Earning Capacity, Efficiency and Poverty: A Study on Rural West Bengal and Orissa

Amita Majumder, Chiranjib Neogi
Indian Statistical Institute
And
Manisha Chakrabarty
Indian Institute of Management, Calcutta

Abstract

'Potential earning', a concept derived from human capital theory, can be interpreted as 'income frontier'. Given endowments (resources), the deviation of actual earning from the frontier gives a measure of 'deficiency in utilization of resources' (inefficiency). We estimate household level earning frontier functions for two eastern states of rural India, namely, West Bengal and Orissa using the nonparametric DEA method and examine the relationships among level of living, occupational status and efficiency obtained from the DEA analysis. We also examine the influence of social opportunities on frontier income and interpret the results in terms of policy implications.

Key words: Income frontier, DEA, Efficiency, Poverty

JEL classification number: C14, I38, O15

Corresponding author:

Amita Majumder
Economic Research Unit,
Indian Statistical Institute,
203 B.T. Road, Kolkata 700108
India
e-mail: amita@isical.ac.in

Earning Capacity, Efficiency and Poverty: A Study on Rural West Bengal and Orissa

Amita Majumder, Chiranjib Neogi
Indian Statistical Institute

And

Manisha Chakrabarty
Indian Institute of Management, Calcutta

1. Introduction

Enhancing individuals' capability to succeed in the labor market is a major objective of families and policy makers, which in recent years has assumed special urgency with respect to those with low earnings. According to the canonical model, earnings are determined by human capital, which consists of capacities to contribute to production, generically called skills (Bowles, Gintis and Osborne, 2001). Two other components that play a major role in determining earnings are "endowment" (commodities and assets) and "social opportunities".

The basis of the concept of potential earnings is the human capital theory, which borrows heavily from the neoclassical theories of investment and production (Smith, 1759, 1776; Mincer, 1958; Becker, 1964; Schultz, 1992). Investment in human capital in the form of schooling, work experience etc., translates into earned income. The analogy with the analysis of firms is now evident. In the analysis of firms, which are inherently heterogeneous, not all firms are able to extract the maximum possible output from a given bundle of inputs. The output loss from not being on the production frontier is called

inefficiency. Transferred to the labor market, the earnings frontier (potential earnings) describes the highest potential income associated with a given stock of human capital, endowment and social opportunities. All individuals are located either on or below this frontier. Individuals who translate their potential earnings into actual earnings enjoy a fully efficient position. In contrast, individuals who earn less than their potential earnings are suffering from some kind of "earning inefficiency". Thus, while the 'frontier' can be interpreted as 'earning capacity' (capability), the actual earning is the 'functioning'. In other words, 'actual earning' can be interpreted as realized attainment, given the resources (endowment (commodities and assets), individual capacity and social opportunities) [see Garfinkel and Haveman, 1977; Borooah, 2005]. The measure of 'inefficiency', given by the deviation of actual earning from the frontier, would give a measure of 'deficiency in utilization of resources'.

It is evident that some of the households are 'poor' in the sense that their income/Monthly Per Capita Expenditure (MPCE) is below the poverty line. But among these poor households there could be some, for whom even the 'frontiers' are below the poverty line. That is, even if they are fully efficient, given their stock of human capital and endowment, their potential incomes are below the poverty line. That means, without extraneous assistance (say in terms of 'social opportunities') these households cannot be possibly pulled out of poverty. This is an issue that we focus on in this paper. Households, whose frontiers are above the poverty line, come under the purview of the usual analysis of explaining efficiency in terms of variables relating to the social,

demographic and structural characteristics of households (e.g., Salas and Contreras, 2003; Bishop, Grodner and Liu, (2006); Bishop et. al, 2007; Oria and Kumbhakar, 2004).

We estimate household level earning frontier functions for two eastern states of India, namely, West Bengal and Orissa, for the rural sector only. We use the nonparametric Data Envelopment Analysis (DEA) method (Charnes, Cooper and Rhodes, 1978) for estimating the frontier and examine the relationships among level of living, occupational status and efficiency obtained from the DEA analysis. We also examine the extent to which district level infrastructural facilities explain the frontier income and try to interpret the results in terms of policy implications.

The plan of presentation is as follows: section 2 describes the estimation procedure used for the analysis; section 3 summarizes the data and results and finally, section 4 concludes the paper.

2. Estimation Procedure

The measurement of firm efficiency has been discussed at length by many authors like Farrell (1957), Fare, Grosskopf and Lovell (1994) and Lovell (1993). In parametric models, one specifies the functional form of the production frontier and estimates the parameters using inputs and output. An alternative procedure of estimating the frontier is using Data Envelopment Analysis (DEA), a non-parametric mathematical programming approach that computes ‘best practice’ efficient frontiers based on convex combinations of firms in the industry. In an output oriented DEA measure of efficiency the purpose is

to maximize the output level for a given level of the set of inputs. DEA involves the use of linear programming methods to construct a non-parametric piece-wise surface (or frontier) over data. One can calculate efficiency of a Decision Making Unit (DMU) in terms of how far it is from the frontier. This provides a nonparametric alternative to parametric frontier production function techniques, i.e., no functional specification of production technology is required [Charnes, Cooper and Rhodes (CCR) (1978), Banker, Charnes and Cooper (BCC) (1984)].

Here we focus on the output oriented *Debreu-Farrell* measure of technical efficiency in a single output and multiple inputs framework with households as DMUs, the income/MPCE of each household as output and household characteristics and other features and as inputs.

Consider the production possibility set:

$$T = \{(x, y): y \text{ can be earned from } x\}, \quad (1)$$

where x is an n-element explanatory inputs bundle and y is the output.

In an output-oriented analysis of technical efficiency, the objective is to produce the maximum output from a given quantity of inputs. The output oriented Debreu-Farrell radial measure of production efficiency is $= \frac{1}{\varphi^*}$, where ϕ^* is obtained from the optimal solution of the following Linear Programming model (n households, m inputs and one output):

$$\max \phi \text{ subject to}$$

$$\sum_{j=1}^{n} \lambda_j x_{ij} \leq x_{io} \qquad i = 1, \cdots, m$$

$$\sum_{j=1}^{n} \lambda_j y_j \geq \phi y_o$$

$$\sum_{j=1}^{n} \lambda_j = 1.$$

$$\lambda_j \geq 0$$

As mentioned earlier, in this study the income/MPCE of a household is considered as output and different characteristics (endowments) that affect the income of a household are considered as inputs of the corresponding household. The *income frontier* represents the optimum level of income of a household for a given set of the household's characteristics. Obviously, all households may not attain the optimum level of earnings and some lie below the frontier level. The difference between the actual income of a household and the corresponding point on the frontier arises basically due to inefficiency of the household. Given the efficiency measure ϕ^*, the frontier is calculated as $\frac{y}{\phi^*}$.

Having determined the frontier in terms of 'endowments' in the first stage, in the second stage we proceed in two directions. We have stated earlier that there could be some households for whom even the 'frontiers' are below the poverty line. So, *first,* we examine the relationship between frontier and 'social opportunity' (such as 'infrastructural facility') using a regression analysis. The underlying hypothesis is that irrespective of the efficiency level, increase in 'social opportunity' enhances the frontier. This regression of 'frontier' on 'infrastructural facility' would enable us to determine the threshold level of 'infrastructural facility' that is required for the frontier to lie above the

poverty line, which in turn may have important policy implications. Figure 1 illustrates the procedure of obtaining this threshold level. *Second,* we address the issue of determinants of efficiency/inefficiency for households whose frontiers lie above the poverty line and try to identify the causes of inefficiency.

3. Data and Results

The data for the analysis have been obtained from household level data (on consumer expenditure, household characteristics and employment status) collected through the employment-unemployment enquiry by the National Sample Survey Organization (NSSO) of India. The data relate to the 61st round (July 2004– June 2005) of NSS surveys. This study is based on data for two eastern states of India, namely, West Bengal and Orissa, for the rural sector only.

Monthly per capita expenditure (MPCE), a proxy for per capita income of household, has been taken to be the output for this study. Data on a sample of 2792 households (after adjusting for missing values) in rural West Bengal and 2365 households in rural Orissa have been used in this analysis. The variables relating to household characteristics that have been included as inputs are the following[1]:

1. Per capita land owned

[1] These variables have been arrived at through a preliminary Stochastic Frontier Analysis (SFA) using a loglinear specification. The variables have been made unidirectional in the sense that they have been transformed (wherever necessary) so that these may be interpreted as 'inputs' having positive effects on income.

2. Proportion of land cultivated (as a proportion to owned land)
3. Average education level of the household
4. Proportion of earners
5. Average duration of employment

$$\left(= 1 - \frac{\text{Total no. of months of unemployment within a year}}{12 \times \text{no. of earners}}\right)$$

6. (1-Dependency ratio), where Dependency ratio is the proportion of children (age <5 years) and aged (> 65 years) members

District level infrastructure index has been computed for both states using the following variables: proportion of villages having (i) educational facilities, (ii) medical facilities, (iii) drinking water facilities, (iv) post and telegraphs facilities, (v) communications facilities, (vi) banking facilities, (vii) credit society facilities, (viii) power supply and (ix) availability of newspaper/magazines. The variables have been normalized $\left(= \frac{x - x_{min}}{x_{max} - x_{min}}\right)$ and combined by taking a simple average of the normalized variables, thereby assigning equal weight to all the attributes of infrastructure. Clearly, higher the value of this variable, better are the infrastructural facilities of the district.

Monthly Per capita expenditure (MPCE) has been considered to be a measure of 'standard of living' and households have been classified into four groups based on PCE. The first group consists of households below the poverty line (Rs. 382.82 for West Bengal and Rs. 325.79 for Orissa) and the upper 20% households comprise the fourth group. The remaining households constitute the 'middle class'. The group above poverty

line to 60 percentile has been named ‘lower middle class’ and the group between 60 and 80 percentile has been named ‘upper middle class’. The first and fourth groups are called ‘poor’ and ‘rich’, respectively.

The data have also been classified by types of occupation. Six occupation groups have been formed according to the National Classification of Occupations (NCO), 1968. They are: (1) Professional, Technical, Administrative, Executive, Managerial, Clerical and related workers, (2) Sales workers, (3) Service workers, (4) Cultivators, Plantation labourers, Farmers other than cultivators, other farm workers and Fishermen and related workers, (5) Agricultural labourers, Forestry workers, Hunters and related workers, and finally, (6) Production and related workers, Transport Equipment operators and Labourers.

First, for each state we estimate the DEA income frontier and the corresponding efficiencies separately for each occupation group, as given endowments frontiers are expected to be occupation specific. However, once the efficiencies have been estimated, the analysis of efficiencies can be done on the pooled estimates.

Table 1 presents the descriptive statistics of efficiency by the MPCE groups. It is observed that for both West Bengal and Orissa the mean efficiencies are positively related with expenditure level.

Table 2 describes the percentage distribution of households by efficiency within each PCE class. It is observed that in the higher level of efficiency classes, for both states, the

percentage of households in the 'rich' group is higher compared to the other three lower expenditure groups. In both the 'poor' and the 'middle class' groups more than 85% of households have efficiency lower than 80%. In general, the 'middle class' does not show any marked improvement in efficiency compared to the 'poor' households. In the 'rich' group about 23% of households have the capacity of earning above 80% level, which is much higher compared to that of 'poor' and 'middle class' households. In other words, the rich households are more capable of utilizing their endowments.

The outcome of the results gives an interesting picture of 'middle class' characteristics as viewed by many authors (Banerjee and Duflo, 2008). It appears that the 'middle class' households are not proactive in increasing their efficiency level, which is marginally different from that of the 'poor' households. There are some inherent characteristics of the 'middle class' people for which they are less aspirant and remains in the 'middle class'. The 'middle class', much like the 'poor', does not have particularly good access to capital and does not run very different businesses than the poor. There is very little scope to increase productivity and efficiency from the small businesses and the lack of entrepreneurship makes them 'middle class'[2]. Figure 2 provides a graphical illustration of the distribution of households by efficiency and MPCE levels.

Tables 3(a)-(b) present the distribution of efficiency over types of occupation and MPCE class. The salient features that emerge from the table are: as in the previous case, within

[2] There is no doubt that many successful entrepreneurs may have come out of the middle class, but in general business is just a source of minor additional cash for them besides the income that comes from a steady job (Banerjee and Duflo, 2008).

the occupation groups the upper middle class and the rich have higher efficiency, exceptions being the occupation groups 'Professional, Technical, Administrative, Executive, Managerial, Clerical and related workers' and 'Service workers' for West Bengal and 'Sales workers' for Orissa.

We now look at the characteristics of the households whose frontiers are below the poverty line against the group whose frontiers are above the poverty line. Tables 4(a)-(b) present the mean values of the endowment variables. It may be mentioned that about 88% of the 50 households for West Bengal and 84% of the 110 households for Orissa, whose frontiers are below poverty line turn out to be efficient (that is, having efficiency score = 1). It is observed from the tables that except for the variable $\frac{Land\ cultivated}{Land\ owned}$, all values in the group with frontiers below the poverty line (Group 1) are lower compared to the corresponding values for the group with frontiers above the poverty line (Group 2) for both states. Hence, the former group is also poor in terms of endowments including 'land owned'. Therefore, given endowments and the fact that they are fully efficient, from the point of view of a policy planner, the only way to alleviate poverty for this group is external assistance, like infrastructural facilities. It is interesting to note that in West Bengal majority of these 50 households are concentrated in 5 districts (out of 17 districts) that have comparatively low values of the infrastructure index. For Orissa, this group has concentration in 10 districts (out of 30 districts).[3]

[3] For West Bengal these districts are Uttar Dinajpur, Purulia, Medinipur, Howrah and South 24 Parganas with an average infrastructure value of 0.457, the average for the other 12 districts being 0.543. For Orissa these districts are Mayurbhanj, Rayagada, Nabarangapur, Anugul, Nuapada, Koraput, Kandhamal, Sundargarh, Kendujhar and Kalahandi with an average infrastructure value of 0.408, the average for the other 20 districts being 0.540.

Defining an intercept dummy to distinguish between the two groups, a regression is run taking 'frontier' as the dependent variable and 'infrastructure index' as the explanatory variable as follows (no dummy variable has been introduced in the slope parameter, since infrastructure is assumed to have the same effect on both groups):

$frontier = \alpha + \beta * inf\ rastructure + \gamma * D + error$, where $D = 1$ for Group 2

=0 for Group 1.

Table 5 presents the results of this regression. Clearly, the coefficient of infrastructure turns out to be positive and highly significant. For the first group the threshold level $(= \frac{poverty\ \ line - \alpha}{\beta})$ of infrastructure index that is required for shifting the frontier above the poverty line is 0.964 for West Bengal and 0.731 for Orissa.[4] For Group 2, even at zero level of infrastructure, the estimated frontier is above the poverty line. This group consists of a large number of inefficient households and hence the issue here is improvement of efficiency.

In an attempt to explain efficiency, a regression, log linear in variables, is run with efficiency as the dependent variable, where the explanatory variables are: household size, dependency ratio $(= \frac{no.of\ children + aged\ persons}{household\ \ size})$, proportion of beneficiaries

[4] It may be pointed out that while none of the 17 districts of West Bengal has infrastructure index above the threshold level, in Orissa 3 out of 30 districts have infrastructure index above the threshold level.

($= \frac{no.of\ members\ receiving\ aids}{household\ \ size}$), and caste dummies. The results are presented in Table 6.

The figures in the table indicate that household size has a negative impact on efficiency in both states, with highly significant value in West Bengal. This means that with increase in household size the MPCE and hence the average efficiency falls. Dependency ratio and proportion of beneficiaries have positive impacts on efficiency in both states, although in Orissa the effects are non-significant. The positive impact of these two variables can be interpreted as follows.

(i) Given the number of dependents, if household size increases, the ratio falls and efficiency falls as a consequence of the effect of household size, as discussed earlier. If given the household size the number of dependents increase (and hence the ratio increases), the household total expenditure decreases (because one or more members become dependent) and, therefore, to remain at the same MPCE level efficiency has to increase.

(ii) The effect of fall in the proportion of beneficiaries as a result of increase in household size, given the number of beneficiaries, can be justified as in the previous case. If, given the household size, the number of beneficiaries increases, the household total income, and thereby, MPCE increases, resulting in increase in efficiency.

The impact of caste on efficiency is different for the two states. While in West Bengal the Scheduled Caste (SC) and Scheduled Tribe (ST) households have significantly higher level of efficiency than the households of other castes, in both West Bengal and Orissa households belonging to the Other Backward Class (OBC) have lower level of

efficiency than the households of other castes, but for Orissa the coefficient is significant.

4. Conclusions

This paper estimates an earning frontier function for rural West Bengal and Orissa using the DEA approach. Considering earnings (per capita expenditure) as output and different characteristics that affect the income of a household as inputs the *income frontier* of households and the corresponding efficiency levels have been estimated for different occupation groups. It is observed that the 'poor' and 'middle class' households have similar efficiency level, which is lower than that of the 'rich' households.

In an attempt to address the issue of alleviation of poverty, we look at the households whose maximum possible incomes lie below the poverty line, given their endowments. It turns out that to uplift this group to a level above the poverty line, external assistance, namely, improvement of infrastructural facilities is needed. For the other group, given infrastructure, the frontiers are already above the poverty line. Hence, these people need to improve their efficiencies to reach the frontier. However, since caste does play a role in determining efficiency, from policy perspective this is an important finding, as it identifies the aspects the policy planner needs to focus on.

References

- Banerjee, A. V. and Duflo, E. (2008): What is middle class about the middle classes around the world?, *Journal of Economic Perspectives*, 22(2), 3-28.
- Banker, R.D., Charnes, A. and W.W. Cooper (1984), Some models for estimating technical and scale inefficiencies in Data Envelopment Analysis, *Management Science*, 30, 1078-1092.
- Becker, Gary S. (1964,1993, 3rd ed.): *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Chicago, University of Chicago Press.
- Bishop, John A., Andrew Grodner and Haiyong Liu (2006): "Chinese Economic Reform and Labor Market Efficiency", Working Paper, Department of Economics, East Carolina University.
- Bishop, John A., Andrew Grodner and Haiyong Liu and Chiou, Jong-Rong (2007): Gender earnings differentials in Taiwan: A stochastic frontier approach, *Journal of Asian Economics*, 18(6), 934-945.
- Borooah, V. K. (2005): Caste, Inequality and Poverty in India, *Review of Development Economics*, 9, 399-414.
- Bowles, Samuel, Herbert Gintis and Melissa Osborne (2001): "The Determinants of Earnings: A Behavioral Approach", *Journal of Economic Literature*, Vol. 39, No. 4, 1137-1176.
- Charnes, A., W. Cooper and E., Rhodes (1978): "Measuring the efficiency of decision-making units", *European Journal of Operational Research*, Vol. 2, 429–444.
- Farrell, M.J. (1957), The Measurement of productive efficiency, Journal of the Royal Statistical Society Series, General, 120, 253-281.
- Färe, R., and C.A.K. Lovell (1978): "Measuring the Technical Efficiency of Production", Journal of Economic Theory, 19, 150-162
- Färe, R., Grosskopf, S. and Lovell, C. A. K. (1994), Production Frontiers, Cambridge University Press, Cambridge.

- Garfinkel, Erwin and Robert Haveman (1977): *Earnings Capacity, Poverty and Inequality*, Academic Press.
- Landeau, S. S. and D. Contrerus (2003): "Chilean Labor Market Efficiency: An Earnings Frontier Approach", *Estudios de Economia,* Vol. 30, No.1, 87-102.
- Lovell C.A.K. (1993): Production frontiers and productive efficiency in H. Fried, C.A.K Lovell, and S. Schmidt (eds.), *The measurement of productive efficiency: Techniques and Applications*, New York: Oxford University Press,3-67.
- Mincer, Jacob (1958): "Investment in Human Capital and Personal Income Distribution", *The Journal of Political Economy,* Vol. 66, 281-302.
- Orea, L. and Subal C. Kumbhakar (2004): "Efficiency measurement using a latent class stochastic frontier model", *Empirical Economics*, 29(1), 169-183.
- Ray, Subhas C. (2009): "Data Envelopment Analysis with Bootstrap: A beginner's Guide" in Arpita Dhar (ed.) *Themes on Quantitative Economics***,** Allied Publishers (forthcoming).
- Salas, S and D. Contreras (2003): "Chilean labour market efficiency: anearnings frontier approach', *Estudios de Economia*, 30(1), 87-102.
- Schultz, Theodore (1992): *The economic value of education. Studies into the economics of education*, Elgar Books, Aldershot.
- Smith, Adam (1759 [2002]): *The Theory of Moral Sentiments,* Cambridge University Press.
- Smith, Adam (1776 [1977]): *An Inquiry into the Nature and Causes of the Wealth of Nations,* University Of Chicago Press.

Table 1: Descriptive Statistics of Efficiency

MPCE Ranges	Number of Households	Minimum Efficiency	Maximum Efficiency	Mean Efficiency	Standard Deviation of Efficiency
West Bengal: Rural					
(1)	(2)	(3)	(4)	(5)	(6)
Below poverty line (Rs. 382.82) (Poor)	438	0.078	1.0	0.401	0.255
Poverty line to 60 percentile (Lower Middle class)	1237	0.113	1.0	0.434	0.248
60 percentile to 80 percentile (Upper Middle class)	559	0.135	1.0	0.440	0.230
80 percentile and above (Rich)	558	0.202	1.0	0.572	0.253
Orissa: Rural					
(1)	(2)	(3)	(4)	(5)	(6)
Below poverty line (Rs. 325.79) (Poor)	864	0.024	1.0	0.418	0.264
Poverty line to 60 percentile (Lower Middle class)	555	0.068	1.0	0.454	0.266
60 percentile to 80 percentile (Upper Middle class)	473	0.077	1.0	0.466	0.274
80 percentile and above (Rich)	473	0.102	1.0	0.543	0.281

Table 2: Percentage Distribution of Households by Efficiency within MPCE Class

Efficiency scores	Percentage of households in efficiency categories within MPCE class				Overall
	Poor	Lower Middle class	Upper Middle class	Rich	
West Bengal: Rural					
(1)	(2)	(3)	(4)	(5)	(6)
0-0.2	21.0	14.3	5.5	0.0	10.7
0.2-0.4	44.5	43.1	50.4	33.9	42.9
0.4-0.6	17.6	19.9	23.8	27.6	21.8
0.6-0.8	5.7	11.2	9.1	15.6	10.8
0.8-1.0	11.2	11.6	11.1	22.9	13.7
Total	100	100	100	100	100
Orissa: Rural					
(1)	(2)	(3)	(4)	(5)	(6)
0-0.2	20.9	18.7	17.1	9.3	17.3
0.2-0.4	36.9	29.2	34.5	29.4	33.1
0.4-0.6	22.8	25.2	20.1	23.7	23.0
0.6-0.8	6.8	13.9	11.4	14.4	10.9
0.8-1.0	12.5	13.0	16.9	23.3	15.6
Total	100	100	100	100	100

Table 3(a): Mean Efficiency by Occupation Group and MPCE Class: West Bengal

Occupation Group	PCE class				Overall
	Poor	Lower Middle class	Upper Middle class	Rich	
(1)	(2)	(3)	(4)	(5)	(6)
Professional, Technical, Administrative, Executive, Managerial, Clerical and related workers	0.355	0.416	0.402	0.580	0.482
Sales workers	0.412	0.360	0.431	0.487	0.408
Service workers	0.773	0.762	0.634	0.885	0.777
Cultivators, Plantation labourers, Farmers other than cultivators, other farm workers and Fishermen and related workers	0.316	0.338	0.350	0.502	0.371
Agricultural labourers, forestry workers, hunter related workers	0.465	0.613	0.739	0.953	0.584
Production and related workers, Transport Equipment operators and Labourers	0.450	0.500	0.635	0.780	0.555
Overall	0.401	0.434	0.440	0.572	0.458

Table 3(b): Mean Efficiency by Occupation Group and MPCE Class: Orissa

Occupation Group	PCE class				Overall
	Poor	Lower Middle class	Upper Middle class	Rich	
(1)	(2)	(3)	(4)	(5)	(6)
Professional, Technical, Administrative, Executive, Managerial, Clerical and related workers	0.450	0.442	0.482	0.622	0.539
Sales workers	0.457	0.426	0.427	0.508	0.456
Service workers	0.460	0.552	0.736	0.839	0.667
Cultivators, Plantation labourers, Farmers other than cultivators, other farm workers and Fishermen and related workers	0.325	0.328	0.343	0.414	0.349
Agricultural labourers, forestry workers, hunter related workers	0.526	0.662	0.800	0.934	0.620
Production and related workers, Transport Equipment operators and Labourers	0.425	0.539	0.588	0.705	0.520
Overall	0.450	0.442	0.482	0.622	0.539

Table 4(a): Mean values of Infrastructure Index and Endowments: West Bengal

	Households with frontier value below poverty line (Rs. 382.82)	Households with frontier value above poverty line
(1)	(2)	(3)
Per capita land owned	0.029	0.133
$\frac{\text{Land cultivated}}{\text{Landowned}}$	3.881	2.724
Average education	2.551	4.907
Proportion of earners	0.266	0.365
Average duration of employment	0.803	0.904
Total Number of households	50	2742

Table 4(b): Mean values of Infrastructure Index and Endowments: Orissa

	Households with frontier value below poverty line (Rs. 325.79)	Households with frontier value above poverty line
(1)	(2)	(3)
Per capita land owned	0.062	0.224
$\frac{\text{Land cultivated}}{\text{Landowned}}$	7.737	5.897
Average education	2.123	4.241
Proportion of earners	0.307	0.442
Average duration of employment	0.771	0.893
Total Number of households	110	2255

Table 5: Results of regression of 'frontier' on infrastructure index: West Bengal and Orissa

Parameters	West Bengal	Orissa
(1)	(2)	(3)
Intercept (Group1) (α)	243.13	97.23
Intercept (Group 2) $(\alpha+\gamma)$	1698.63	1175.13
Slope (Coefficient of Infrastructure index) (β)	144.86 (2.24)**	312.20 (2.59)
Adjusted R Square	0.043	0.057
Threshold value of infrastructure index*	**0.964**	**0.731**

* Calculated as $\frac{poverty\ line - int ercept\ (Group\ 1)}{slope}$

****** Figures in parentheses are the t-ratios.

Table 6: Results of regression explaining 'efficiency'

Parameters	West Bengal	Orissa
(1)	(2)	(3)
(Constant)	-0.079	-0.651
Household Size	-0.297 (-4.74)**	-0.128 (-1.75)
Dependency Ratio	0.164 (3.32)	0.013 (0.22)
Proportion of Beneficiary	0.095 (2.27)	0.039 (0.79)
SC/ST	0.121 (2.75)	-0.020 (-0.26)
OBC	-0.076 (-1.01)	-0.153 (-1.95)
Adjusted R square	0.14	0.02

****** Figures in parentheses are the t-ratios.

Figure 1

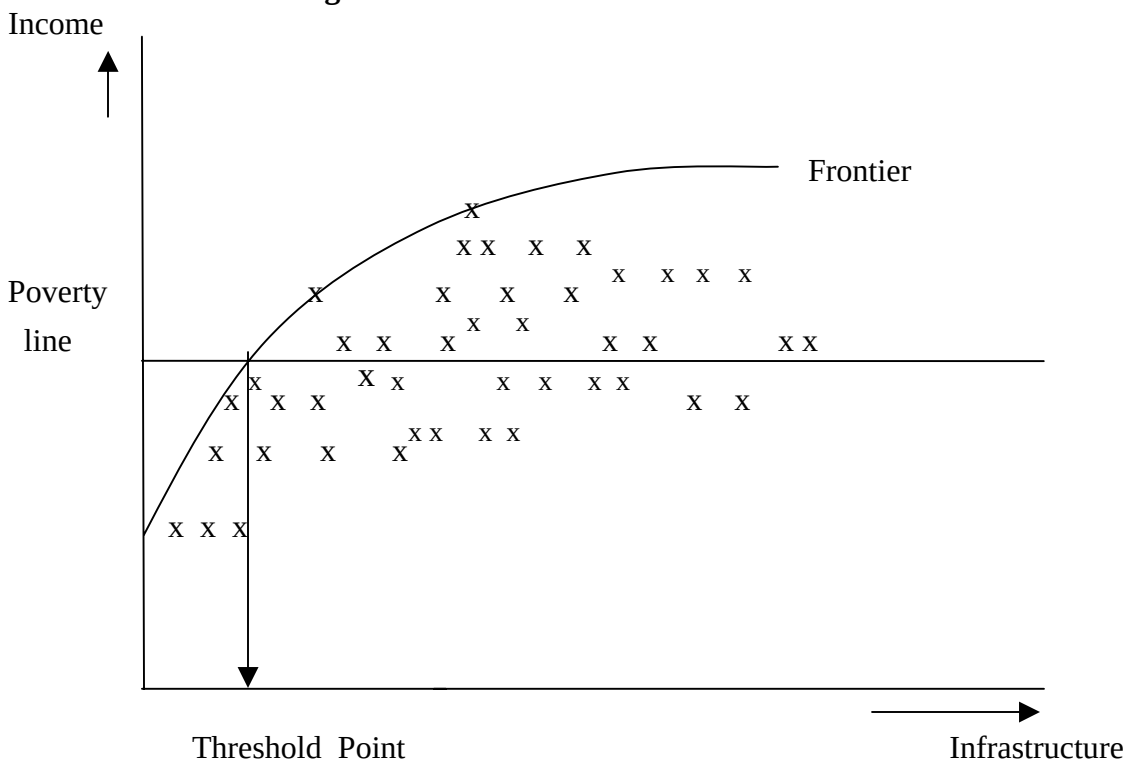
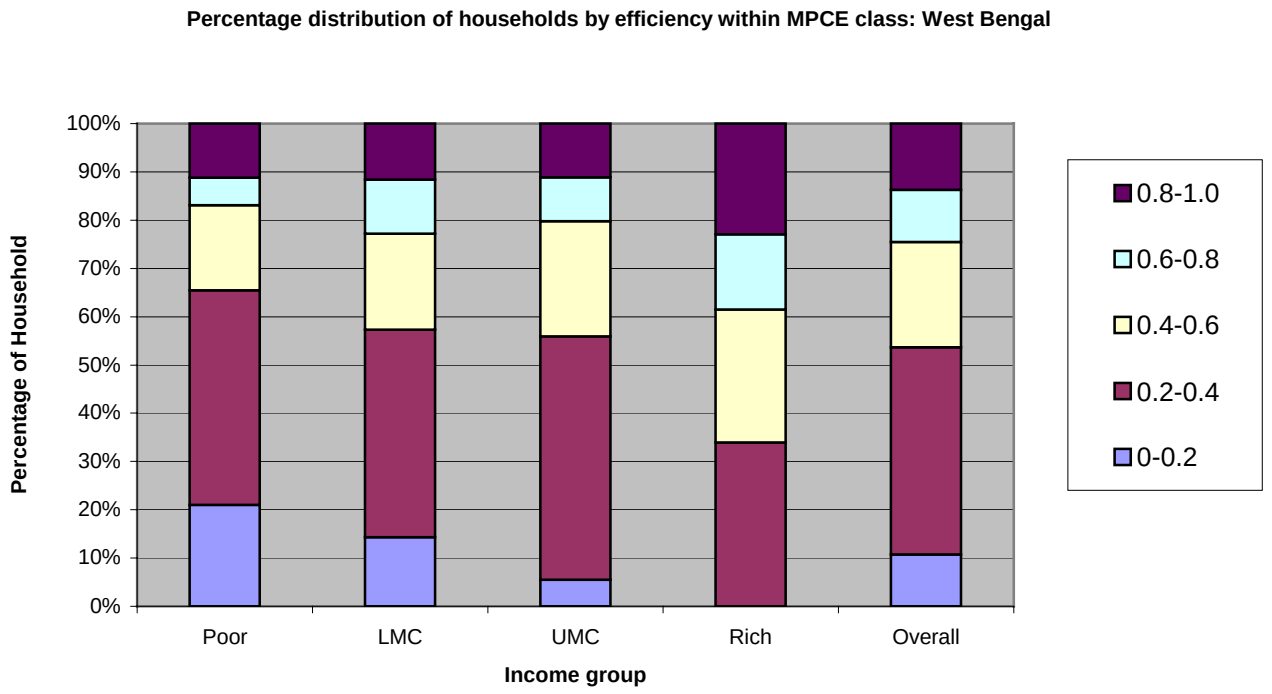
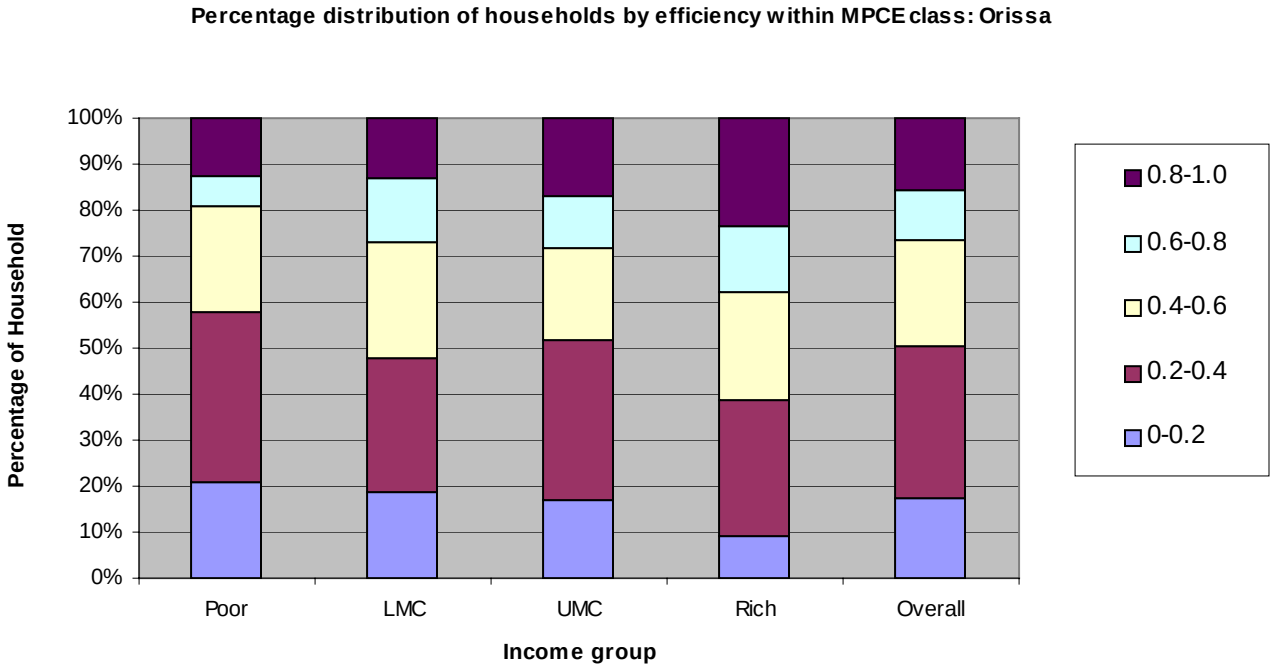

Income
Frontier
Poverty
line
Threshold Point
Infrastructure

Figure 2


Percentage distribution of households by efficiency within MPCE class: West Bengal
Percentage of Household
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Poor
LMC
UMC
Rich
Overall
Income group
0.8-1.0
0.6-0.8
0.4-0.6
0.2-0.4
0-0.2


Percentage distribution of households by efficiency within MPCE class: Orissa
Percentage of Household
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Poor
LMC
UMC
Rich
Overall
Income group
0.8-1.0
0.6-0.8
0.4-0.6
0.2-0.4
0-0.2