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During the past two decades a good deal of attention has focused on the contributions of agriculture to economic growth. This mainly has included emphasis on involuntary methods of extracting capital from rural areas. Various forms of taxation have been widely discussed and used in this regard in many less developed countries. Only rarely, however, have policy makers considered methods of stimulating voluntary rural savings. This is due, in part, to the lack of research on this topic and to the stereotype applied to farm families in developing countries. This stereotype maintains that farmers in less developed countries are poor and have very high marginal propensities to consume.

Although the literature on aggregate saving-consumption behavior in the less developed countries is growing, only a handful of studies have investigated rural saving behavior, especially at the firm-household level. 1/ These few studies have not yet resolved the issue of whether or not substantial voluntary rural savings capacities exist. On the one hand some studies tend to support the stereotype; rural households were found to have very low average and marginal propensities to save out of income, and to have savings propensities substantially lower than urban households. 2/ On the other hand additional studies show evidence of high saving propensities in rural areas

with little or no observed differences between rural and urban savings behavior. 3/ There is also a lack of agreement on the major determinants of rural savings. It is not clear to what extent these conflicting results are due to behavioral differences among the groups studied, data limitations, or differences in policy environments.

In what follows we try to shed some light on the extent of rural savings as well as its determinants in Taiwan. We use temporal cross-sections of farm level data from 1960 to 1970. We go on to argue that stereotypes which depict rural households as poor savers may not be correct, and that substantial voluntary savings capacities may emerge in rural sectors with significant agricultural growth. We conclude that substantial voluntary savings can be generated in the rural sector with appropriate policies designed to mobilize savings through regular financial markets. 4/

In many respects Taiwan provides a unique opportunity for the study of rural savings behavior. During the past two decades its agricultural sector has experienced rapid economic growth. Overall agricultural output has increased at a rate in excess of 5 percent per annum since the early 1950's, while the value of agricultural exports has more than tripled. 5/ Unlike many countries, the benefits from this rapid growth have been relatively equitably spread, and various aspects of this development have been well documented. 6/ Taiwan is also one of the few developing countries which has substantial amounts of farm-household data suitable for a micro analysis of savings-consumption behavior. Furthermore, it is also one of only a handful of countries which has a financial market and associated policies which strongly encourage and facilitate voluntary savings.

Data Used in the Analysis

The micro data used in this study were collected by the Provincial Department of Agriculture and Forestry in Taiwan (PDAF) as part of a Farm Record-Keeping project. 7/ Data collection was started in 1953 by ten agricultural vocational schools. In 1960 the responsibility for the program was transferred to local Farmer's Associations and PDAF began closer supervision of the data collection and tabulation. Record-Keeping families were mainly located in the three major rice regions from 1960 through 1963. In 1964 the project was expanded to the five additional agricultural regions of Taiwan and the number of participants was doubled. A subsequent decline in the sample occurred, but a total of 404 farmers participated in the program in 1970 (Table 2).

As might be expected, farmers who voluntarily participate in the Record-Keeping project are not completely representative of all Taiwanese farmers. Some indication of how much they differ can be shown through comparison with the Farm Income Survey Data. These island-wide Surveys, carried out in 1952, 1957, 1962 and 1967, were designed to be representative of all Taiwanese farms. 8/ In Table 1 a comparison between Farm Record-Keeping and Farm Income Survey data for the two overlapping years 1962 and 1967 can be seen. As can be noted the Record-Keeping farms had somewhat more land than the average Taiwanese farm in both years. Family sizes, however, were roughly the same. Record-Keeping families reported substantially higher incomes than Farm Income Survey families. This may have been due in part to the fact that the Income Surveys were carried out through single interviews in which respondents tended to underestimate their true incomes. Record-Keeping

Table 1: Average Economic Conditions of Taiwan Record-Keeping Households and Farm Income Survey Households in 1962 and 1967

	1962		1967	
	Record-Keeping Project	Farm Income Survey	Record-Keeping Project	Farm Income Survey
Number of farms	223	1947	402	1640
Average Farm Land (hectares)	1.36	1.12	1.39	1.08
Average Family Size	8.90	8.58	8.29	8.30
Average Farm Family Disposable Income (NT$) a/	48,522	30,401	55,543	43,196
Average Farm Family Consumption Expenditures (NT$) a/	38,405	26,100	40,673	39,753
Average Propensity to Save	0.21	0.14	0.27	0.08

a/ Converted to 1970 prices using the general index of prices-received by farmers published by the Bureau of Accounting and Statistics, Provincial Government of Taiwan: 1962 = 79.3, 1967 = 93.5, and 1970 = 100.0
In 1970 NT$ 41.02 = U.S. $1.

Source: Computed from Joint Commission on Rural Reconstruction (JCRR), Taiwan Farm Income Survey of 1967, with a Brief Comparison with 1952, 1957 and 1962. (Taipei, Taiwan: JCRR, 1970); and Department of Agriculture and Forestry, Provincial Government of Taiwan (PDAF), Report of Farm Record-Keeping Families in Taiwan, 1962 and 1967 issues, (Nantou, Taiwan: PDAF, 1963 and 1968).

families on the average spent larger amounts on consumption in 1962 than did the Income Survey families, but there was little difference in 1967. The average propensities to consume for the Record-Keeping families in both years were substantially lower than for the Income Survey families.

Because of the relatively homogeneous nature of farms in Taiwan, the Farm Record-Keeping units probably come closer to representing the entire population than would similar accounts in other countries like the United States. Farm record data is probably the only source that allows analysis of the directions and the rates of change in key variables. This type of data also provides strong insights into structural changes which are occurring in rural areas.

Methodology

In this study savings capacities are estimated through consumption-income relationships. Savings are defined as total net farm family income (Y) minus household expenditures (C). To remove the effect of size-of-family, income and expenditure data were converted to per capita figures by dividing through by the number of residents living in the household (N). Initially, four functional forms were used in the analysis of the data: linear, quadratic, semi-log, and double log. Results from the linear and double log forms consistently gave the highest "F" ratios and smallest standard errors. Since both of these functional forms gave roughly the same statistical results only the coefficients for the linear form are presented in the following discussion. 2/ The linear form used was:

$$(C/N)_i = a_o + a_1 (Y/N)_i + u_i$$

where u = the residual term. This "per capita" function was estimated using ordinary least squares. Cross sectional data for eleven consecutive years (1960-1970) were analyzed. [10] The first column in Table 2 indicates the number of farm households included in each of the yearly cross sections.

Propensities to Save

Yearly figures for average per capita incomes and expenditures are also shown in Table 2. It is interesting to note that average per capita income of Farm Record-Keeping households increased in real terms by almost 50 percent over the 11 year period, a compounded rate of almost 4 percent per year. Household expenditures also increased substantially over the period, though at a slightly slower rate than did incomes. This resulted in a gradual increase in the average propensity to save (APS) over the 1960 to 1968 period. One cannot help being impressed by the very high APS's displayed by the Farm Record-Keeping households during the period under study. In the early 1960's households were saving roughly one-fifth of their incomes. In the 1964 through 1968 period rates of savings increased to roughly one-quarter of total income. The sharp down turn in APS in 1969 was, in part, due to very adverse weather which seriously affected agricultural production and incomes. Part of the decrease in APS in 1969 and 1970, however, may also have been caused by the flood of very attractive consumer goods which began entering rural markets in the mid-1960's. [11] The decline in the average saving rates may also have been due to lower rates of return to on-farm investments in the late 1960's which may have further discouraged household savings.

Table 2: Average and Marginal Propensities to Save Calculated from Taiwan Farm Record Keeping Data 1960-1970.

Year	Number of Households	$\frac{\bar{Y}}{N}$ (a)	$\frac{\bar{C}}{N}$ (a)	APS (b)	Estimated Coefficients (c) $\hat{a}_0$	$\hat{a}_1$	R^2	MPS (d)
		(1970 NT$)						
1960	95	4,609	3,784	.18	739.3	.623 (13.9)(d)	.675	.377
1961	207	5,358	4,364	.19	1219.8	.542 (21.0)	.683	.458
1962	233	5,731	4,504	.21	1355.7	.488 (18.8)	.616	.512
1963	227	5,750	4,421	.23	1675.6	.432 (16.2)	.487	.568
1964	535	5,691	4,346	.24	1364.7	.496 (30.6)	.638	.504
1965	501	6,151	4,702	.24	1013.6	.580 (29.3)	.632	.420
1966	430	6,711	4,840	.28	2426.0	.315 (17.4)	.415	.685
1967	402	6,784	5,136	.24	1372.6	.541 (22.0)	.548	.460
1968	416	7,122	5,140	.28	1850.9	.457 (23.6)	.573	.543
1969	411	6,388	5,645	.12	1433.4	.649 (20.9)	.517	.351
1970	404	6,778	5,409	.20	1813.0	.531 (21.1)	.526	.469

(a) $\bar{Y}$ equals average net farm family income. $\bar{C}$ equals average household expenditures, and N equals number of individuals residing in the household during the year. Current New Taiwanese dollar (NT$) figures were converted to 1970 prices using general index of prices-received-by-farmers published by the Bureau of Accounting and Statistics, Provincial Government of Taiwan 1960 = 81.0, 1965 = 89.2 and 1970 = 100.0.

(b) APS is the average propensities to save calculated at mean farm family income and household expenditure levels for each year $(1 - \bar{C}/\bar{Y})$.

(c) These are estimates of the linear "per capita" consumption function $(C/N)i = \hat{a}_0 + \hat{a}_1 (Y/N)i + Ui$

(d) MPS is the marginal propensity to save calculated at the arithmetic mean income and expenditure levels for each year $(1 - \hat{a}_1)$.

(e) Figures in brackets are "t" values for the "slope" coefficients. All coefficients are significant at the one percent level.

Information on the marginal savings behavior of households in the study is also given in Table 2. Estimates of the marginal propensities to save (MPS) throughout the 1960's were fairly high, ranging from one-third to two-thirds of marginal income. The rather substantial variability in MPS from year-to-year also illustrates the limitations of attempting to deduce savings behavior on the basis of data from a single cross section. Further, it is recognized that results from cross section data tend to generally show a higher MPS and a larger divergence between MPS and APS than results derived from time series information.

Other Determinants of Savings Capacities

Other studies in less developed countries have suggested that savings performance among households may vary considerably depending upon farm size (often used as a proxy for income) and by source of income. 12/ In order to investigate these factors the data for each year were disaggregated in two ways. First, the observations were grouped into three farm size categories: zero to one hectare, one to two hectares, and more than two hectares. A second classification was based on the ratio of income derived from on-farm agricultural activities to total farm-household income. Average and marginal propensities to save among these different sub-groups for the period 1960-1970 are presented in Table 3.

A review of the average propensities to save by farm size groups shows that APS's almost always increase with farm size. In part this reflects the favorable impact on savings of higher incomes associated with larger farm sizes. In a separate study of the same data Chin found a very close positive relationship between household income levels and APS's. 13/ The

Table 3: Average and Marginal Propensities to Save by Farm Size Groups and Income Source Groups, For Farm Record-Keeping Households (1960-1970)

Groups	Years										
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Average Propensities to Save a/											
By Farm Size											
0 - 1.0 Ha. b/	.15	.14	.16	.21	.17	.18	.19	.19	.23	.07	.13
1.1 - 2.0 Ha.	.16	.21	.22	.21	.25	.26	.28	.25	.27	.10	.23
2.0 + Ha.	.28	.19	.26	.30	.32	.30	.39	.29	.34	.19	.24
By Ratio of Farm Income to Total Household Income											
0 - .7	.09	.18	.24	.14	.16	.22	.22	.30	.23	.07	.14
.7 +	.19	.19	.21	.25	.26	.24	.30	.26	.29	.15	.24
Marginal Propensities to Save c/											
By Farm Size											
0 - 1.0 Ha.	.60	.42	.49	.68	.40	.46	.50	.46	.44	.48	.34
1.1 - 2.0 Ha.	.26	.45	.54	.49	.43	.40	.68	.45	.48	.40	.56
2.0 + Ha.	.78	.51	.50	.50	.61	.40	.77	.46	.63	.21	.46
By Ratio of Farm Income to Total Household Income											
0 - .7	.32	.53	.60	.34	.28	.36	.60	.27	.41	.15	.26
.7 +	.39	.45	.49	.59	.56	.45	.70	.56	.58	.52	.56

a/ Average propensity to save equals (1 minus household expenditures/household income)

b/ One hectare (Ha.) equals 2.47 acres

c/ Marginal propensity to save is calculated at the arithmetic mean income and expenditure levels for each year. As in Table 2, results are for a linear functional form.

generally higher APS's and MPS's among the larger farms also suggest that households with more farm land may have had more attractive on-farm investment alternatives for their savings than did smaller landowners. Additional savings may have been induced, therefore, by expected higher rates of return. A further point worth noting in Table 3 is the relatively high APS's and MPS's among households in the smallest farm size groups. Further, that the marginal savings behavior of households with small farms was not vastly different from households with larger land areas.

Also shown in Table 3 is a breakdown of APS's and MPS's by income source ratios. Households with the highest ratios received a larger part of their total income from on-farm agricultural activities than did households with low ratios. These APS's and MPS's are fairly consistent in showing better savings performance among high ratio households. These results tend to confirm Noda's findings in Japan, that households which are close to full time farming units tend to have better savings performance than do those households that derive a substantial part of their income from outside their own farming operation. 14/ As with the farm size situation, these income ratios may be associated with overall income levels of households as well as reflect entrepreneurial investment opportunities.

In addition to farm size and income ratios the households were also grouped by their 8 regional locations and by 2 household dependency ratios. 15/ Neither of these breakdowns shed additional light on savings behavior. 16/ Savings patterns in various geographic regions of Taiwan appear to be very similar. Likewise, there appeared to be little difference in savings performance between high and low dependency ratio households.

Conclusions and Implications

While the data reported on in this study may somewhat overstate average rural savings capacities other indicators reinforce the conclusion that very substantial savings occurred in rural Taiwan during the 1960's. The large increase in financial savings in rural areas, and the rapid increase in total on-farm assets are evidence of substantial savings. 17/ The well documented transfer of capital out of the agricultural sector, sharp increases in rural human capitalization, and widespread accumulation of consumer durables in rural areas lend further weight to the argument that a surprisingly large portion of Taiwan's rural product during the 1960's was voluntarily saved.

The households analyzed in this study suggest that aggressive savings behavior was present throughout the various farm size groups and among the very diverse agricultural regions in Taiwan. Surprisingly, the age composition of the farm families appeared to have little systematic relationship to savings performance. The lack of any systematic pattern in saving behavior as a function of the dependency ratio (a measure of the extent to which non-productive members of society affect savings) casts some doubt on the simple life-cycle hypothesis. More research needs to be done, however, before these findings can be fully substantiated. On the other hand, farm families which realized a very large part of their incomes from on-farm agricultural activities, saved at a higher rate than did families earning substantial amounts of off-farm income.

It might be argued that the large rural savings capacity found in Taiwan during the 1960's is a special case; that Taiwanese are somehow culturally endowed with large doses of frugality. We feel inherited behavioral

characteristics are not the major explanation of Taiwan's remarkable savings performance. We also do not feel that the substantial increases in rural incomes in Taiwan during the period under study make the Taiwan experience unique. Individual farm households and major agricultural regions in a number of other less developed countries also are realizing high rates of growth in incomes. We feel this very satisfactory voluntary savings performance is due to appropriate policies rather than unique behavioral characteristics. Household savings have been strongly stimulated by two sets of incentives. The first set includes price policies, new technology, marketing facilities, land tenure adjustments, and public investment programs which have created a very healthy environment for on-farm investments. Rural households have responded to these incentives by making large investments in land improvement, water control, farm machinery, buildings, animal inventories, and farm operating capital. The second set of savings incentives have flowed to farmers through financial markets. The physical presence of savings institutions in most rural areas (postal savings, farmers associations, and commercial banks) have given rural people the opportunity to save. These institutions provided the convenience, stability, liquidity, and security necessary to attract savings. Furthermore, Taiwanese policy makers have been very aggressive in using attractive interest rates on deposits to induce savings. Over the past two decades interest rates on deposits were adjusted, sometimes monthly, to assure positive real returns to financial savers. 18/

Aside from Korea, Japan and Taiwan, policy makers in most less developed countries have ignored the possibility of mobilizing voluntary financial

savings in rural areas. In a handful of countries half-hearted savings activities have been embellished with lottery schemes, tax concessions on interest receipts, deposit insurance, life insurance tied to amount of savings deposited, and compulsory savings programs. Some or all of these techniques can be useful in stimulating savings if tied to more fundamental elements of an aggressive savings mobilization effort. We feel these fundamental elements can be identified in the Taiwanese experience. In the short run the existing financial system must be positively oriented toward mobilization of rural savings. In addition, savers must be offered a substantial rate of return on deposits. Where financial facilities are absent local institutions must be developed to provide these financial services. In the longer run, particular attention must be paid to the profitability of farming. Serious attention must be given to policies which affect the rate of return to on-farm investments. This, in turn, will increase the incentives to save as well as expand the ability of rural households, through increased incomes, to participate in financial savings activities.

The Taiwan experience during the 1960's seriously challenges the low saving capacity stereotype which has been routinely applied to rural households. We feel that integrating a more realistic notion of rural saving behavior into economic planning should receive a high priority in the development profession.

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1/ Those readers interested in the general literature on consumption-savings studies in less developed countries may want to refer to Raymond F. Mikesell and James E. Zinser, "The Nature of the Savings Function in Developing Countries: A Survey of the Theoretical and Empirical Literature", The Journal of Economic Literature, Vol. XI, No. 1, March 1973, pp. 1-26. Also see U. Tun Wai, Financial Intermediation and National Savings in Developing Countries, (New York: Praeger, 1972).

2/ For example see, Allen C. Kelley and Jeffrey G. Williamson "Household Saving Behavior in the Developing Economies: The Indonesian Case", Economic Development and Cultural Change Vol. 16, No. 3, April 1968, pp. 385-403; and K. L. Gupta, "On Some Determinants of Rural and Urban Household Saving Behavior", Economic Record, Vol. 46, December 1970, pp. 578-583.

3/ Examples are: P.G.K. Panikar, Rural Savings in India (Bombay: Somaiya Publications, 1970); Toshiyuki Mizoguchi, "Consumption Functions and Savings Functions for Japanese Farmers' Families in Post-War Japan", Rural Economic Problems, Vol. 4, No. 1, December 1967, pp. 20-35; and R.A.J. Roberts, "The Role of Money in the Development of Farming in the Mumbwa and Katete Areas of Zambia", unpublished Ph.D. dissertation, Department of Agriculture and Horticulture, University of Nottingham, October, 1972.

4/ This line of thinking is amplified in Edward S. Shaw, Financial Deepening in Economic Development (New York: Oxford University Press, 1973) and Ronald I. McKinnon, Money and Capital in Economic Development (Washington D. C.: The Brookings Institution, 1973).

5/ Council for International Economic Cooperation and Development (CIECD), Taiwan Statistical Data Book 1971, (Taipei, Taiwan: CIECD, 1971) pp. 35-36.

6/ For examples see: Teng-Hui Lee, Intersectoral Capital Flows in the Economic Development of Taiwan 1895-1960 (Ithaca, New York: Cornell University Press, 1971); Anthony Y.C. Koo, The Role of Land Reform in Economic Development: A Case Study of Taiwan (New York; Praeger, 1968); T. H. Shen, The Sino-American Joint Commission on Rural Reconstruction (Ithaca, New York: Cornell University Press, 1970); and Kowie Chang (editor), Economic Development in Taiwan (Taipei, Taiwan: Cheng Chung Book Company, 1968).

7/ Further background on the data used in this study can be found in 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.

8/ These surveys were sponsored by the Joint Commission on Rural Reconstruction.

9/ The results of all four functional forms are presented in Ong previously cited.

10/ A large number of households participated in the Farm Record-Keeping project for more than just 1 year. See Ong previously cited p. 41 for more details.

11/ A slightly different argument is presented by Deborah S. Freedman, "The Role of the Consumption of Modern Durables in Economic Development", Economic Development and Cultural Change, Vol. 19, No. 1, October 1970, pp. 25-48. She argues that the availability of consumer durables in Taiwan provided households with additional incentives to save.

12/ For example see: H.S. Houthakker, "On Some Determinants of Savings in Developed and Under-developed Countries", in Problems in Economic Development edited by E.A.G. Robinson (London: MacMillan and Co., 1965) pp. 212-227; Kelley and Williamson previously cited; and Toshiyuki Mizoguchi, "Consumption Functions and Savings Functions for Japanese Farmers' Families in Post-War Japan", Rural Economic Problems, Vol. 4, No. 1, December 1967, pp. 20-35.

13/ Lien-In Amy Chin, "Changes in Rural Consumption Patterns in Taiwan 1960-1970", unpublished M.S. Thesis, Department of Agricultural Economics and Rural Sociology, The Ohio State University, 1973, p. 34.

14/ Tsutomu Noda, "Savings of Farm Households" in Agriculture and Economic Growth: Japan's Experience, Kazushi Ohkawa and others (editors) (Tokyo: University of Tokyo Press, 1970) pp. 352-373.

15/ The dependency ratios were calculated by summing the number of household members of less than 15 years in age and more than 60 years of age and dividing by the total number of household members.

16/ For the results of this analysis, see Ong previously cited pp. 80 and 82.

17/ See Chyau Tuan, "Determinants of Financial Savings in Taiwanese Farmer's Associations 1960-1970", unpublished Ph.D. dissertation, Department of Agricultural Economics and Rural Sociology, The Ohio State University 1973, p. 36.

18/ Tuan previously cited p. 26.