Savings Behavior of Rural Farm Households
A Case Study of Coastal Andhra Pradesh

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This paper examines the determinants of rural farm households' savings behavior in the coastal districts of Andhra Pradesh. This study divides the formulation of models into two groups: an analysis of household saving behavior mainly based on the formulations using the Absolute Income Hypothesis; and testing of the Permanent Income Hypothesis and Normal Wealth Hypothesis. The results show that among different farm size groups, the big farm households saved 81% of their transitory income, while the marginal farm households saved only 64% of their transitory income. The results indicate that there is no direct relationship between the size of the farm and the proportion of savings out of the transitory income. A comparison of the estimated results for the study area—of the developed West Godavari district, moderately developed Srikakulam district, and the developing Prakasam district—indicate that the normal wealth formulation is neither superior nor inferior to the current wealth formulation in terms of predicting the saving behavior of the households.

Introduction

The process of economic development depends upon the community's ability to save and invest. The progress of industrialization and economic modernization is closely related to the rapidity with which savings and investments are harnessed. The target of governments in developed countries is to sustain its growth rate, given the increased needs of growing population, whereas developing countries raise the standard of living of people. Since the World War II, while dealing with the developmental problems of the developing countries, economists have stressed on the need for increased savings to accelerate the rate of economic development. It is the high rate of capital formation that enables the developing countries to break the vicious circle of poverty Rugnar (1960).

In both, developed and developing countries, savings form the most crucial factor of economic growth. The process of economic development depends upon the communities' ability to save and invest. The studies of Rostow (1960) and Lewis (1961) clearly indicate

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the necessary rates of investment and relate these rates with rates of growth of population. The ability to sustain economic growth lies on its capacity to mobilize its domestic resources.

Review of Literature

Under the traditional view of saving, many economists quote the earlier works of Lewis (1961) and Rostow (1960) for their special emphasis on the importance of higher rate of saving in order to attain sustainable economic growth. In Tobin's (1957) model of money and economic growth, households allocate their wealth between money and productive capital assets. The higher is the return on capital relative to money, the larger is the ratio of capital to money in the household portfolios. According to the well-known Friedman Permanent Income Hypothesis, consumption does not depend on current income but rather on permanent income (Friedman, 1957).

The definition of Permanent Income used in any empirical study depends on available statistical information. Most of the time series studies of less developed countries are conducted with at most 15 or 20 annual observations. To maintain large degrees of freedom, a moving average of two to four years may be employed (Mikesell and Zinser, 1973). Williamson (1968) in his study of eight Asian Countries, derived significant estimates of Marginal Propensity to Save (MPS) out of Permanent Income of from 0.2 to 0.29, the range for MPS out of Transitory income was 0.37 to 0.73. Friend *et al*., (1966) in their study estimated the MPS for 22 countries to be 0.065 and 0.41 for MPS_p and MPS_T, respectively. Thus, both the studies support the permanent income hypothesis.

Leff and Sato (1975) estimated saving function by employing a simultaneous equation model for five developing countries—Brazil, Costa Rica, Israel, the Philippines, and Taiwan—using the data over the period 1952-69 and two Sequential Least Squares (SLS) estimation technique. For the countries, the parameters estimated for the saving is significant responsive to income growth.

Ramanathan (1971) improved the moving average approach in estimating the proxies for permanent income, by correcting "pseudo" proxies for number of earners within a group. These corrected proxies for permanent income by moving average approach in estimating the proxies for permanent income for differences in quantum of wealth and number of earners within a group. Yielded better results than cell mean approach. The gain in estimates is not overwhelming. However, he concludes that discounting alone was not sufficient for obtaining an estimate of permanent income by the moving average method but there is some gain in taking into account the differences within a group.

Firouz Vakil (1973) uses the mean income of broadly defined occupational groups as a proxy for permanent income. He provides estimates for several data sets of National Council of Applied Economic Research on savings. He concludes that the Indian data overwhelmingly support the loose version of the permanent-income theory, thereby rejecting the stricter version.

Roy Choudhury (1970), Gupta (1970), Chopra (1972), Krishnamurthy and Saibaba (1981) and Raj and Roy (1982) obtained the time series estimates of the propensity to save. These authors utilized the Reserve Bank of India (RBI) saving series data. They have studied different year periods, starting from 1952 to 1979. The Rural (agricultural) and Urban

(non-agricultural) household savings series have been obtained by using benchmark proportions. In these studies, the series are not based on the independent information, and hence, reliability of the marginal propensity to savings estimates is doubtful. The results of these studies, however, suggest that the propensity to save of the urban households is substantially higher than that of the rural households. The difference in the two propensities ranges between 0.2 and 0.5 ignoring the extreme values. However, the estimates of the propensity to save of the rural households are uniformly low (less than 0.05). Raj and Roy (1982) made similar studies for the periods 1952-63 and 1961-74.

Methodology

This empirical study is based on the data from primary survey conducted by Paramaiah from 478 sample households for the purpose of his PhD work. The Study was conducted in the coastal districts of Andhra Pradesh. A multistage stratified random sampling technique was adopted to select the sample. The coastal region of Andhra Pradesh is spread over nine districts and the level of agricultural development is not uniform due to the variations in natural and resource endowments.

To be able to categorize these districts for the study on the level of agricultural development, a composite index of development is computed. The parameters like percentage of food crops to gross cropped area, percentage of area under irrigation to gross cropped area, percentage of area under High Yielding Variety (HYV) crops to gross cropped area, cropping intensity, yield per hectare of principal crop (paddy), fertilizer consumption per hectare and percentage of population depending on non-agricultural sector are considered in this study. On the basis of scores given to each of the parameter a composite index is computed to measure the level of agricultural development of each of these districts.

The focus of this paper is to examine the determinants of household savings behavior of rural farm households in the coastal districts of Andhra Pradesh. The existing studies on the estimation of rural savings, savings behavior of rural households dealt mainly with the income, occupation and educational status of the households. However, there is a dearth of comprehensive studies to estimate savings and to examine the influence of determinants of the savings behavior of rural farm households under different levels of agricultural development. The formulation of the models has been divided into two methods. The first method deals with an analysis of household savings behavior mainly based on the formulations using Absolute Income hypothesis, while the second method deal with determinants of household savings behavior by testing Permanent Income Hypothesis and Normal Wealth Hypotheses.

Formulation of the Models

Saving is assumed to be an amorphous function.

$S = F (Y, W, YW - - - - - - - - - -)$

where, S = Gross saving;

Y = Gross income; and

W = Net worth at the beginning of the reference period.

The type of functional relationship (of the saving function) depends on the nature of the effects of different factors responsible for saving. Different alternative models have been formulated by taking the hypothesis involving income and wealth into consideration.

$$S = a_0 + a_1 Y + a_2 Y^2 + U$$

Or alternatively

$$S = a_0^{/} + a_1^{/} \log Y + U$$

Similarly, two alternative ways of examining the effect of wealth on saving have been suggested. They are:

$$S = a_3 W + a_4 WY + U \text{ and}$$

$$S = a_2^{/} W + a_2^{//} W \log Y + U$$

By combing the effects of income and wealth on saving, the following alternative models are formulated.

$$S = a_0 + a_1 Y + a_2 Y^2 + a_3 W + a_4 WY + U \quad ...(1)$$

$$S = b_0 + b_1 \log Y + b_2 W + b_3 W \log Y + U \quad ...(2)$$

Estimation Procedure

One of the assumptions underlying the general linear regression model is homoscedasticity, which means that the variance of the disturbance term is constant, i.e., $E(D_1^2) = \sigma^2$ for all *i*. While dealing with the cross-section data, some of the studies relating to the household savings behavior have assigned higher probability of inclusion to high-income households than the low-income households to ensure better representation of all types of households. If so, it is unlikely that this assumption is satisfied. In general, higher income households tend to have higher variance of the disturbance term *U*, thereby, violating the assumption of homoscedasticity. If we use the ordinary least square method in estimating the parameters ignoring heteroscedasticity the consequences are twofold. The estimates of regression parameters will be unbiased but inefficient, and the estimates of variances are biased.

There are two methods that are often suggested and used for tackling the problem of heteroscedasticity. They are:

1. Weighted least squares method and
2. Use of deflators.

A straightforward method to resolve heteroscedasticity is to apply weighted least squares method. In studies like the present one, weights are proportional to the inverse probability

of selecting the household into the sample. In case weights are not available, the method of deflation can be used. There are two ways often suggested and used, in using the method of deflation to tackle the problem of heteroscedasticity. One is transforming the variables into logarithmic form and the other is to deflate all the variables by some measure of size. The former method often does reduce the heteroscedasticity in the residual variances, though there are also other criteria by which one has to decide between the linear and the logarithmic forms.

Prais and Houthakker (1955) found in their analysis of family budgets that the residuals from the regression had variance increasing with household income. Klein and Morgan (1951) have also shown that the residuals about regression have variance increasing with current household income. In yet another study by Ramanathan (using NCAER data covering Delhi city), it was found that the standard deviations of residuals increased with current household income. A simple way of dealing with this heteroscedasticity problem is to assume that the error term U has a zero mean and standard deviation σy, where σ is constant and Y is current household income. If we also assume that the error terms for any two households are uncorrelated, the above assumptions are equivalent to using an Aitken model with a diagonal covariance matrix of disturbances.

The Aitken model, as is well-recognized, can be transformed into the standard linear model by finding a suitable transformation. Dividing the model (1) and (2) by current household income would transform the models into the standard linear models. In other words, specifying the saving-income ratio as dependent variable is consistent with the assumption of homoscedasticity. Using the saving-income ratio as the dependent variable has the additional advantage of providing estimates of parameters that are less likely to be dominated by extreme values on the assumption that an extremely large income, for example, is likely to be associated with extremely large positive saving.

Dividing the relations (1) and (2) by Y we get

$$S/Y = a_0(1/Y) + a_1 + a_2Y + a_3(W/Y) + a_4W + U_1/Y \quad ...(3)$$

$$S/Y = b_0(1/Y) + b_1(\log Y)/Y + b_2(W/Y) + b_3(W/Y)\log Y + U_2/Y \quad ...(4)$$

Since U_1/Y have constant variance by assumption, the estimates of the parameters may be obtained by using ordinary least squares. Multiplying the resulting estimates of the parameters in (3) and (4) by weighted mean income, we will get back the estimates of the parameters in (1) and (2). One should note that the constant and coefficient of $1/Y$ in relation (3) are the coefficients of Y and intercept in relation (1). Thus, the models can be estimated either by Weighted Least Squares (WLS) or by the Ordinary Least Squares (OLS) method after deflation as mentioned above.

Tobin has argued that the use of weights is not required for estimates of parameters of multivariate distributions. In another similar study, Klein and Morgan (1951) have obtained estimates of parameters of identical equations using both weighted and unweighted data. Their results suggest, for an American Survey of similar sample design, that the use of weights does not have much effect on estimates of the saving relation particularly when the saving-income ratio is specified as the dependent variable. For these reasons, only

unweighted estimates have been presented by Ramanathan (1971) in his study. However, weighted least squares method has been used to tackle heteroscedasticity, but, in the next section, both weighted and unweighted (assuming homoscedasticity) estimates are presented to show whether heteroscedasticity is really a serious problem in this study or not.

Empirical Findings

Examination for Heteroscedasticity

Before we examine the effects of various characteristics on saving, it may be interesting to look into the results of our models, when we estimate the parameters by ordinary least squares assuming homoscedasticity of disturbances. Model (1) has been estimated for developed West Godavari district, moderately developed Srikakulam district and developing Prakasam districts. Using both unweighted (ordinary) and weighted least squares; the estimated regression equations are as follows (Table 1):

Table 1: Empirical Findings

Study Area	
Unweighted Least Squares (OLS)	
Study Area	S = -24887.64 + 0.75Y + 0.1E-4Y^2 + 0.0016W – 0.1E-7WY, $\bar{R}^2$ = 0.87 (16.34*) (1.71) (3.23*) (5.87*)
West Godavari District	S = -29145.33 + 0.72Y + 0.6E-6Y^2 + 0.0041W – 0.6E-7WY, $\bar{R}^2$ = 0.87 (9.89*) (1.02*) (3.97*) (3.49*)
Srikakulam District	S = -26372.34 + 0.75Y + 0.6E-7Y^2 + 0.0018W – 0.6E-7WY, $\bar{R}^2$ = 0.81 (8.97*) (1.18) (2.97**) (2.31**)
Prakasam District	S = -204254.52 + 0.61Y + 0.1E-5Y^2 + 0.0024W – 0.1E-6WY, $\bar{R}^2$ = 0.78 (4.15*) (2.15***) (2.28**) (4.92*)
Weighted Least Squares (WLS)	
Study Area	S = -23887.64 + 0.71Y + 0.1E-4Y^2 + 0.0016W – 0.1E-7WY, $\bar{R}^2$ = 0.85 (18.84*) (2.31**) (3.92*) (6.93*)
West Godavari District	S = -19154.33 + 0.74Y + 0.6E-6Y^2 + 0.0047W – 0.6E-7WY, $\bar{R}^2$ = 0.89 (11.37*) (1.95***) (4.39*) (4.51*)
Srikakulam District	S = -25369.11 + 0.77Y + 0.6E-7Y^2 + 0.0018W – 0.6E-7WY, $\bar{R}^2$ = 0.81 (9.17*) (1.85***) (3.17*) (2.93**)
Prakasam District	S = -14618.49 + 0.52Y + 0.1E-5Y^2 + 0.0024W – 0.1E-6WY, $\bar{R}^2$ = 0.78 (5.13*) (2.12***) (3.28*) (5.12*)

Note: Figures in parentheses are the corresponding t-statistics. $\bar{R}^2$ is the coefficient of multiple determination of the fitted equation.

*** Indicates significance at the 10% level.

** Indicates significance at the 5% level.

* Indicates significance at the 1% level and 0.1E-5 = 0.1×10^{-5}

It is evident from the above results that the explanatory power ($\overline{R}^2$) of weighted and unweighted models is almost same and significant at 1% probability level. The signs of the regression coefficients are also same in both weighted and unweighted models. In addition, the regression coefficients have registered signs with *a priori* economic logic. The only difference between weighted and unweighted models is that *t*-values associated with different regression coefficients are higher in the weighted models as compared to the corresponding values of unweighted models.

Further, some of the regression coefficients, which are found to be not significant even at 10% probability level in unweighted models, are found to be significant at 5 to 10% probability levels in the weighted models. Basing on this, the weighted model is considered as superior to unweighted model. Klein and Morgan (1951) and Ramanathan (1971) had obtained similar results and they felt that this is a better way of confirming the presence of heteroscedasticity.

Even though we did not explicitly test for the proportionality of standard deviation of disturbances to income, we guess that it is so as suggested by *a priori* information and among different regression coefficients only income coefficients is significantly differing between OLS and WLS estimates. In this case, we assume $E(D_1^2) = \sigma^2 y^2$ and go ahead with deflationary method of estimation. However, the weighted least squares method has been adopted in this analysis, as the weights are available, to over come the problem of heteroscedasticity.

Permanent Income Hypothesis

This paper analyzes the savings behavior by examining the permanent income hypothesis. The permanent income hypothesis in its simplest version states that the saving is primarily a function of permanent income. Another proposition is added to this hypothesis, namely, that the marginal propensity to save is independent of the level of permanent income.

Model

If *Y** is permanent (or normal) income and (*Y*-*Y**) is transitory income, the saving relation may be specified as:

$$S = a_0 + a_1(Y - Y^*) + a_2 Y^* + U \quad \text{...(5)}$$

where,

$$Y = Y^* + (Y - Y^*)$$

It was suggested in the methodology that an alternative way of examining the effect of wealth (*W*) on saving may be written as:

$$S = a_3 W + a_4 WY + other\ factors \quad \text{...(6)}$$

By combining relations (4) and (5), the following model can be formulated.

$$S = a_0 + a_1(Y - Y^*) + a_2 Y^* + a_3 W + a_4 WY + U \quad \text{...(7)}$$

In the above model, information on *Y* (measured income) instead of (*Y*-*Y**) may be used for estimation purposes. Given the relation between measured income (*Y*) and permanent

income and transitory income variables, it is possible to get back the coefficients of (*Y-Y**) and *Y**. Thus the following model has been considered for estimation.

$$S = a_0 + a_1 Y + a_2 Y^* + a_3 W + a_4 WY + U \quad ...(8)$$

In the above equation (8), the coefficient of Y gives the value of Marginal Propensity to Save (MPS) out of transitory income and the sum of the coefficients of Y and Y* represents the Marginal Propensity to Save (MPS) out of permanent income.

Estimation Procedure

As permanent income is not directly observable, the main problem in estimating model (8) is thus to find a suitable proxy for permanent income. Milton Friedman defines permanent income as the mean present value of the current and future receipts. In order to compute permanent income, by using single year cross-section data, the cell mean method has been adopted for estimation purpose. In some studies, moving average method in addition to cell mean method is also used to compute permanent income, and they observed that both methods yielded similar results. Hence, only cell mean method has been used in this study to compute permanent income of the sample households.

Cell Mean Method

In the cell mean method, the households are divided by (size group x age) of the head of the household, and Y_{ij}, the mean income of the households belonging to the i^{th} size group and j^{th} age group is computed. It is the cell mean income, which is treated as a proxy for the permanent income of each household in that cell.

We call the above specified proxy for permanent income as "pseudo permanent income" and it is denoted by Y_s^*

To adjust for difference between the wealth and number of earners within each group, the following relation has been estimated:

$$Y - Y_s^* = \Pi_1 W + \Pi_2 (Ne - 1) + U$$

Then the permanent income variable "corrected" for wealth and number of earners Y_p^* is derived using the relation:

$$Y_p^* = Y_s^* + \Pi_1 W + \Pi_2 (Ne - 1)$$

Thus, two proxies for permanent income are obtained by this cell mean method namely, (1) pseudo permanent income, and (2) corrected pseudo permanent income.

Permanent and Transitory Income Effects

In the estimated model (8), information on *Y* instead of (*Y-Y**) is used. Given the relationship between measured income and permanent and transitory income variables, it is possible to get back the coefficients of (*Y-Y**) and *Y**. Consider the estimated model (8).

$$S = a_0 + a_1 Y + a_2 Y^* + a_3 W + a_4 WY + U \quad ...(8)$$

We may write $Y = Y^* + (Y - Y^*)$.

Substituting in the above model, we get

$$S = a_0 + a_1(Y^* + (Y - Y^*)) + a_2 Y^* + a_3 W + a_4 WY + U$$
$$= a_0 + a_1(Y - Y^*) + (a_1 + a_2) Y^* + a_3 W + a_4 WY + U \quad ..(9)$$

Model (9) is nothing but the theoretical model. In estimated model, the coefficient of Y gives the value of marginal propensity to save out of transitory income in the theoretical model. Sum of the coefficients of *Y* and *Y**, i.e., $(a_1 + a_2)$ of the estimated model represent the coefficient of permanent income variable of the theoretical model i.e., the marginal propensity to save out of permanent income.

Table 1 presents the estimates of model (8) incorporating "pseudo permanent income" variable for the study area, developed West Godavari district, moderately developed Srikakulam district and developing Prakasam districts respectively. Similarly, Table 2 presents the estimates of the coefficients as specified in model (9) incorporating proxies for permanent income variable corrected for differences in quantum of wealth and number of earners for study area, developed West Godavari district, moderately developed Srikakulam district and developing Prakasam districts respectively.

A comparison of the results of the estimated model (8) indicates the explanatory power of the model ($\bar{R}^2$) is almost same either with pseudo permanent income or corrected pseudo permanent income as one of the explanatory variables. The signs and magnitudes of the estimated coefficients in both of these models are almost equal. However, the *t*-values of the estimated coefficients in the model with corrected pseudo permanent income are higher as compared to those in the model with pseudo permanent income as explanatory variable. Hence, the results of the model incorporating corrected pseudo permanent income as independent variable is considered for the analysis.

Tables 2 and 3 reveal that the coefficients of the transitory components are positive and significant in the study area as well as all the districts and all the coefficients of transitory income are below unity. The results disapprove Milton Friedman's hypothesis that all the transitory income will be saved. The results indicate that in the study area the households have saved 75% of their transitory income. In the developed West Godavari district households have saved 79% of their transitory income. In moderately developed Srikakulam district 66% of their transitory income have been saved and in developing Prakasam district only 60% of their transitory income have been saved. The results also show a direct relationship between the level of development and the proportion of saving out of transitory income.

In the study area, among different farm size groups, the big farm households have saved 81% of their transitory income while in the marginal farm households have saved 64% of their transitory income. The results indicated in Table 3 shows that there is no direct relationship between the size of the farm and the proportion of saving out of the transitory income in the

Table 2: Estimated Saving Relation S = F (Y, Y_S^*, W, WY)

Farm Size	Constant	Y		Y_S^*		W		WY		$\bar{R}^2$	F
		Est.	t	Est.	t	Est.	t	Est.	t		
Study Area											
Marginal	-14330.37	0.63	4.94*	-0.119	2.76**	-0.0450	3.36*	0.00000066	2.56**	0.76	58.59
Small	-25973.52	0.75	7.60*	-0.057	3.35*	-0.0003	2.09***	-0.00000112	1.16	0.82	66.18
Medium	-28474.71	0.79	9.40*	-0.021	2.38**	-0.0095	4.43*	0.00000011	2.65**	0.85	125.80
Large	-46954.61	0.74	6.79*	-0.142	3.92*	0.0270	5.19*	-0.00000021	2.14***	0.82	40.76
Big	-49119.23	0.81	9.37*	-0.094	4.09*	0.0029	7.80*	0.00000001	2.35**	0.87	77.65
All Farms	-23212.97	0.75	28.76*	-0.031	3.17*	-0.0019	6.15*	-0.00000026	8.46*	0.85	674.59
West Godavari Distrcit											
Marginal	-9264.91	0.71	6.98*	-0.105	3.94*	-0.052	3.25*	0.0000008	3.59*	0.79	48.36
Small	-16110.27	0.76	9.01*	-0.054	5.92*	-0.012	3.16*	-0.000001	2.98**	0.84	36.18
Medium	-14985.16	0.79	11.92*	-0.018	3.68*	-0.011	4.16*	0.0000003	4.17*	0.85	41.32
Large	-36687.32	0.80	8.59*	-0.016	5.08*	0.028	7.01*	-0.0000003	3.25*	0.86	39.89
Big	-35652.85	0.82	12.01*	0.035	7.91*	0.007	8.21*	0.0000001	4.98*	0.91	41.72
All Farms	-20376.70	0.79	13.49*	-0.016	6.23*	0.002	6.29*	0.00000006	10.91*	0.91	409.42
Srikakulam District											
Marginal	-4172.948	0.66	4.09*	-0.15	2.95**	-0.031	3.00**	0.0000006	3.12**	0.73	27.01
Small	3021.19	0.61	4.59*	-0.17	3.28*	-0.077	0.52	0.0000013	2.31**	0.72	28.36
Medium	28348.94	0.69	5.88*	-0.32	3.27*	-0.019	0.70	0.0000037	2.47**	0.87	66.96
Large	19133.52	0.59	6.26*	-0.41	4.87*	-0.058	1.49	0.0000006	3.19*	0.76	25.13
Big	3704.57	0.75	7.31*	0.34	2.41**	-0.010	1.40	0.00000004	4.23*	0.80	21.82
All Farms	18007.14	0.65	11.19*	-0.17	2.43**	-0.002	0.73	-0.00000001	9.75*	0.81	245.89
Prakasam District											
Marginal	-23379.92	0.52	3.23*	0.04	3.25*	0.067	2.17**	-0.000015	3.18*	0.68	26.02
Small	18896.96	0.57	3.36*	-0.29	3.59*	-0.016	2.89**	0.000002	2.76**	0.78	25.19
Medium	42126.59	0.66	3.39*	-0.22	4.69*	0.066	1.98***	-0.000002	3.40*	0.83	21.18
Large	22891.02	0.60	3.21*	-0.40	6.43*	-0.067	2.83**	0.000002	4.69*	0.78	21.32
Big	15582.28	0.72	4.01*	-0.56	4.55*	-0.029	2.48**	0.000003	4.31*	0.79	20.26
All Farms	14143.33	0.59	12.30*	-0.12	5.59*	-0.024	3.79*	0.0000002	6.60*	0.75	118.31

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.

Table 3: Estimated Saving Relation S = F (Y, Y_p^*, W, WY)

Farm Size	Constant	Y		Y_p^*		W		WY		$\bar{R}^2$	F
		Est.	t	Est.	t	Est.	t	Est.	t		
Study Area											
Marginal	-14025.45	0.64	5.27*	-0.1370	4.25*	-0.04901	2.83**	6.46 E-07	3.71*	0.76	60.22
Small	-26200.51	0.75	7.93*	-0.0490	5.15*	-0.00014	3.21*	-2.50 E-07	2.89**	0.82	74.84
Medium	-28529.49	0.79	9.24*	-0.0096	3.17*	-0.00982	4.42*	6.12 E-08	4.73*	0.85	155.60
Large	-48189.85	0.75	7.92*	-0.0757	5.49*	0.02741	6.14*	-2.34 E-07	4.09*	0.82	46.19
Big	-49440.75	0.81	9.89*	-0.0782	6.91*	0.00395	7.97*	-2.33 E-08	5.34*	0.87	86.89
All Farms	-23689.76	0.75	29.93*	-0.0132	5.49*	-0.00182	6.46*	-2.57 E-09	10.74*	0.85	675.72
West Godavari District											
Marginal	-10303.72	0.73	7.11*	0.1226	4.82*	-0.05292	3.50*	7.68 E-07	4.92*	0.79	48.94
Small	-16494.86	0.76	9.35*	-0.0498	6.04*	-0.01133	3.64*	-5.02 E-08	3.17*	0.84	46.05
Medium	-15298.79	0.79	12.13*	-0.0112	4.01*	-0.0120	4.19*	2.53 E-07	4.76*	0.85	44.21
Large	-35078.07	0.81	9.23*	-0.0843	6.08*	0.0274	7.20*	-3.01 E-07	3.44*	0.86	43.72
Big	-35710.08	0.85	13.43*	0.0438	8.32*	0.0066	8.73*	1.49 E-06	5.37*	0.91	41.87
All Farms	-21131.35	0.79	15.53*	0.0316	7.66*	0.00157	7.84*	1.16 E-08	11.62*	0.91	411.31
Srikakulam District											
Marginal	-4732.12	0.67	4.65*	-0.1439	3.01**	-0.0281	3.28*	5.51 E-07	3.23*	0.73	28.74
Small	-2481.33	0.61	5.58*	-0.1628	3.52*	-0.0763	0.68	1.27 E-07	2.99**	0.72	31.04
Medium	-29494.34	0.69	6.85*	-0.0127	3.31*	-0.0183	0.67	2.66 E-07	3.44*	0.87	68.83
Large	14989.65	0.59	7.17*	-0.3522	4.98*	-0.0523	1.63	5.38 E-07	3.47*	0.76	26.48
Big	-5219.39	0.76	8.18*	-0.3299	2.61**	-0.0057	1.85*	3.39 E-07	4.85*	0.80	24.19
All Farms	-19192.46	0.66	12.99*	-0.1469	2.63**	0.0007	1.31	-1.29 E-08	9.95*	0.81	246.11
Prakasam District											
Marginal	-24562.79	0.53	3.37*	-0.1688	3.63*	0.06580	2.37**	-1.09 E-05	3.89*	0.68	26.34
Small	-24013.65	0.58	4.29*	-0.0462	3.69*	-0.01167	3.16*	6.55 E-05	3.15*	0.78	26.03
Medium	-42249.47	0.66	3.77*	-0.2047	5.04*	0.06596	2.97**	-2.11 E-04	4.42*	0.83	21.19
Large	-20120.46	0.60	4.09*	-0.4088	7.47*	-0.07389	3.90*	2.46 E-06	5.70*	0.78	21.33
Big	-6867.98	0.72	4.07*	-0.1700	5.16*	-0.02815	3.44*	3.82 E-07	5.33*	0.79	20.18
All Farms	-16333.99	0.60	13.01*	-0.0785	6.55*	-0.02664	4.89*	1.69 E-07	7.79*	0.75	118.27

* Significant at 1% level, ** Significant at 5% level.

study area. In the developed West Godavari district, among the different farm size groups, it is observed that the big farm households have been saved 85% of their transitory income whereas the marginal farm households have saved 73%, the small farm households have saved 76%, medium and large farm households have saved 79% and 81% of their transitory income respectively. The results also indicate that there is a direct relationship between the size of the farm and the proportion of saving out of the transitory income in the developed West Godavari district.

In the moderately developed Srikakulam district, among different farm size groups, the proportion of saving out of transitory income, as indicated by the coefficient associated with measured income ranges from 59% in large farms to 67% in big farms. The results further reveal that there is no definite relationship between the size of the farm and the proportion of saving out of the transitory income in the moderately developed Srikakulam district. In the Prakasam district, the proportion of saving out of transitory income is 60% and this is the highest in big farms (72%) and lowest in marginal farms (53%).

Normal Wealth Hypothesis

The normal wealth hypothesis assumes that each household has a "desired" level of wealth (we will use the term normal wealth). If the actual level of wealth is below the normal level, the household has an inducement to save. If the actual level of wealth is above the normal level, the household is likely to save less.

This may be formulated as

$$S = a_3 (W\text{-}W^*) + \textit{the effect of other variables} \quad ...(10)$$

Making use of normal wealth hypothesis, Ramanathan (1971) tested the interaction between (W-W^*) and current income (Y), this interaction hypothesis states that the speed with which the gap between the actual level of wealth and the normal level of wealth is reduced, depends on the current level of income.

This hypothesis may be examined by assuming that

$$\frac{\partial S}{\partial}(W - W^*) = a_3^{11} + a_4^{11} Y$$

In terms of saving relation, this would imply that

$$S = a_3^{11}(W - W^*) + a_4^{11}(W - W^*)Y + U \quad ...(11)$$

Model

By combining relations (1), (10) and (11) the model may be written as

$$S = b_0 + b_1(Y - Y^*) + b_2(Y^*) + b_3(W - W^*) + b_4(W - W^*)Y + U \quad ...(12)$$

In the above model, information on 'Y' instead of (Y-Y^*) may be used for estimation purpose. As mentioned earlier, given the relation between measured income and permanent income and transitory income variables, it is possible to get back the coefficients of (Y-Y^*) and Y^*. Thus the following model has been considered for estimation.

$$S = b_0 + b_1 Y + b_2 Y^* + b_3 (W - W^*) + b_4 (W - W^*) Y + U \quad \text{...(13)}$$

The difference between models (9) and (13) is that current wealth hypothesis in model (9) is replaced by normal wealth hypothesis yielding model (13).

Estimation Procedure

The main problem in estimating model (13) is to find suitable proxies for permanent income and normal wealth variables, which are not directly observable. The proxies for permanent income variable are estimated as specified in analysis. In a similar way, the proxies for normal wealth variable are estimated by using the cell mean method.

Cell Mean Method

In the cell mean method, households are divided by (size group x age) of the head of the household, and W_{ij}, the mean wealth of the households belonging to the i^{th} size group and j^{th} age group is computed. It is considered the cell mean wealth, which is treated as a proxy for the normal wealth of each household in that cell.

In this study, we considered the above mentioned proxy for normal wealth as "pseudo normal wealth" and which is denote by W_s^*.

In order to adjust for differences in the level of income and number of earners within each group, the following relation has been estimated.

$$W - W_s^* = \Pi_1 Y + \Pi_2 (Ne - 1) + U$$

Then the normal wealth variable "corrected" for differences in the level of income and number of earners W_p^* is derived using the relation.

$$W_p^* = W_s^* + \Pi_1 Y + \Pi_2 (Ne - 1)$$

Thus, two proxies for normal Wealth are obtained by this cell mean method namely, pseudo normal wealth, and corrected pseudo normal wealth.

Normal Wealth Effect

The impact of normal wealth effect on saving is analyzed by considering model (13) that incorporated corrected *Y** and *W** variables, as it was mentioned in the earlier sections, that correcting *Y** does yield better results compared to uncorrected *Y**. Table 3 presents the estimates of model (13) incorporating "Pseudo Permanent income" and Pseudo Normal Wealth" variables for study area, developed West Godavari district, moderately developed Srikakulam district and developing Prakasam districts respectively. Table 4 presents the estimates of model (13) incorporating Corrected Proxies for Permanent income and Normal Wealth variables for study area, developed West Godavari district, moderately developed Srikakulam district and developing Prakasam districts respectively.

Table 4: Estimated Saving Relation S = F (Y, Y_S^*, W-W$_S^*$, (W-W$_S^*$))Y

Farm Size	Constant	Y		Y_S^*		(W-W$_S^*$)		(W-W$_S^*$)Y		$\bar{R}^2$	F
		Est.	t	Est.	t	Est.	t	Est.	t		
Study Area											
Marginal	-17928.92	0.68	12.92*	-0.0210	3.70*	-0.0222	3.12**	-1.02 E-07	2.80**	0.75	57.43
Small	-23159.43	0.81	10.33*	-0.0115	5.96*	-0.0105	3.00**	-5.42 E-08	3.16*	0.85	43.98
Medium	-30940.37	0.81	17.84*	-0.0056	4.44*	-0.0104	3.63*	-6.15 E-08	3.80*	0.85	125.70
Large	-26242.35	0.71	10.32*	-0.0042	3.72*	-0.0076	5.62*	-8.06 E-08	3.74*	0.80	37.27
Big	-37685.41	0.80	11.27*	-0.0006	5.16*	-0.0019	7.51*	-6.17 E-09	5.04*	0.86	72.27
All Farms	-23216.74	0.76	37.04*	-0.0035	3.75*	-0.0036	12.45*	-3.68 E-09	5.20*	0.85	677.03
West Godavari District											
Marginal	-17928.92	0.68	18.92*	-0.015511	5.70*	-0.019272	3.42*	1.01 E-07	3.22*	0.75	57.43
Small	-12962.88	0.72	17.18*	-0.019977	3.71*	-0.019566	3.33*	1.03 E-07	3.31*	0.65	28.23
Medium	-33752.82	0.76	7.17*	-0.006755	3.31*	-0.008852	3.16*	1.99 E-07	3.41*	0.87	47.66
Large	-17539.42	0.82	6.96*	-0.005216	4.55*	0.001527	7.10*	-3.91 E-08	3.85*	0.85	33.33
Big	-58072.92	0.80	13.88*	-0.011391	5.11*	0.009327	4.54*	-7.13 E-10	4.03*	0.91	42.41
All Farms	-21397.35	0.78	14.65*	-0.003531	5.05*	0.0031264	10.84*	6.25 E-09	4.09*	0.90	404.42
Srikakulam District											
Marginal	-17818.23	0.58	8.05*	-0.018006	3.23*	-0.021458	3.50*	9.87 E-08	3.55*	0.77	29.19
Small	-17689.21	0.66	3.92*	-0.018807	0.96	0.000827	3.03**	-2.92 E-07	3.22*	0.70	24.39
Medium	-35509.52	0.65	14.27*	-0.007383	0.61	-0.008486	3.54*	2.20 E-08	3.10**	0.87	66.45
Large	-3855.41	0.71	6.27*	-0.03335	2.73**	-0.064141	4.29*	6.02 E-07	2.34**	0.74	28.81
Big	-7237.20	0.73	6.04*	-0.010783	1.73	-0.014382	3.93*	6.50 E-08	4.70*	0.79	26.49
All Farms	-1894.81	0.64	27.61*	-0.012607	5.33**	-0.005214	6.49*	1.95 E-08	3.81*	0.80	248.93
Prakasam District											
Marginal	-15879.22	0.51	8.02*	-0.00683	0.41	-0.016251	3.80*	3.04 E-07	3.91*	0.69	22.82
Small	-37253.86	0.60	2.61**	-0.04434	0.78	0.0245637	3.37*	-5.29 E-09	3.42*	0.72	25.97
Medium	-25360.73	0.66	1.53	-0.02215	0.47	-0.019273	5.19*	1.11 E-06	2.33**	0.83	18.139
Large	-25345.04	0.59	0.57	-0.00274	0.06	-0.103578	7.12*	3.95 E-06	3.44*	0.74	27.56
Big	-8703.86	0.76	0.26	-0.00345	0.09	-0.079878	8.84*	1.16 E-06	3.71*	0.73	25.35
All Farms	-17788.23	0.61	4.73*	-0.01505	2.00***	-0.29377	4.12*	2.34 E-07	6.91*	0.76	118.54

* Significant at 1% level, ** Significant at 5% level, *** Significant at 10% level.

Table 5: Estimated Saving Relation S = F (Y, Y_p^*, W-W_p^*, (W-W_p^*))Y)

Farm Size	Constant	Y		Y_p^*		(W-W_p^*)		(W-W_p^*)Y		$\bar{R}^2$	F
		Est.	t	Est.	t	Est.	t	Est.	t		
Study Area											
Marginal	-18577.48	0.70	13.03*	-0.012355	4.32*	-0.015008	3.65*	-7.79 E-08	3.91*	0.76	56.18
Small	-23265.43	0.82	11.25*	-0.014280	6.10*	-0.012958	3.02**	-1.34 E-08	3.29*	0.85	43.72
Medium	-20568.63	0.80	18.96*	-0.014873	4.28*	-0.000371	4.04*	-1.99 E-07	3.36*	0.87	144.20
Large	-50654.28	0.82	11.39*	-0.016457	3.83*	0.0003278	6.16*	-2.87 E-07	4.09*	0.82	51.53
Big	-55844.02	0.89	12.03*	-0.00673	6.50*	-0.001823	7.82*	-4.08 E-08	5.29*	0.87	81.52
All Farms	24754.29	0.78	39.62*	-0.002039	4.67*	-0.002081	12.39*	-9.15 E-09	5.96*	0.85	680.96
West Godavari District											
Marginal	-20488.30	0.77	17.56*	-0.013093	5.98*	-0.016300	3.11**	-9.32 E-08	3.36*	0.76	38.47
Small	-14844.31	0.76	13.93*	-0.016931	6.09*	-0.015254	3.22*	-4.16 E-08	2.39**	0.86	37.74
Medium	-32761.76	0.82	6.33*	-0.000376	5.03*	0.003358	4.65*	-9.17 E-08	2.69**	0.85	40.38
Large	39798.27	0.81	8.68*	-0.008177	4.96*	-0.011492	7.71*	-3.28 E-07	3.65*	0.88	36.76
Big	-26477.31	0.85	11.55*	-0.004573	6.39*	0.009856	4.65*	-3.98 E-08	4.65*	0.91	44.03
All Farms	-19422.64	0.78	22.63*	-0.001561	5.98*	0.0027316	11.60*	-1.54 E-08	4.48*	0.85	406.89
Srikakulam District											
Marginal	-17219.97	0.67	4.34*	-0.002505	3.56*	-0.000778	4.11*	-1.14 E-07	3.69*	0.76	32.31
Small	-14585.77	0.62	3.75*	-0.028897	4.02*	-0.014562	3.96*	-2.20 E-07	3.58*	0.76	24.18
Medium	-21218.38	0.67	3.15*	-0.016429	4.12*	-0.006477	3.59*	-2.17 E-07	4.10*	0.88	72.72
Large	-53219.77	0.60	4.99*	0.008729	4.95*	-0.000133	4.98*	-3.88 E-07	3.65*	0.78	26.07
Big	7370.15	0.79	4.85*	-0.027545	5.12*	-0.004096	3.99*	4.22 E-08	5.00*	0.79	16.16
All Farms	21210.46	0.67	31.79*	-0.010970	6.55*	-0.002637	6.85*	-4.20 E-09	3.91*	0.80	249.70
Prakasam District											
Marginal	-18257.59	0.56	9.65*	-0.0032	1.21	-0.066344	3.20*	-3.22 E-06	4.35*	0.66	28.88
Small	-31972.24	0.58	3.25*	-0.0287	1.03	-0.007837	0.12	-2.92 E-07	4.23*	0.69	55.26
Medium	-29762.25	0.66	2.22**	-0.0312	0.98	-0.017751	0.45	-6.81 E-07	3.39*	0.82	22.11
Large	-16721.38	0.61	1.23	-0.2913	0.68	-0.026484	1.21	-1.09 E-05	3.71*	0.80	20.64
Big	-9874.78	-0.71	1.31	-0.0219	0.91	-0.012714	0.48	-4.52 E-07	3.16*	0.77	20.19
All Farms	16388.06	0.62	5.94*	-0.0188	2.56**	-0.021042	4.08*	-7.55 E-08	7.28*	0.75	118.17

* Significant at 1% level, ** Significant at 5% level.

The normal wealth effect on household savings is analyzed by considering the model (13) that incorporated corrected *Y** and *W** variables. As already mentioned the correcting *Y** and W* does yield the better results when compared with the uncorrected *Y** and *W** variables. In the developed West Godavari district, the estimated coefficient of (*W*-*W**) is positive in the entire farm category and it is also significant at 1% level. If the value of the coefficient of (*W*-*W**) is negative, it indicates that normal wealth hypothesis are to be true. But in developed West Godavari district the coefficient of (*W*-*W**) is positive which indicates that even if households actual wealth is above the desired level, still the households are saving. This may imply that the households may be saving regularly and may continue to save because of habit even though their assets are well above the desired level.

It may be said that as per the study, in the developed West Godavari district, there is considerable evidence in support of Katona's habit formation hypothesis. However, Differences could be found when analysis is carried out at disaggregate level. The regression coefficient of the interaction variable (*W*-*W**) *Y* is negative and significant at probability levels ranging from 1 to 5%. This means that the speed with which the gap between current and normal levels of wealth is bridged, depends on current income. This is true irrespective of the classification used in approximating *Y** and *W**.

This paper provides substantial evidence in support of the normal wealth hypothesis in the moderately developed Srikakulam district. In all the farm size groups the coefficient of (*W*-*W**) is negative. The substantial support for the normal wealth hypothesis comes from the (Size group x Age) classification. The regression coefficient of both the normal wealth and interaction variables are highly significant. The interaction between (*W*-*W**) and *Y* is highly significant and it is positive in all the farm size groups in the Srikakulam district.

In the developing Prakasam district, the regression coefficient of (*w*-*w**) is positive in the case of large and big farms, which indicating that even if the actual wealth is above the desired level, still the households are saving. This may imply that the households may be saving regularly and may continue to save because of habit even though their assets are well above the desired level. The coefficient of the interaction variables (*W*-*W**) *Y* is negative and significance at 1% level in all the farm size groups in the developing Prakasam district.

Conclusion

The study shows that in the coastal Andhra Pradesh, among different farm size groups, the big farm households have saved 81% of their transitory income, while the marginal farm households have saved 64% of their transitory income. The results indicate that there is no direct relationship between the size of the farm and the proportion of savings out of the transitory income in the study area. A comparison of the estimated results in the study area—the developed West Godavari district, moderately developed Srikakulam district and developing Prakasam district—indicate that the normal wealth formulations is neither superior nor inferior to the current wealth formulation in terms of predicting saving behavior of the households. The predictive power of the both models as measured by two is almost the same. ❖

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