities in Taiwan, 1970

	Farming Population (% of total population)	Agricul- tural Production (NT\$Mil.)	Farm Families Agri. Production (NT\$1,000)	Number of Township (Number)	Township with FA Postal CD Savings (Number)		Number of Other Banks ^a (Number)	Length of Highway (Km/Km ²)
<u>Region 1</u>								
Taipei P.	22.37	2,336	62.09	29	24	22	38	0.42
Taoyuan P.	43.55	2,525	59.33	13	12	8	22	0.72
Sinchu P.	45.03	1,681	48.40	15	12	7	34	0.43
Keelung C.	02.44	273	268.51	7	1	7	22	0.68
Taichung C.	17.77	821	75.84	8	8	8	57	1.19
Tainan C.	13.73	718	79.41	7	2	7	53	0.82
Kaohsiung C.	04.97	901	157.96	10	7	10	75	2.36
<u>Region 2</u>								
Taichung P.	56.05	3,038	48.38	21	20	9	27	0.51
Changhwa P.	64.99	4,194	41.30	26	26	14	36	1.22
Yunlin P.	68.76	3,923	47.63	20	20	18	21	1.19
Chiayi P.	52.49	3,150	47.25	19	18	14	26	0.72
Tainan P.	66.42	3,774	40.22	31	31	16	20	0.79
Kaohsiung P.	50.64	2,898	46.35	28	25	12	25	0.39
Pingtung P.	54.25	4,074	60.92	33	23	18	25	0.56
<u>Region 3</u>								
Yilan P.	49.32	1,220	39.20	12	10	7	16	0.27
Miaoli P.	63.91	1,543	33.33	18	17	12	23	0.39
Nantou P.	65.61	1,829	35.46	13	11	9	22	0.26
Taitung P.	55.26	1,082	39.99	16	8	8	13	0.19
Hwalien P.	49.51	1,053	38.61	13	9	7	17	0.16
Penghu P.	62.94	194	18.04	6	5	1	8	1.43

^aAll financial institutions except FACD's and Postal Savings.

Sources: Calculated from: Taiwan Provincial Department of Agriculture and Forestry (PDAF), *Taiwan Agricultural Yearbook*, 1970 ed. (Nantou, Taiwan, China: PDAF, 1971), pp. 26, 27, 49; Bureau of Accounting and Statistics, Provincial Government of Taiwan (BAS), *Taiwan Statistical Abstract*, No. 30 (Nantou; Taiwan, China: BAS, 1971), Tables 12, 75, 99; Directorate General of Posts, Ministry of Communications, Republic of China (DGP), *Statistical Abstract of Posts*, 1971 ed. (Taipei, China: DGP, 1971), Tables 84, 108.

Table 33 The Comparison of Three Regions in Farming Populations, Economic Conditions, Financial Services, and Transportation Facilities in Taiwan, 1970

	Region 1	Region 2	Region 3
Agricultural Population (as % of total Population)	21.41	59.09	57.76
Number of Farm Families	141,488	536,563	194,079
Total Area (Km ²)	5,390.0	13,984.2	16,335.0
Arable Land (Km ²)	1,597.6	5,231.5	2,160.1
Arable Land (as % of Total Area)	29.64	37.41	13.22
Total Agricultural Production (NT\$ Million)	9,254	25,050	6,921
Livestock Production as Percentage of Total Agricultural Production	54.7	21.1	26.1
Agricultural Production Per Farm Family (NT\$1,000)	107.36	47.44	34.11
Township with FACD (as % of Total Townships)	0.78	0.92	0.77
Township with Postal Saving (as % of Total Townships)	0.81	0.57	0.56
Number of Other Financial Agents Per 1000Km ²	0.457	0.129	0.061
Number of Other Financial Agents Per 1,000 Farm Families	2.1	0.34	0.51
Length of Highway ^a (Km/Km ²)	0.59	0.67	0.23

Source: Same as Table 32.

^aIncludes all highways, municipal road and rural road.

most mountains of the island). Farming in this region is also relatively extensive.

With the inconvenient transportation facilities (highway and rural route distribution) and less financial services, it is generally agreed that the financial transaction is expensive (due to the higher travel cost) in this area.

Tables 32 and 33 provide the basis of grouping the counties and comparisons between the regions. Figures 4 and 5 then show the regions and cropping system associated.

Figure 4 Map Showing Counties Constituting the Three Agricultural Finance Regions in Taiwan

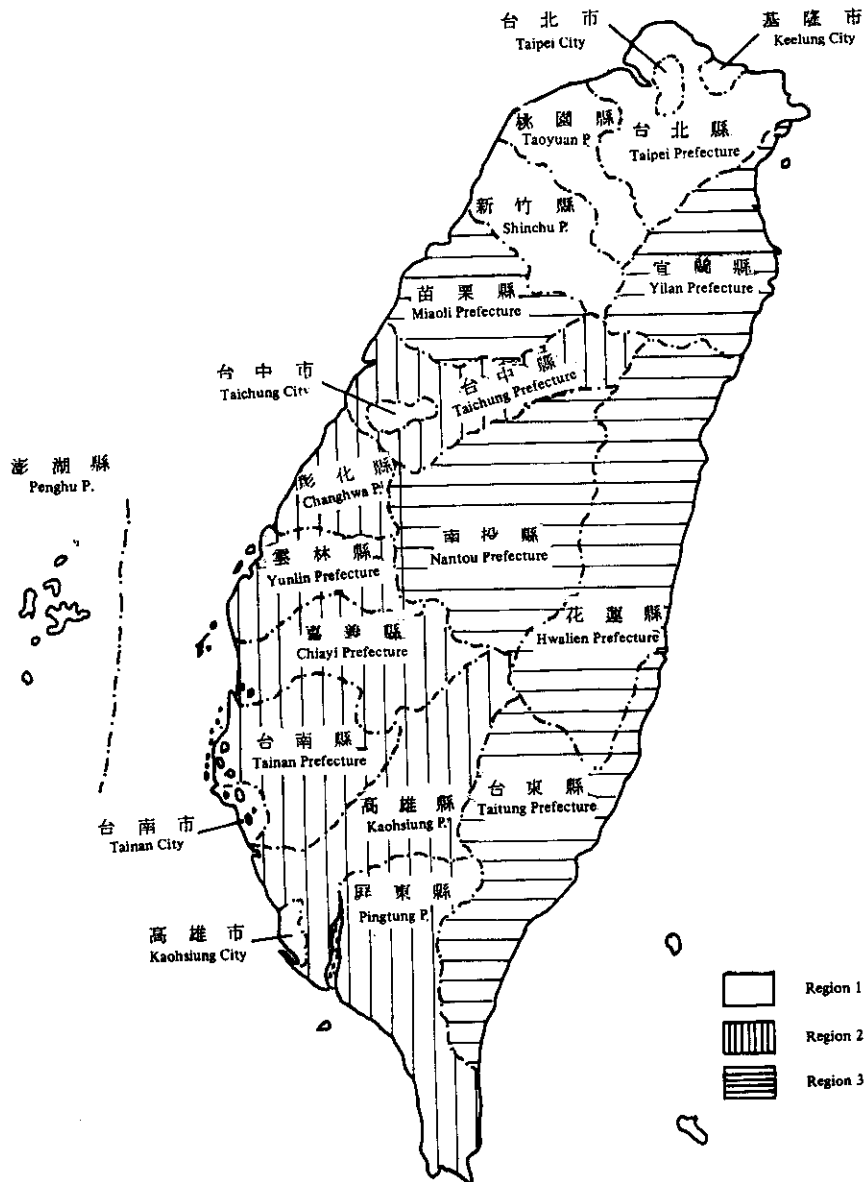
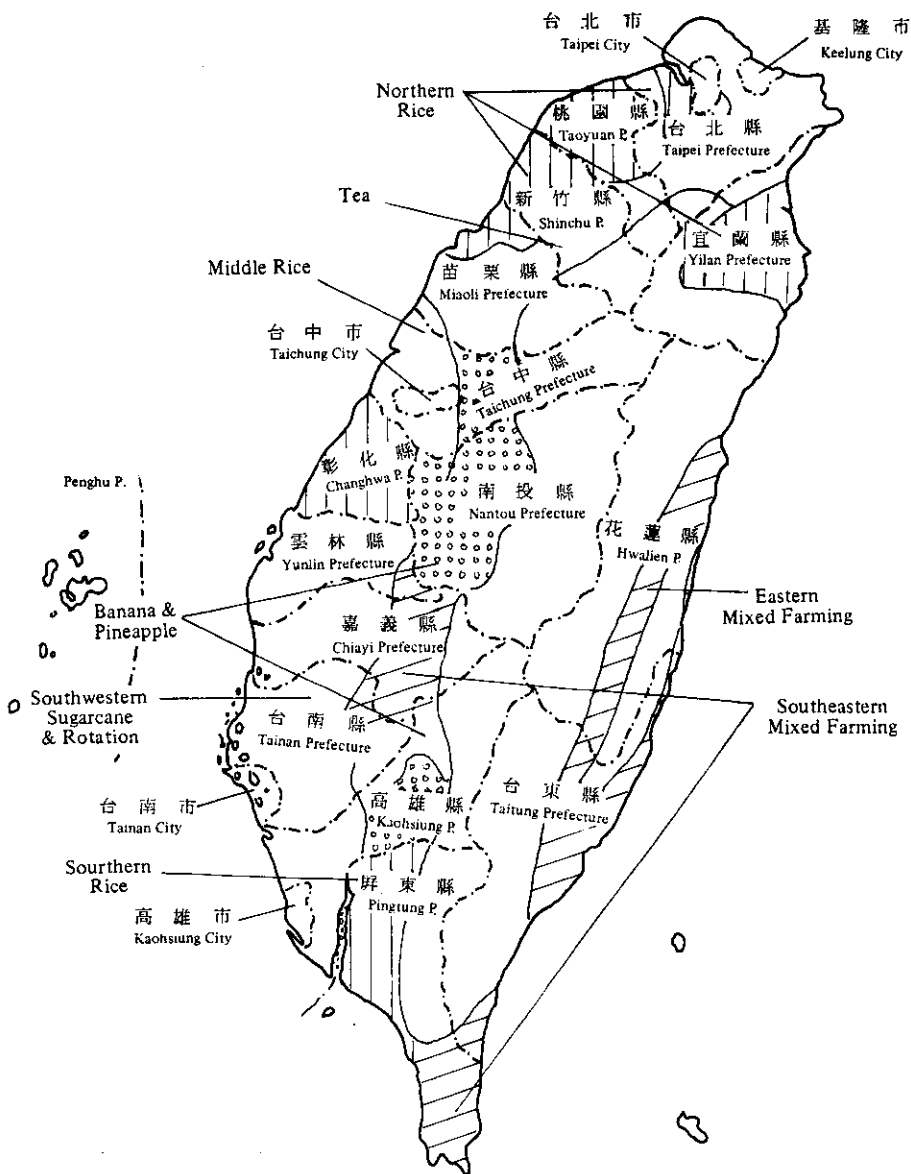


Figure 5. Map of Three Agricultural Financial Regions and the Corresponding Cropping System in Taiwan



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