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RESEARCH NOTES

PATTERN OF ASSET ACCUMULATION IN RURAL INDIA

I

INTRODUCTION

With greater emphasis on rural development, the level of incomes of rural households is expected to go up. It is of considerable importance to know how much of this income is saved and invested in productive assets, in durable goods, and in financial assets. It is also of practical interest to know if the pattern of asset accumulation differs for different occupational groups. For this purpose, we require a suitable concept of asset elasticity which can be easily computed. In this study the asset elasticity for a particular asset type is defined as the ratio of the percentage change in the value of an asset of a specified type to the corresponding percentage in the total value of all types of assets held by an individual or household.

While accumulating assets, one generally compares the relative net returns (which may also include elements like social prestige, risk, etc., which cannot be easily be quantified) from one's intended portfolio. The tendency to accumulate assets in specific form will be higher or lower depending on their relative yields. Assets with higher yield are generally elastic with respect to total assets. Possibly, there are also such assets whose incremental size and value may diminish as total accumulation proceeds. These forms of assets may be regarded as inferior assets, to use the terminology of demand analysis. The elasticity of a particular asset may be low because its distribution is more even and/or its returns are low. Residential buildings in rural India, which are essential for dwelling but less productive in the sense that they do not fetch good rents, serve as a good example.

As total value of assets increases, asset holders do not necessarily increase their assets in different forms in the same ratio. The graph depicting the relationship between total assets and specific asset holding may be termed the 'asset accumulation curve' (AAC), which is quite analogous to the Engel curve employed in applied demand analysis. As different assets do not bring same returns, the inequality in different types of asset holding will naturally be different. The graph showing the cumulative share of a specific type of asset against cumulated proportions of asset holders may be called the 'specific asset concentration curve' (SACC), and the one showing cumulative shares of total assets against cumulative proportions of asset holders may be termed the 'total asset concentration curve' (TACC). These curves can be used for obtaining the asset elasticities.

The estimates of asset elasticity could be of considerable use in economic analysis and policy formulation. They provide an analytical description of the existing pattern of asset holding which, in turn, could be used to project the household asset formation, as economic development takes place. An

analysis of the asset distribution would at the same time show the degree of concentration in asset holdings of various types. Quantitative information of this kind can be used in designing appropriate fiscal policies, particularly in the developing countries with markedly uneven income and wealth distributions.

The existing few studies on rural asset holdings in India (1, 2, 3, 9, 10, 11) tend to emphasize the inter-regional and/or the inter-temporal aspects of asset distributions, but none of them attempted to estimate the asset elasticity. In this note which focuses mainly on the descriptive aspects of asset elasticities rather than their predictive aspects, an attempt has been made to provide elasticity estimates for a few important items of assets commonly held by rural households. Two sets of estimates are provided for the years 1961 and 1971, based on the Reserve Bank of India (RBI) data collected in their Rural Debt and Investment Surveys, using the method of concentration curves, first developed by Iyengar (5) for analysing the grouped data from the National Sample Surveys (NSS).

The sources of data used in this study are briefly described in section II. In section III the method of estimation and the underlying assumptions are indicated. Our main results are presented in section IV. An attempt has been made in section V to compare two sets of asset elasticities, one relating to 1961-62 and the other relating to 1971-72. A few concluding observations and limitations are given in section VI.

II

DATA USED IN THE STUDY

Though it is generally believed that asset holdings in India are extremely unevenly distributed, the available official statistics are too inadequate to undertake any scientific investigation of the changes in wealth distribution over time or space. One can, however, get a glimpse of the rural scene through three somewhat independent sources: (*a*) Records of wealth tax returns, (*b*) Data furnished by the NSS Organisation, and (*c*) Reserve Bank of India surveys on rural debt and investment. The information from (*a*) is not comprehensive and is extremely limited in coverage and scope, and, hence, does not permit any in-depth study of asset accumulation. Data thrown up by various surveys of NSS Organisation, though useful for certain purposes, are not directly useful for our present purposes, for it does not provide asset details in size classes of total assets. The RBI had conducted two major all-India rural surveys on households' debt and investment in 1961 and 1971, *viz.*, All India Rural Debt and Investment Survey (AIRDIS), 1961-62 and All India Debt and Investment Survey (AIDIS), 1971-72. We have used summary statistics available in these reports.

Information regarding asset holding is available for nine broad types, according to size of total asset holding: (1) land, (2) vacant space, (3) buildings, (4) livestock, (5) machinery, (6) durables, (7) shares, (8) deposits,

and (9) dues receivable. For each type of asset, the proportion of households reporting possession of the asset and the average value of particular asset are available in size classes of total assets. Similar information is also available for the following occupation groups: (1) cultivators, (2) agricultural labourers, (3) artisans, and (4) others.

III

THE METHOD OF ESTIMATION

Regression techniques (weighted or unweighted) have generally been employed by economic statisticians to estimate the elasticity parameter in time-series as well as in cross-section situations, often assuming linear logarithmic models which involve two or more variables. But the regression approach leads to biased estimates, even in large samples, when grouped mean data are used as variates. This bias tends to increase with the magnitude of the elasticity being estimated, as shown by Iyengar (6). As the available RBI data is in the form of grouped size distribution, the application of ordinary or weighted least squares method was considered inappropriate. Another major consideration against the least squares approach was that it is inapplicable when both the dependent and independent variables are actually 'estimates' subject to unknown margins of sampling and non-sampling errors. We have, instead, used a simple graphical device which is known to yield consistent estimates in certain realistic situations. This method assumes joint log-normality for the asset distribution which implies constancy for the asset elasticity. Both these assumptions can be tested empirically by adopting the double probit test, now extensively used in Engel curve analysis. Our method has been successfully employed in earlier studies on consumer expenditures (4, 5, 6, 7). The same is being extended to cover the variable elasticity cases also by Jain (1979) and others.

Under the assumption of log-normality, the AAC for a given asset type takes the familiar form

$$E(y|x) = A\,x^{\eta} \qquad \ldots\ldots \quad (1)$$

where y and x stand, respectively, for specific asset and total assets, A and η are parameters to be estimated, and E, the expectation symbol. The above relation can also be written in logarithmic form

$$\log y = \log A + \eta \log x + u \qquad \ldots\ldots \quad (2)$$

The error term 'u' is distributed as a normal variable with zero mean and constant variance. The asset elasticity is denoted by η, which is of immediate interest.

The SACC for a specific asset is given by

$$t_Q = t_p - \eta \qquad \ldots\ldots \quad (3)$$

and the TACC for total assets by

$$t_q = t_p - \lambda\eta \qquad \ldots\ldots \quad (4)$$

where t_Q, t_q, and t_p are, respectively, the standard normal variates corresponding to the cumulative proportions, Q, q, and p, defined as follows:

p=proportion of asset holders whose total assets do not exceed a variable limit, say, x_0;

q=proportion of community's total assets accruing to the above group of asset holders;

Q=proportion of community's assets of a specific type accruing to the same group of asset holders.

λ stands for the standard deviation of log x and is related to the Lorenz measure of inequality, L, through a simple relation

$$L = 2\,\phi\,(\lambda/\sqrt{2})-1 \qquad \ldots\ldots \qquad (5)$$

where ϕ is the cumulative distribution function of the standard normal variable, having zero mean and unit variance.

The asset elasticity is easily obtained by putting $p=\frac{1}{2}$ in relations (3) and (4) and dividing the standard normal abscissa of the corresponding Q by that of q. In symbols,

$$= t_{Q^*}/t_{q^*} \qquad \ldots\ldots \qquad (6)$$

where Q* and q* are the values of Q and q at $p=\frac{1}{2}$. The value of Q* and q* may be found out from the SACC and TACC curves, if they are readily available; otherwise, they could be obtained by simple interpolation. For a detailed derivation of (6) and other associated results, see Iyengar (5, 6).

IV

MAIN RESULTS

In this section we present the estimates of asset elasticities for five major items, namely, land, livestock, implements, buildings, and durables, which turn out to be the major forms of assets constituting 66 per cent, 6 per cent, 3 per cent, 18 per cent, and 5 per cent, respectively, of the total value of household assets in rural India. Taken together, they constitute about 98 per cent of total assets. Productive assets, *viz.*, land, livestock and implements, account for 75 per cent of total assets. However, in the case of agricultural labourers and artisans, the share of productive assets is hardly 30 per cent. Also, the degree of inequality in the distribution of productive assets is relatively greater than in the case of other assets. This is particularly pronounced in the case of agricultural labourers and artisans.

Pathak and others (11) found that the distribution of assets, both at national and State levels, is close to a highly skewed two-parameter log-normal distribution. They also found that the overall pattern of asset holding had not undergone any major changes during the sixties except for slight increments in the share of the top asset holders in a few States. Divatia (3) went further and observed that there was no systematic relationship between the degree of inequality and the level of assets held. We have also indepen-

dently tested the log-normality assumptions implied in equations (3) and (4) of the foregoing section, using a graphical approach and found that our assumptions are by and large valid.

Table I gives consistent estimates of elasticities for five major assets and for four classes of asset holders, using 1971 data.

TABLE I—ASSET ELASTICITIES OF MAJOR ASSETS: RURAL INDIA, 1971

Class of asset holders	Asset type				
	Land	Live-stock	Imple-ments	Build-ings	Dura-bles
Cultivators	1·1083	0·6709	1·1535	0·7992	0·7664
Agricultural labourers ..	2·2203	1·1400	0·8225	0·8970	0·6981
Artisans	1·9127	0·8906	1·8059	1·0254	0·7790
Others	1·6060	0·7745	0·8604	1·8885	0·6500
All households	1·1950	0·7489	1·0562	0·7397	0·6643

Land

The concept of elasticity for land requires careful interpretation, as total land available to a community in a region cannot be increased in the short run. So, whenever there is a rise in the level of asset holdings of a community, a positive land elasticity would only suggest that the price of land will go up, as the households tend to augment their land assets (or else, they may have to buy land outside their region). If the elasticity is greater than 'one', the rate of increase in the price of land would be greater than the rate of increase in total assets. However, a positive land elasticity need not necessarily imply an increase in the price of land products like foodgrains, as productivity of land also depends on other factors like technical progress. If, on the other hand, the rise in land productivity is lower than the asset elasticity of land, it may lead to a rise in the price of agricultural products.

For a given class of asset holders a positive land elasticity need not lead to any price rise, because land can be bought or sold through inter-class transfer of land.

The land elasticity turns out to be the lowest for the cultivator class, though it is greater than unity. The implication is that the cultivators consider it worthwhile to invest in land, if available. This has the effect of increasing the inequality of land holdings.

The high elasticity of land for agricultural labourers shows the extent of land hunger prevailing among them; for, this may be due to the fact that agricultural labourers already possess knowledge of cultivation but hardly any land. High land elasticity for artisans and others would imply that they might be willing to take up cultivation if an opportunity is provided.

Livestock

Livestock complements land. However, when mechanization of agriculture takes place, then machine becomes a substitute to livestock. As livestock is heterogeneous in nature, its analysis becomes very difficult. In dry areas, for instance, one would like to have more draft animals than milch animals, while in wet areas where draft animals are generally substituted by machines, preference would likely to be for milch animals. Even within a region the structure of livestock of a richer household is likely to differ significantly from that of a poorer household. A general policy should be to provide milch animals to those who have high asset elasticity with regard to livestock. Our analysis indicates that agricultural labourers deserve particular assistance to enable them to own milch animals.

Implements

As the value of assets increases the cultivators and artisans tend to adopt more advanced and efficient methods of production by adding costlier implements and machinery to their capital stock. This is borne out by our elasticity estimates as far as the cultivators and artisans are concerned. On the contrary, agricultural labourers possess hardly any land, and implements will be of little use to them. This is clearly reflected by the comparatively lower elasticity for implements.

The relatively lower elasticity for livestock as compared to implements for cultivators would appear to suggest that they would rather aim at increasing their earnings from land by using more of implements and machinery rather than by expanding their livestock. Agricultural labourers, on the other hand, would tend to rely more on livestock for increasing their total earnings. There is hardly any incentive or necessity for agricultural labourers to acquire more implements when they do not possess enough land.

Buildings

The elasticity for buildings is high for artisans while it is low for cultivators. This could be because most of the cultivators (more than 98 per cent) already possess their own buildings and hence, with an increase in their total assets they would normally invest only in minor additions like creating larger cattle sheds or storage facilities. Further, unlike in the urban areas, buildings do not yield high returns in the rural areas. In the case of artisans a large percentage of them do not own a house (14 per cent) and hence would aspire to have their own house whenever they get an opportunity. The low elasticity for agricultural labourers is indicative of their preference to have more land than to have a larger and better house.

Durables

Durables constitute 5 per cent of total assets. It reflects the standard of living of the people in general and their preference for present rather than future consumption. Here, complications may arise because this item can be treated

both as a consumer durable or as a productive asset depending upon the use to which it is put. For instance, a sewing machine when used to stitch clothes for household members is a consumer durable, but when it is used to stitch clothes for others for payment, then it is classified as a productive asset. This difficulty should be kept in view while interpreting the elasticity for household durables.

A high elasticity for consumer durables would seem to imply that asset formation of a productive nature may not be taking place, thereby hampering rural development. However, the observed elasticities do not warrant this conclusion.

V

AN INTER-TEMPORAL COMPARISON

It would be of interest to see if the asset elasticity is time-invariant. For this purpose, asset elasticities were computed for the 1961 data using the same method. We present in Table II the two sets of elasticities for six asset items, corresponding to two selected periods, *viz.*, 1961 and 1971.

TABLE II—ASSET ELASTICITIES: RURAL INDIA, 1961 AND 1971

Asset type	1961	1971
Immovables	1·0641	1·0509
Livestock	0·7498	0·7489
Machinery	0·9180	1·0562
Durables	0·7561	0·6643
Financial assets	0·7922	0·7710
Dues receivable	1·2171	1·0910

The 1971 estimates are about similar to the 1961 figures. However, in the case of machinery, the asset elasticity increased from 0.91 to 1.05 over the ten-year period under review. Perhaps this phenomenon could be attributed to higher degree of mechanization adopted by wealthier farmers and artisans for increasing their output.

Financial assets display a low elasticity as compared to immovables, machinery and cash dues. This is to be expected, because banking has not made any large-scale impact on the behaviour of asset holders in the rural areas. It is generally observed that the well-to-do farmers find it better to invest their surpluses in moneylending business rather than putting their money in bank deposits. It is not uncommon to find wealthy farmers investing their money in human capital and urban property at the expense of rural development. [See (12)].

VI

CONCLUDING REMARKS

Certain broad statements may be made regarding the behaviour of asset holders in rural India. In most cases, our analysis confirms the common sense view of the social scientists. In certain respects our conclusions, based on estimated asset elasticities, may help to bring out certain aspects of policy which are not so obvious.

Land is highly asset elastic for all segments of our rural population. Its value is likely to go up rapidly as economic development takes place. The prices of primary products of agriculture will also go up if the rise in productivity of land does not keep pace with the demand pressure. There is considerable hunger for land among agricultural labourers; they possess knowledge of land use, but no land of their own. Rural artisans show an innate urge to become cultivators, while cultivators exhibit high propensity to acquire complementary assets in the form of machinery and equipment. Agricultural labourers show stronger tendency to expand their livestock as a way of earning extra incomes. There is good scope to increase construction activities in our rural areas by providing financial assistance to the artisans directly instead of to the cultivators. A larger proportion of extra income will be absorbed by consumer durables when it accrues to the cultivators and artisans. Inter-temporal comparison of asset elasticities reveals that they have more or less remained unchanged.

The above statements may be used as starting hypotheses for a more rigorous study. Our conclusions are mainly exploratory and subject to serious limitations, both conceptual and statistical. The main weakness of our analysis is also the weakness of the secondary sources of data used. The definitional and statistical problems of measurement of assets, reference period, sample size, etc., present in the data limit the accuracy of our estimates. Apart from these limitations, our study used distributions of asset values in current prices, and as is well-known this creates serious difficulties for inter-temporal comparisons. Another limitation of our study is that it is confined to tangible assets only; intangible assets like human skills have been ignored.

Although the basic assumptions for using the method of concentration curves have been tested using a graphical approach, it is possible that slight mis-specification errors might have entered into our calculations. Our estimates are merely consistent and may not meet any other rigorous statistical requirements like unbiasedness, efficiency, sufficiency, and so on. For the same reason, it may not be correct to apply the usual tests of significance for judging the significance of our estimates.

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REFERENCES

1. V. A. Avadhani and (Kum.) S. Gopalakrishnan, "Indebtedness of Rural Artisan Households as at end-June 1971", *Reserve Bank of India Bulletin*, Vol. XXXII, No. 3, March 1978, pp. 184-208.
2. Sreelekha Basu, "Pattern of Asset Holdings in Rural India—A Study of Top Asset-Holders", *Economic and Political Weekly*, Vol. XI, No. 28, July 10, 1976, pp. 1034-1041.
3. V. V. Divatia, "Inequalities of Asset-Holdings in Rural Households", Paper presented to a Seminar on Distribution of Income, Consumption and Accumulation, Indian Association for Research in National Income and Wealth, Pachmari, January 28-30, 1975.
4. S. Indrakant and Hanumanthacharya, "Consumption Pattern in Rural and Urban Andhra Pradesh (1957-58 to 1967-68)", *Asian Economic Review*, Vol. XIX, Nos. 2 & 3, August-December 1977, pp. 154-170.
5. N. S. Iyengar, 'On a Method of Computing Engel Elasticities from Concentration Curves", *Econometrica*, Vol. 28, No. 4, October 1960, pp. 882-891.
6. N. S. Iyenger, "A Consistent Method of Estimating the Engel Curve from Ground Survey Data", *Econometrica*, Vol. 32, No. 4, October 1964, pp. 591-618.
7. N. S. Iyengar, 'Some Estimates of Engel Elasticities Based on National Sample Survey Data," *Journal of Royal Statistical Society*, Series A, Vol. 130, March 1967, pp. 84-101.
8. N. S. Iyengar "A Note on Elasticities of Asset Components in Rural India", Mimeo. Paper, Department of Economics, Columbia University, November 1978.
9. G. A. Kelkar and S. Subramanian, "Pattern of Assets of Rural Households, 1961-71", *Reserve Bank Staff Occasional Papers*, Vol. 2, No. 1, June 1977, pp. 1-57.
10. N. S. Krishna Murthy and S. Subramanian, "Financial Assets of Rural Households (as at the end of June 1971)", *Reserve Bank Staff Occasional Papers*, Vol. 2, No. 1, June 1977, pp. 84-135.
11. R. P. Pathak, K. R. Ganapathy and Y. U. K. Sarma, "Shifts in Pattern of Asset-Holdings of Rural Households, 1961-62 to 1971-72", *Economic and Political Weekly*, Vol. XII, No. 12, March 19, 1977, pp. 507-517.
12. Government of India: Draft Five-Year Plan, 1978-83, Planning Commission, New Delhi, 1977, pp. 11-12.
13. Reserve Bank of India: All India Debt and Investment Survey (1971-72)—Assets and Liabilities of Rural Households as on 30th June 1971, Vols. 1 and 2, Bombay, 1975.

GROWTH OF PRODUCTIVITY IN INDIAN AGRICULTURE: A COMMENT

I

In his article 'Growth of Productivity in Indian Agriculture', Dharm Narain concludes, "that the base period of the index of productivity being what it is, it imparts an asymmetry to the manner in which the interaction effects bear on the growth of productivity in the two periods and this asymmetry imparts an upward bias to the growth rate of productivity for the first period. We have thus shown that the substantive step-up in the growth rate for the 1960s and thereafter over that for the 1950s has been significantly larger than what the present index of productivity reveals".[1]

A close scrutiny of the facts with a little of mathematical manipulation in his index number would reveal that the above hypothesis is not correct.

The problem arises because of his argument that the direction and magnitude of the interaction effect between any two components is base-neutral while the direction of the pure components changes with a change in the base period. While advancing this argument Dharm Narain ignores the fact that by changing the origin, the weights associated with pure effects also change by as much as the magnitude of the interaction effect. This makes the total increase (or decline) remain the same. This is demonstrated below.

1. Dharm Narain, "Growth of Productivity in Indian Agriculture", *Indian Journal of Agricultural Economics*, Vol. XXXII, No. 1, January-March 1977, p. 32.