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Household's access to and affordability of Electrcity during Reforms: A comparative study of Orissa and West Bengal

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HOUSEHOLD'S ACCESS TO AND AFFORDABILITY OF ELECTRICITY DURING REFORMS: A COMPARATIVE STUDY OF ORISSA AND WEST BENGAL

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Abstract: *Using India's National Sample Survey data on consumption expenditure by households this paper examines how access to affordability of electricity services have fared under power sector reform programme that was pursued in the of State Orissa (India). To draw a comparative picture of Orissa with a state which did not follow the path of World Bank inspired restructuring of the power sector we use similar data for West Bengal (a proximate State to Orissa). Paper finds that increment in the access to electricity for the bottom 60 percent of the population has remained almost stagnant and the burden of electricity expenditure on the poor households has increased significantly. Compared to west Bengal much larger increase in the expenditure on electricity in Orissa by households having access to electricity clearly signifies that electricity reforms have led to considerable loss in the in consumers' welfare. Paper uses concentration ratio method to elicit findings.*

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1 Introduction

This paper intends to discuss how the access to and affordability of electricity by households belonging to different socio-economic status in Orissa have fared during the reform process. Orissa was one of the first states to bring in compressive reforms in the power sector. Here we compare Orissa with West Bengal because West Bengal did not introduce reform. After the reform various studies have come up but none of them have tried to see the impact of power sector reforms in such objective manner. After the initiation of the reform there has been significant increase in the tariffs of electricity.

The three important exogenous channels through which the cost of supply of electricity has experienced manifold increase in Orissa are

- increase in the rate of return that utility can earn, from 3 percent to 16 per cent
- artificial revaluation of assets of power sector by two times and
- Withdrawal of subsidy by the government.

These changes presumably have led to tariff hikes that have considerably affected the access to and affordability of electricity to households. It was thought that efficiency gains in the operation after initiation of reform would offset such increase in costs. But this did not materialised as there were some endogenous factor within the reform model itself which led to increased cost of supply of power. The reform model was unable to target the serious ailments of the power sector in Orissa (Siddiqui 2005). The complex web of perverse incentives that existed in pre-reform era is still intact. Because of this, the generic problem of the power sector that is high transmission and distribution losses and low cash collection efficiency by the utility still persists (Siddiqui 2004 chapter 4 and 5).

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2. What is a power sector reform?

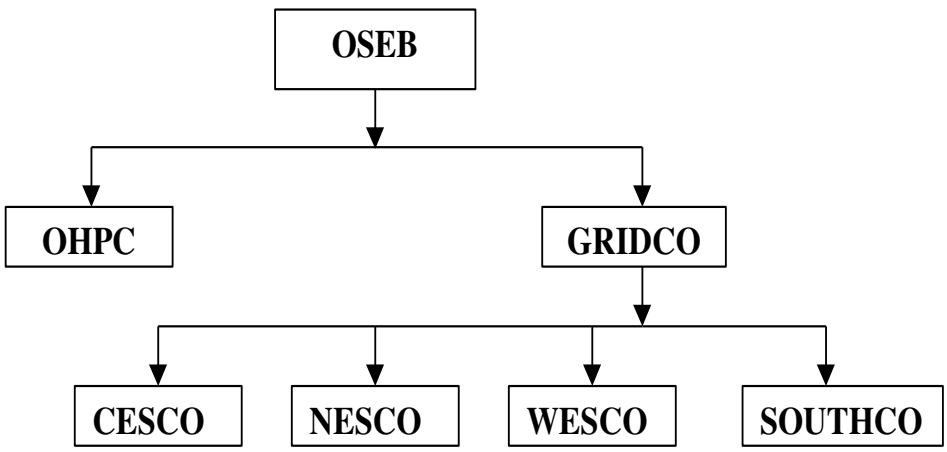
Power sector reforms in developing with initially having vertically integrated structure generally denotes three things

1. The **deintegration** of publicly owned vertically integrated structures separate entities e.g.,
    - Generation
    - Transmission and
    - Distribution

    Initially the three segments are separated and then horizontal deintegration of potentially competitive segments i.e., Generation and Distribution are done to foster competition.
2. Privatisation of these separated units.
3. Appointment of independent regulatory body which sets the tariff and monitors the performance of the private operators.
4. Gradually introducing competition in potentially competitive segment, mainly generation

In Orissa first three steps have been completed, in the name competition, reform document stated that grant of generating plants will be based on competitive bidding. Orissa Electrcity Board was fragmented in the following manner (see Appendix for chronology of implemtation)

Figure1: Process of restructuring of Assets of OSEB



After restructuring Orissa Power system may represented in following diagram

Figure 2: Current Organisation of the Power industry in Orissa

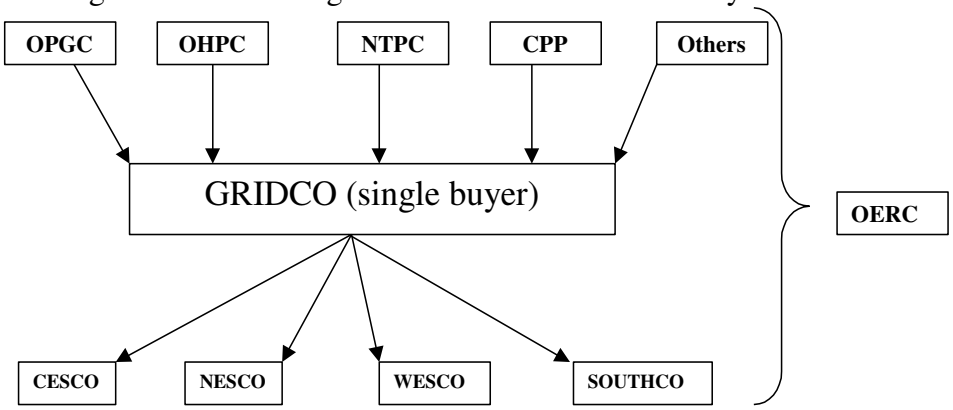


Table1 represents the institutional framework of power sector in pre and post reform period in nutshell.

Table 1: The Institutional framework of power sector in pre and post reform period

Activity	Pre-reform	Post Reform
1. Policy Making	GoO, GoI	GoO, GoI
2. Regulation	OSEB	OERC
3. Generation	OSEB, OPGC	OPGC, OHPC,
4. Transmission	OSEB	GRIDCO
5. Distribution and supply	OSEB	DISTCOs
6. Tariff Structure	Average Tariff	Two part tariff

One of the important reasons for privatisation obsessed reforms was ever worsening of fiscal health of the state. The Government of Orissa (GoO) found it increasingly difficult to finance development of power sector as other commitments on social sector was souring. The state of Orissa is one of the less developed states with highest poverty ratio[2]. Therefore the GoO anticipated that elimination of subsidies and proceeds from private participation in power sector would leave more resources in fiscal exchequer which can be reallocated to programmes whose incidence on poverty

[2] nearly 47 percent of Orissa's population still lives under the shackles of poverty (Panning Commission 2003, Chapter 8)

is more progressive than the original power sector investment and consumption subsidies. Estache, Foster and Wodon (2002) with the help of regional studies try to establish that shift of resources away from utility subsidies towards other programmes may benefit lower income groups. But there is no guarantee that public revenues will be reallocated in a pattern which is favourable to the poor. Staff Appraisal Report (SAR) also outlined similar argument for Orissa (World Bank 1996). But government actually may end spending more on power sector because of such privatisation policy do not work as anticipated. This is so primarily because the private participation is conditioned upon the guarantees and counter guarantees. In case these guarantees are revoked, this may lead to further erosion of the public finances, which actually has happened. For example, Independent Power Producers (IPP) programme has added considerable financial burden to the few well performing SEBs like Maharashtra, Gujarat and Karnataka (Morris 2000).

This paper consists of seven sections. The next section gives the description on data used in the study. Then we deal with access to and affordability of electricity to households in third and fourth sections respectively. In fifth section we measure the inequality in the access to and affordability of electricity. The last section concludes.

3 Data and Method

We use the 50th and 55th rounds of the consumption expenditure survey of the National Sample Survey Organisation (NSSO) conducted in 1993-94 and 1999-00.These surveys are conducted during the agricultural year in India, which begins in July and ends in the month of June of the following year. The national sample survey uses a stratified two-stage sampling design, first sampling clusters (which are villages in rural areas and urban blocks in urban areas) and then selecting 10 (or 12 as in the case of the 55th round) households within each cluster (called first-stage sampling units or FSUs). The survey elicits consumption expenditures and consumption quantity for the household for the month preceding the date of survey. The date of survey varies between the FSUs as the survey is done at four different times (corresponding to quarters) within the 12 months from July to June.

We have selected two states for our analysis. One is obviously Orissa and the second is West Bengal. Our objective here is to see what would have happened to the changes

in access to electricity and expenditure on electricity by households if reform had not taken place in Orissa during this time period of analysis. In order to do such analysis, we have West Bengal, which is similar to Orissa in many aspects of culture, habit and physical geography (weather) but has not reformed its power sector. Therefore we have taken West Bengal for a comparison with Orissa. Table 2 shows the number of households that were surveyed.

Table 2: Number of Households Surveyed

	Orissa			**West Bengal**		
Round	Rural	Urban	Total	Rural	Urban	Total
50th	3,338	1,037	4,375	4,480	3,338	7,818
55th	3,477	1,049	4,526	4,549	3,432	7,981

Source: NSS 50th and 55th round survey on consumption expenditure

We make use of consumption expenditure data for our purpose. We divide the whole sample into quintiles based on their household monthly total consumption expenditure (HMCE) in increasing order to have a measure of economic status of the households. The first quintile represents the bottom 20 percent of households with the lowest HMCE and fifth quintile represents top 20 percent of households with the highest HMCE.

Table 2 gives the quintile wise HMCE of the two states. The HMCE of Orissa remains lower for all the quintiles in both the periods (for both rural and urban) compared to West Bengal. As expected, rural HMCE is always lower than the urban HMCE. It is important here to note that the annual growth rate of HMCE for all the quintiles (for both rural and urban areas) in both the states were quite the same, i.e., around 40 percent mark (based on current prices). Another remarkable feature of Table 3 is that the co-efficient of variation of the HMCE secularly declines as we move from lower quintile to the higher quintile, irrespective of region and time. This means that inequality in HMCE is severe among the poor.

Table 3: Average household monthly total consumption expenditure (HMCE) and its co-efficient of variation (CV) for 1993-94 and 1999-2000 (Rs)

	Rural		**Urban**		**Total**		**Rural**		**Urban**		**Total**	
Quintile	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV	Mean	CV
	Orissa 1993-94						**West Bengal 1993-94**					
1	377.76	1.43	564.92	0.95	391.70	1.38	569.90	0.96	587.11	0.93	573.90	0.95
2	649.29	0.83	1007.55	0.54	678.39	0.80	892.58	0.61	1040.71	0.52	918.66	0.59
3	874.91	0.62	1460.85	0.37	924.75	0.58	1162.31	0.47	1511.41	0.36	1227.65	0.44
4	1179.32	0.46	2069.85	0.26	1269.22	0.43	1512.91	0.36	2173.02	0.25	1659.16	0.33
5	2089.85	0.26	3593.36	0.15	2392.65	0.23	2817.17	0.19	4232.75	0.13	3284.17	0.17
Total	1034.49	0.52	1742.88	0.31	1131.56	0.48	1391.38	0.39	1909.96	0.29	1532.91	0.36
	Orissa 1999-2000						**West Bengal 1999-2000**					
1	644.98	1.34	919.18	0.94	675.44	1.28	1050.85	1.17	1169.07	1.05	1070.66	1.15
2	1069.02	0.81	1583.39	0.55	1122.86	0.77	1581.78	0.78	2020.55	0.61	1654.66	0.74
3	1444.80	0.60	2255.61	0.38	1540.59	0.56	2044.85	0.60	2811.42	0.44	2179.91	0.56
4	1942.92	0.45	3108.51	0.28	2123.74	0.41	2622.83	0.47	3967.58	0.31	2874.23	0.43
5	3522.65	0.25	5672.41	0.15	4006.13	0.22	4277.59	0.29	7710.19	0.16	5317.28	0.23
Total	1725.55	0.50	2710.03	0.32	1894.08	0.46	2316.00	0.53	3538.26	0.35	2625.74	0.47

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

To have further idea about the distribution of HMCE, we calculated the Gini coefficient[3], which is shown in Table 4. We see that the value of Gini co-efficient is usually higher in the case of Orissa.

Inequality in HMCE in case of Orissa has remained more or less same at around 0.30 during the period of analysis. For West Bengal Gini co-efficient shows a marginal increase in aggregate but for urban areas it increased drastically during the same period and that of rural area it shows a marginal decline. Thus, we see that Orissa is characterised by low expenditure level with relatively high inequality. This may serve as good background information when we focus on the issues of access and affordability on the basis socio-economic status.

[3] We use the formula of Gini coefficient $G = 1 - \Sigma P_i (Z_i + Z_{i-1})$ where Z_i is is the cumulative share of expenditure made by households and P_i is the share of population in each quintile ($P_i = 0.2$)

Table 4: Gini co-efficient of average household monthly total consumption expenditure for 1993-94 and 1999-2000

	Rural		**Urban**		**Total**	
	1993-94	1999-2000	1993-94	1999-2000	1993-94	1999-2000
Orissa	0.31	0.32	0.30	0.29	0.31	0.31
West Bengal	0.29	0.27	0.11	0.26	0.25	0.26

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

4 Issues in Access to Electricity

"In industrialised countries, the majority of citizens have access to modern infrastructure services, and regulatory strategy focuses on overseeing established industries and customer relationships. In contrast, large proportions of the populations of developing countries lack access to any formal infrastructure services. Two billion people lack access to adequate sanitation, two billion lack access to electricity, and one billion, access to clean water. Transportation and communication networks also remain poorly developed. Those living in urban slums and in rural communities are least likely to have access. The effectiveness of any pro-poor regulatory strategy must thus be tested against the goal of expanding access to services, rather than just improving the convenience of those who already have service" (Smith 2000: 6).

A substantial proportion of the poorest households lack access to basic energy supply through traditional utilities for their cooking and lighting purposes and consequently must find substitutes like kerosene, firewood or coal to meet their energy needs. Ironically, these fuels are often provided through informal means and involve high cost and risk (Estache, Foster and Wodon 2002). In rural areas, often children especially girls of poor households are responsible for collecting the firewood. This adversely affects their allocation of time on education, which ultimately affects their educational attainment. In addition to this, with passage of time, access to such resources is getting reduced due to strict rules and regulations increasingly being implemented to protect wild life and forests. This raises the cost of substitutes. Similarly, in urban areas where Kerosene is major source of cooking and is supposed to be provided by the Public Distribution System (PDS) is often not sufficient in quantity to meet the requirement. In most of the cases the poor do not get the mandated or rationed quantity because owners of public distribution outlet often tend to sell it illegally in the open market for higher prices. As a result, the poor

households have to buy kerosene from open market, which is priced exorbitantly high in comparison to the PDS price. Households having no usual utility connection for its energy requirement face double disadvantage – one is high cost of procuring the fuels and another is the negative impact of indoor environmental externalities associated with such fuels. Usage of kerosene and firewood produces shoots, which adversely affects the respiratory system if inhaled. Those who mostly stay at home and take part in cooking, generally women, inhale most part of this shoot.

Two main types of access issues can result from power sector reform and private sector participation.

1. Potential increase in connection fees
2. Reluctance of the utilities to serve the poor

Privately operated utilities can charge substantial one-time connection charges to cover the cost of network expansion. In addition, households may have to make significant investment in wiring their homes to reap the benefits of the electricity connection. These costs can be prohibitively very high for low-income customers, preventing them from being connected to the network, once it has been built. Reform process must take into account the potential obstacles or access costs and try to reduce them. Often poor households in urban areas in order to minimize one time payment problem get connection from a near by household which is already electrified. Therefore their access to electricity will subsist on the whims of another person.

Private utilities on the other hand have no incentives to serve customers in whose case cost of provision exceeds the tariff that they pay. Poor customers are relatively costly to serve for several reasons. First, higher commercial risk and billing costs may be associated with recovering revenues from customers with limited ability to pay. Second, poor neighbourhoods are often located in geographically challenging areas for a utility service provider, i.e., places where it is costly to establish and maintain distribution network like hilly regions. Thirdly, poor households often consume relatively smaller quantity of service, i.e., the loads are very thinly distributed, meaning that fixed cost of service provision are spread over a relatively small number of units of demand resulting in higher average fixed cost. Cross-subsidies may exacerbate this problem by reducing the amount of revenue that can be collected from

them, thereby, making poor households even more commercially unattractive to serve. Thus, once competition or third party sale, is introduced, new entrants may be tempted to "cream-skim" or acquire only those customers whose tariffs exceed their true cost of provision e.g., industry, commerce and traction, leaving the incumbent utilities (SEBs) with customers who are uneconomic to serve, e.g., households and agriculture. It is because of this fear that the Electricity Act 2003 envisaged introduction of competition only after phasing out cross subsidies.

4.1 Trends in Access Rates

To assess the change in access due to introduction of reform, here we are taking two time points, before reform and after reform. We make use of the NSS data on electricity expenditure by households in Orissa and West Bengal. We use the two round data on consumer expenditure, one is 50^{th} round (1993-94) and the second is 55^{th} round (1999-2000). We compare the level of access in different HMCE quintiles before and after reform situation. To make it sure that changes in the access rate is due to reform in the power sector and not just a macro level changes in the economy, we have taken access rates for West Bengal, which has not reformed its power sector but otherwise faces similar macroeconomic environment. In order to obtain the extent of access rates for each quintile we take number of individuals having access to electricity service as percentage of total population of that particular quintile.

Our analysis shows that access level is very low in both the states. The trends in access rates show that the increase in access rates during this period is higher for West Bengal in comparison to Orissa for almost all quintile classes in both urban and rural areas (Table 5). This trend exists except for top 20 percent of population in rural area where Orissa's access rate is better. The improvement in access for bottom 60 percent of the population in Orissa is marginal but improvements in West Bengal for the same section of population is significant as it can be seen in Table 5.

Table:5: Quintile wise trends in access rates (%)

	Rural		Urban		Total	
Quantile	1993-94	1999-2000	1993-94	1999-2000	1993-94	1999-2000
Orissa						
1	2.32	2.25	30.28	39.08	3.75	5.07
2	4.62	8.19	37.72	40.35	6.81	12.37
3	8.77	10.23	56.76	57.05	12.67	16.94
4	13.97	18.62	73.89	78.75	20.69	27.01
5	35.33	46.18	83.65	89.59	50.88	61.68
Total	13.01	17.11	56.50	60.99	18.96	24.62
West Bengal						
1	3.38	8.25	33.43	53.24	10.93	16.95
2	3.51	13.00	43.64	61.33	9.75	20.64
3	7.04	17.64	65.97	78.31	17.50	26.67
4	11.98	21.58	80.71	87.70	29.35	38.66
5	29.31	38.77	92.86	94.95	59.05	66.02
Total	11.05	19.85	63.34	75.13	25.32	33.86

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

NSS data showing lower achievement by Orissa in terms of access is because there was no deliberate attempt to extend electricity supply to more houses under the reform programme. In fact, the access to poorest 20 percent of population, which was already at very low level (2.32 percent) in rural area, has further declined (to 2.25 percent). Access to electricity, as expected, moves with economic status. But it is notable here that even within the same quintile a household having no access to electricity is more likely to have low economic status (measured by consumption expenditure) in comparison to those who have electricity connection. In NSS sample the average HMCE of households without access to electricity are generally lower when compared to that of households with access to electricity with few exceptions (appendix 2).

Negligible increments in access rates in case of Orissa clearly shows the neglect of the government to mitigate the possible negative effect of increase in tariff rates might

have had. The subsidy from the government to power sector was reduced to zero. Government of Orissa was so conservative that it did not release any additional fund to restore the network even after the heavy cyclone in 1999, which affected network of the DISTCOs (Ramanathan and Hassan 2003).

The trends in access show that there is need to design policies to extend access to large sections of the society. Therefore, the following section is devoted to discuss the possible ways that can be explored to extend the access to electricity at universal level.

4.2 Instruments for Facilitating Access

Selection of instruments for improving access may have important implication for the distribution companies, government and the consumers. Instruments requiring the companies to electrify all the households irrespective of their capacity to pay may be a burden for the company. But if it is not so, several households may remain without electrification. So the basic philosophy of public policy is to choose instruments, which induce the stakeholders of the industry to spend maximum in terms of money and effort within their reachable capacity. In other words, policy makers have to design a policy framework where rent seeking behaviour of the stakeholders are minimised. In case government is not able to meet its objective of universal access to electricity even after designing such policy because of the low capacity to pay by the some consumers then subsidy might be targeted to such consumers only.

Instruments Requiring Distribution Companies to Provide Access

(a) Service Obligation: The most common way to introduce commitment is by specifying universal service obligations (USOs). USOs provide a legal expression to social objective of bringing electricity to all households. Such objective can also be justified in terms of social benefit of universal coverage i.e. the positive externalities associated with electricity consumption on development. Rural electrification is viewed as prime mover of rural development. Electricity is not only the basic pre-requisite for industrialisation but also contributes significantly to increasing agricultural productivity, jobs and income generation activities besides enhancing the quality of life in rural areas and controlling migration from rural to urban areas (MoP

2003). The obligations can be defined in variety of ways and is often expressed in vague languages. In typical formulation a distribution company (DISTCO) is required to provide the connection to all households or all those who request the service. The obligation may be unidirectional i.e. incumbent only upon the DISTCO or bi-directional meaning that the customer is also obliged to connect once the service has been made available.

Unfortunately because of their vagueness, USOs often raise as many questions as they answer. USOs may not be truly operational on its own. Limitations in the coverage of the network may make fulfilling the obligation a physical impossibility in the short run even in communities already linked to the network and access charges may render a connection unaffordable making the obligation irrelevant. These concerns highlight the need to complement a USO with requirements that specify the obligations in more detail and how obligation has to be financed when customers lack ability to pay. The financing of obligation is real challenge not only due to lack of availability of money but also because of incentive. The instrument should be designed in such a way that there is enough incentive for the households not to underreport their capacity to pay, which might be very challenging in practice. The Electricity Act 2003 has tried to bring in all possible ways of electrifying the population. It encompasses various methods and institutions that might get involved in the process of rural electrification. The Act has proposed that in case of geographically challenging areas, off grid possibilities mostly with renewable energy sources can also be explored. The act also envisages the possibility of involving the local community along with Non-Governmental Organisations (NGOs) in the process of electrification (see para 4, 5 and 6 of part II of the Act).

(b) Connection Targets: This is a gradual approach to USO. Here the DISTCO is obliged to meet certain connection targets and may concentrate more clearly on the issue of who has to be connected. Targets may also be necessary to ensure that coverage is provided to customer groups that are unprofitable to serve. Targets have the advantage of being easy to monitor and therefore can be imposed by financial penalty. However, connection targets can only be met if customers take up the service, which will not always be the case. Consumers may not be taking up the service because of unaffordable access charges. Thus, any serious attempt to increase

coverage among poor households may require a serious assessment of connection charges. Government of India has embarked upon a gradual approach of electrification process. The initial target is to electrify 100 per of villages in India by the end of tenth plan (2007) and then it will focus on electrifying 100 per cent of households by the end of the eleventh five year plan (2012) (MoP 2003). .

Instruments Reducing Connection Cost

There are four main strategies for reducing connection cost

- Spreading the connection cost over time through design of financing arrangements
- Cross-subsidising between new and existing consumers.
- Using connection subsidies.
- Using off grid electrification technologies in case of geographically challenging areas.

(c) Financing Arrangements: Many low-income households lack savings to pay connection costs up-front but may be able to afford the cost if they were spread across a number of instalments. We see such financing instruments used by non-food consumer goods industry in marketing their products. Because the poor pose a high credit risk and they lack collateral, such household lacks access to loans as well. In such cases government can play a crucial role in financing the electrification process. It can design flexible financing arrangements suited to the poor sections of the society. But here again policy makers have to be careful for the recovery of the loan amount. Often loans provided by government owned banks for development purposes have usually failed in recovery.

(d) Cross-subsidisation: Cross-subsidy is a very important tool especially, in the cases of the fiscal constraint and help in redistribution of the wealth across the society. This can be seen as one of the important tools for reducing inequality in the society provided that beneficiaries are clearly defined and it is made sure that their benefits flow only to intended customers. But we have considered the following points to confirm the feasibility of such subsidy schemes.

- As long as the size of unconnected population is small relative to the connected population, cross-subsidisation spreads the cost of network over a

much larger population and generally at a reasonably low cost to each household. The charge that each household pays to be connected is reduced and become sustainable economically and politically.

- Cross subsidies towards new connections are in many cases more likely to reach the poor, because those lacking connections are predominantly poor.
- Sector becomes self-sufficient therefore no burden for exchequer.
- Cross-subsidisation to new connections may be justified on ethical grounds. The fact that already connected households, enjoying the consumption subsidy since long time is more likely to be rich households while the other households which are not connected to the network enjoy no subsidy. Santhakumar (2003) has shown that how middle-income class of Kerala, a majority in terms of vote bank, who can very well afford cost reflective price of electricity has influenced the government of Kerala to keep the tariffs for them at low levels.
- By reallocating a significant proportion of connection cost to richer households, regulator actually reduces the collection risk of the utility leading to better collection efficiency.
- Success of a cross-subsidy regime largely depends upon the elasticity of demand and cost of service to the subsidising category of consumers. The lower the price elasticity of demand higher will be the leverage for utility to charge higher prices thus the cross-subsidy. (Chattopadhyay 2004).

5. The Issue of Affordability

Reforms and private sector participation can give rise to the following broad sources of affordability restriction

- Tariff increases needed to cover the costs
- Increase in cost caused by increased rate of return requirement
- Reduction in cross subsidy along with withdrawal of subsidy.
- Revaluation of asset value of the DISTCO

Theoretically as the Staff Appraisal Report (World Bank 1996) argued that reform has the potential to reduce the cost of service provision, but the current experience shows that cost has escalated instead of declining. It seems that the time when people of Orissa will be able to claim benefits of efficiency improvements is quite far. The

above mentioned reasons for the increase in the cost of electricity were true in case of Orissa. Among them most important was upvaluation the assets of erstwhile OSEB to earn more proceeds from privatisation so that GoO could finance its fiscal deficit.

At the time of privatisation governments has choice between fixing a relatively high tariff and the auctioning of the assets of ESI to private party on the basis of highest bidder or waiving the asset value altogether and auctioning of the services to private party who bids lowest tariffs. In one case government directly appropriates the asset value and finances the fiscal deficits that results in high tariff. In the second case, the asset value is given as capital subsidy to people resulting in lower tariffs. In the first case, high tariff can be viewed as a tax on consumers to fund the fiscal deficit through a high sale value of a company rather than because of privatisation. In most cases of private sector participation governments are choosing the first option because they are more interested in relieving fiscal constraint than that of securing tariff reductions (Guasch 2000). In fact, government of Orissa went one step ahead to tax people by revaluing the assets of ESI to double without any additional physical investment. In constrained fiscal environment selling enterprises in the name of reform through first option turns out to be an obvious perversion. Similar divestment strategy for utility services was also adopted by the many developing countries during the difficult fiscal situations.

5.1 Impact on Affordability

To see the possible impact on affordability, we use the NSS collected data for the same rounds as we did in the case of access. Here we use mean expenditure made on electricity by each quintile group ranked in increasing order of their HMCE as a proxy for affordability. While calculating mean expenditure made on electricity, we take into account only those households, which have positive expenditure on electricity. We have ignored all households showing either zero or no expenditure on electricity assuming that they do not have access to electricity[4]. An ideal way to assess the impact on affordability would be to see changes in units of electricity consumed

[4] But there are houses, which show that their main source of lighting is electricity, but they do not report any expenditure on electricity. We have ignored such households in calculating mean as they might pull down the representative average. Those households might be illegally connected to the grid or might have connection offered by the institution where members of these households are employed. Moreover these kinds of houses constitute very small proportion of the sample.

during the period of reform. But data on units of electricity consumed is not reliable as there are lot of missing cells under this column in data sheet even when households are showing positive expenditure on electricity. Therefore, we use expenditure on electricity, which is product of price and units of electricity consumed. Table 6 gives the average share of electricity expenditure in HMCE of households belonging to different quintiles.

Table 6: Share of expenditure on electricity in total consumption expenditure (%).

	Rural		**Urban**		**Total**	
Quintile	1993-94	1999-2000	1993-94	1999-2000	1993-94	1999-2000
Orissa						
1	6.06	10.66	1.45	5.32	5.31	8.48
2	6.73	5.76	1.89	7.22	5.92	5.38
3	6.87	6.20	2.38	5.22	6.07	6.34
4	5.44	5.38	2.53	4.72	4.86	5.39
5	3.36	4.22	2.37	3.40	3.13	3.96
Total	3.96	4.61	3.37	4.29	3.69	4.47
West Bengal						
1	3.46	3.84	3.30	4.47	3.38	4.18
2	2.43	3.18	3.32	3.75	3.01	3.45
3	2.55	2.89	3.06	3.90	3.01	3.25
4	2.25	2.61	2.90	3.83	2.70	3.28
5	1.44	2.29	2.79	3.72	2.41	3.32
Total	1.70	2.54	2.90	3.80	2.54	3.34

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

Table 6 shows that there is drastic increase in the share of expenditure on electricity by households in the case of urban Orissa especially for the bottom 60 per cent of the population. In rural Orissa the share of expenditure on electricity has marginally declined from second quintile to fourth quintile but there is a drastic increase in the first quintile (from 6.06 per cent to 10.66 percent). The share of expenditure on electricity in rural Orissa is considerable high even in the initial level (before reform) when compared to west Bengal in all cases. Within Orissa the jump is larger in case of urban areas. This might happen because of two reasons- (a) the increment in households' total consumption expenditure in case of West Bengal is higher and (b) increase in the price of electricity is higher in case of Orissa. So both the factors were working against Orissa. Share of expenditure on electricity in HMCE indicates the

burden of expenditure on electricity for households. But it would be important to know the actual level of expenditure on electricity so that we can compare the two states in different time points.

In Table 7 provides average household expenditure made on electricity. There is drastic increase in the expenditure on electricity in both the states but it is more so in case of Orissa. This average expenditure can increase due to three factors. One is increases in access rates, second is increase in the prices and third is increase in consumption or due to cumulative effect of all the factors together.

Table 7: Quintile wise average expenditure on electricity (Rs)

	1993-94			**1999-2000**		
Quintile	Rural	Urban	Total	Rural	Urban	Total
Orissa						
1	23.52	8.43	20.67	73.24	50.93	61.62
2	43.75	19.17	40.31	61.75	115.11	60.84
3	61.99	35.26	57.30	88.51	117.94	99.78
4	65.22	52.76	63.39	105.42	147.39	118.45
5	77.91	84.68	81.18	161.27	192.96	168.55
Total	67.22	71.05	68.78	128.24	138.73	132.86
West Bengal						
1	21.07	19.97	20.13	42.15	52.10	45.15
2	21.71	35.41	28.09	50.48	76.41	57.62
3	30.13	46.87	37.60	59.19	110.46	71.44
4	34.31	63.40	45.72	69.09	152.60	95.61
5	42.57	119.97	82.32	100.49	289.04	186.69
Total	36.55	68.13	58.11	74.93	151.68	118.09

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

We have already seen that access rates have remained more or less stagnant for bottom three quintiles of Orissa but access rates in West Bengal are increasing over time (Table 5). So one can say that drastic increase in the expenditure on electricity in the case of Orissa is due to either increase in the prices or increase in the consumption of electricity of those households who already have electricity connection. Moreover, it is a well known fact that the price increase was more prominent than increase in the

units consumed in the case of Orissa. So it can now be established that the increase in expenditure on electricity for the bottom 60 percent (first three quintiles) of the population is largely on account of increase in the prices but for the top 40 per cent of the population it might be due to all the three factors. On the other hand, increments in the total consumption expenditure by households are higher, in absolute terms, in the case of West Bengal, which was already at high level in the initial period (Table 3). Therefore, we see that the poor in Orissa had to spend a higher proportion of their income on electricity.

5.2 Instrument for Promoting Affordability

Targeted Subsidies: Targeting subsidy for poor has been one of the most challenging jobs for most of the public supported programmes. Often they do not hit the target. One of the famous cases is of public distribution system in India where we see pervasive targeting errors of wrong inclusion and exclusion.

Electricity subsidy in India has been mainly dependent on category of consumers rather than income or socio-economic characteristics. Agricultural and domestic consumer are cross-subsidised by other categories of consumers. If one is agricultural consumer, he is entitled to subsidised power irrespective of his socio-economic status. This kind of subsidies can in fact be detrimental for poor households who are basically subsistence farmers and largely depend on human power for their agricultural activities. They are unable to utilise the benefit of the electricity subsidies because they can not afford and find it uneconomical to buy a pump-set because of their small land holding. During the dry season big farmers drag groundwater with the help of subsidised power to take groundwater level further down which was already at a very low level because of vagaries of weather. As a result, all the wells from where small farmers draw water with the help of human power to irrigate their fields get dried. Now only option left for such farmer in order to save his crop is to buy water from big farmer who can draw water from far below with the help of subsidised power. In this unorganised water market, small farmer often becomes the victim of market power of the large farmers. At the end of the day we see that electricity subsidy helps in widening inequality rather than reducing it along with indiscriminate extraction of precious natural resource like ground water. Jain (2003), in the case of

Punjab, has shown that poor farmers remain worse while the big farmers utilise the benefits of the electricity subsidy.

In the case of household consumers, a similar story follows. One big source of inequality is that a large proportion of poor household both in urban and rural is not having access to electricity. Electricity subsidy is provided to all household consumers irrespective of their socio-economic characteristics. Since subsidy is based on the consumption, those who can consume more electricity enjoy more subsidies. It is natural to expect that richer household will be having more electronic gadgets than a poor household. Those who are not having access to electricity they enjoy zero subsidy and those who have access to electricity enjoy positive subsidy. The actual amount of subsidy enjoyed by household will be directly proportional to its connected load. That is the more you demand electricity the more you get electricity subsidy. This is quite in contrast to the policy objective.

Therefore, during the reform era there is need to re-look at these ill-designed subsidy schemes. If we go through the following truth, it is relatively easy to target poor for electricity consumption than any other commodity or service. In urban India poor generally live in pockets. Electricity can be consumed only when one is connected to the network. So it is easy to verify whether the connected consumer belongs to area where poor live or not especially when the bills are being delivered on the spot. It will be easier for the billing authorities to know socio-economic status of the house as the billing authority can very well see the housing condition. Similar ways pricing is being worked for Delhi.

5.3 Priority in Subsidy

The policy question relevant here is whether to emphasise subsidy for new connections or consumption subsidies among those already benefiting from connections. Discussions in above sections indicate that it is reasonable to have primary focus on access. Moreover access subsidy is more likely to reach the intended population (poor) in comparison to affordability subsidy. Jain (2003: 139), in context of agricultural consumers of Punjab, demonstrated that poor do have willingness as well as capacity to pay for electricity because they generally spend more on the inferior quality substitutes of electricity e.g., diesel. But after the reforms,

affordability also became important consideration due to unprecedented rise in tariffs. Orissa's agricultural connected load is experiencing downtrend and growth of household consumers' connected load is quite low when compared to before reform situation (see Sidiqui 2004: chapter 4, section 4.2). Concerns over this was reflected by deliberate attempt to keep the prices of the electricity lowest through various ways suggested by Kanungo Committee Report (GoO 2001). Recently in order to increase the access, Department of Energy, government Orissa has embarked upon the mass scale rural electrification programme. But the policy should be tilted towards rationalising the electricity tariffs in such a way that cross subsidies are designed on the basis of economic status of the consumers. Very low levels of access among the poor is an immediate factor to which policy should respond as these household may fall in other kinds of deprivation due to lack of access.

The lack of access may be either due to demand side or supply side problems. Alternatively household may not be having electricity connection either because the connection is not possible, i.e., village or hamlet is not electrified or household is not connected to grid even though the hamlet is having electricity connection. It is important to identify the two situations because it suggests the nature of intervention required. The first situation suggests the need of supply side intervention and second the need for demand side support measures. In Orissa, only 34 percent of households are electrified in the so called 'electrified villages'. Though one might assume the urban centres are mostly electrified but we find several households are yet to have electricity connection as shown in section 4. This suggests the need for demand side support measures. On the other hand the stagnation in the progress of rural electrification after the initiation of reform, suggests intervention of supply side policies.

We have seen that access is usually higher for higher HMCE households (for quintile wise HMCE see Table 3). Though we have got an idea of inequitable distribution of access and expenditure burden on households. Here we go for an accurate measure for inequality so that we are able to compare the inequalities existing in different situations.

6 Measuring Inequality in Access to and Affordability Electricity

For a long time literature on measuring inequality have evolved specially in the area of income and health care. Our aim here is to use similar measures to the capture the inequality of access to and affordability of electricity among people of different economic status. This is being done here with the objective of examining the impact of reform. A variety of measures of inequality may be used be to measure inequalities in access to and affordability of electricity. Wagstaff et.al. (1991) argued that an index of inequality should satisfy the following three basic requirements, (1) it should reflect the socio-economic dimensions of inequalities; (2) it should reflect the experiences of the entire population; and (3) it should be sensitive to changes in the distribution of the population across socio-economic groups. Most of the measures fail to satisfy the all three requirements.[5]. The only two indices that satisfy all the three criteria are the relative index of inequality and the concentration index. The added advantages of using concentration index are (1) it is related to relative index of inequality (2) it has more immediate visual appeal; (3) if can also be estimated using regression method analysis, standard errors can be computed, based on which statistical tests can also be conducted to check of dominance relationship; and (4) it has a firm grounding in the literature on income distribution.[6]

Inequality in Access to Electricity:

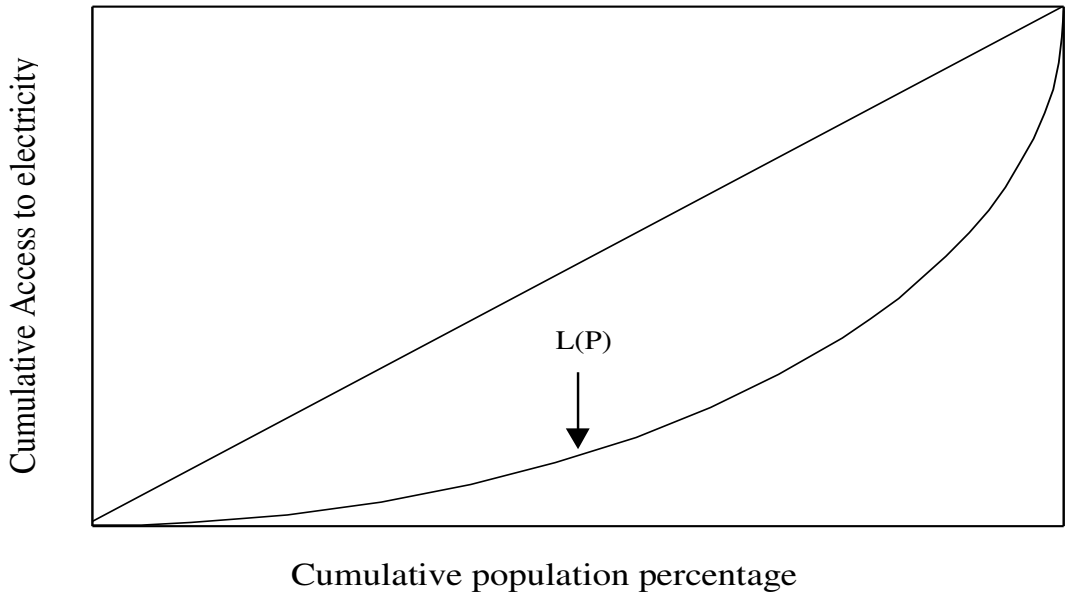
Let us assume that we have information about the economic status of individuals using, which we use to rank them, and divide the sample into N groups (say quintiles, deciles or fractiles). We then estimate the proportion of population having access to electricity for whole as well as for each quintile separately.

[5] Measures like Gini coefficient fail to distinguish between a situation where the persons without access are millionaires or very poor when examining access inequality. Such cases generally does not arise in electricity but never the less these properties are desired even in case of access to electricity and more so in case of burden of expenditure on electricity.

[6] For a review and comparison of properties of concentration index with alternative measures of health inequality, see Wagstaff, Paci and van Doorslaer (1991).

The concentration curve L(P) , shows the cumulative proportion of people having access to electricity by individuals against the cumulative proportion of population ranked by economic status beginning with the poorest (refer Figure 3). Unlike Lorenz curve, we are not ranking the variable whose distribution we are examining rather we are looking at the distribution of access to electricity across the population grouped by economic status. If L(P) coincides with the diagonal, all groups irrespective of their economic status show same level of access to electricity. If L(P) lies above the diagonal, inequalities in access favours the poor and in such cases it is called inequality pro-poor. If L(P) lies below the diagonal, the distribution of access to electricity is pro-rich. The farther the L(P) lies from the diagonal, the greater the degree of inequality in access to electricity across economic status.

Figure 3: Concentration curve of access to electricity



Suppose the concentration curves of two states A and B lies below the diagonal. Now if the concentration curve of state A lies everywhere above the concentration curve of state B, then we say state A's concentration curve dominates that of state B. It seems reasonable to unambiguously conclude that there is less inequality in access electricity in state A than in state B.

When two concentration curves intersect each other, we need to have a single measure to check their dominance. Concentration index (CI) is used for that purpose. It is defined as twice the area between L(P) and the diagonal. CI is zero when L(P)

coincides with the diagonal, negative when L(P) lies above the diagonal and positive when L(P) lies below the diagonal. In general, with N economic groups, CI can be expressed as

$$CI = \frac{2}{h}\sum_{n=1}^{N} p_n h_n R_n - 1$$

$$R_n = \sum_{i=1}^{n-1} p_i + p_n$$

$$h = \sum_{n=1}^{N} p_n h_n$$

Where, h = average access to electricity of households, p_n = proportion of n^{th} group population in total population; h_n = Access to electricity of households in the n^{th} group R_n = Relative rank of the nth group; Where n = 1,…, N. The value of CI can range from minus one to plus one i.e, $-1 \leq CI \leq 1$.

Based on the above method, we calculate the concentration index of access to electricity for Orissa and West Bengal for the year 1993-94 and 1999-2000. Table 8 represents the value of concentration index of access to electricity.

Table 8: Concentration index for access to electricity for 1993-94 and 1999-2000

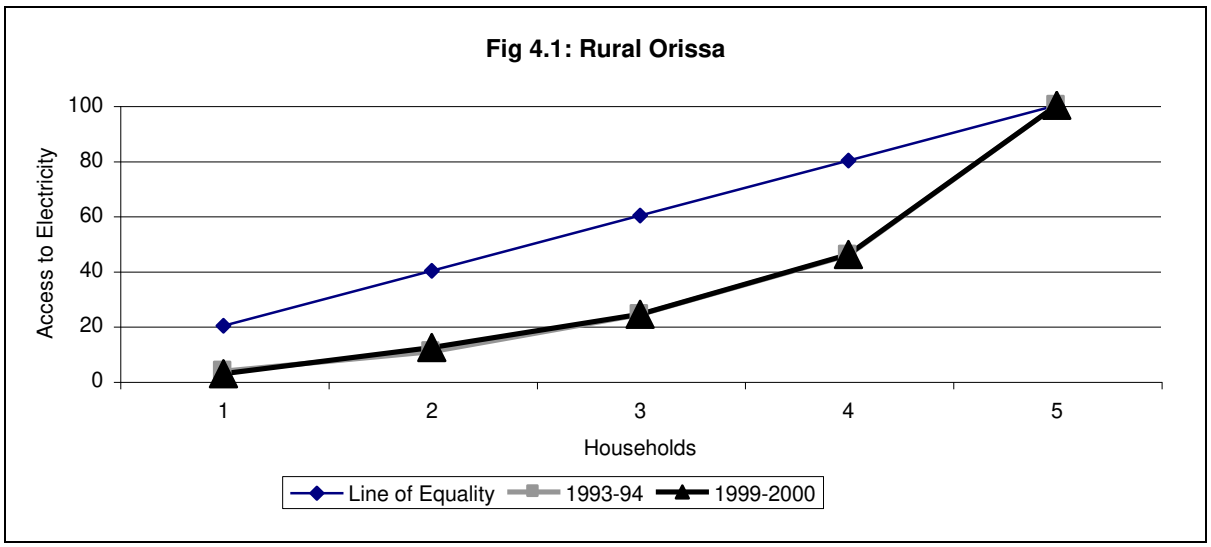
	Rural		**Urban**		**Total**	
Sector	1993-94	1999-2000	1993-94	1999-2000	1993-94	1999-2000
West Bengal	0.44	0.28	0.20	0.12	0.37	0.27
Orissa	0.46	0.46	0.20	0.18	0.46	0.42

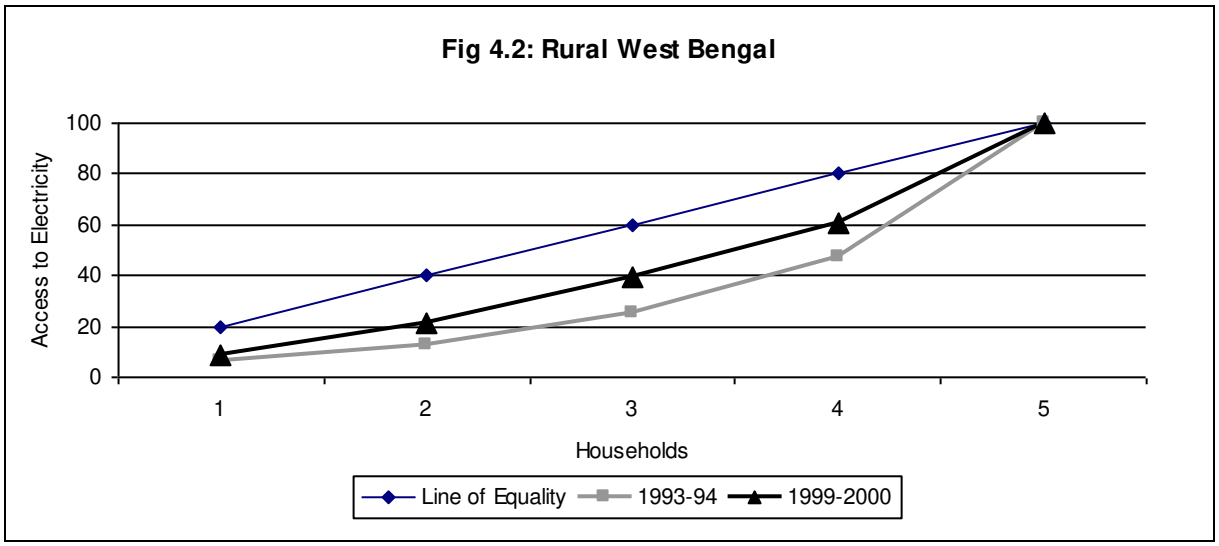
Source: Calculated from NSS 50^{th} and 55^{th} round survey on consumption expenditure.

The Table 8 shows that inequality in access to electricity is quite high in Orissa (CI=0.46) and the performance in reducing that also is marginal during the period of reform. But the reduction in inequality is higher in case of West Bengal, which was having already less inequality in the initial year (CI = 0.37). We see a drastic decline of inequality in access to electricity in rural West Bengal from 0.44 to 0.28 while the value of the concentration ratio has remained stagnant at 0.46 for Orissa, which can be

considered as pretty high. In urban sector also, West Bengal has sharper reduction in the value of the concentration ratio when compared to Orissa. In the case of West Bengal the reduction is of 8 percentage points while for Orissa of the reduction is of only 2 percentage points from the same initial level, i.e., 0.80. Therefore, the need of the hour is to first ensure the access to poor sections of the rural areas as, the concentration ratio of access rate is still very high in rural Orissa. For visual clarity one can look that concentration curve given in the figures 4.1 to 4.6

Figure 4: Concentration Curve for Access to Electricity





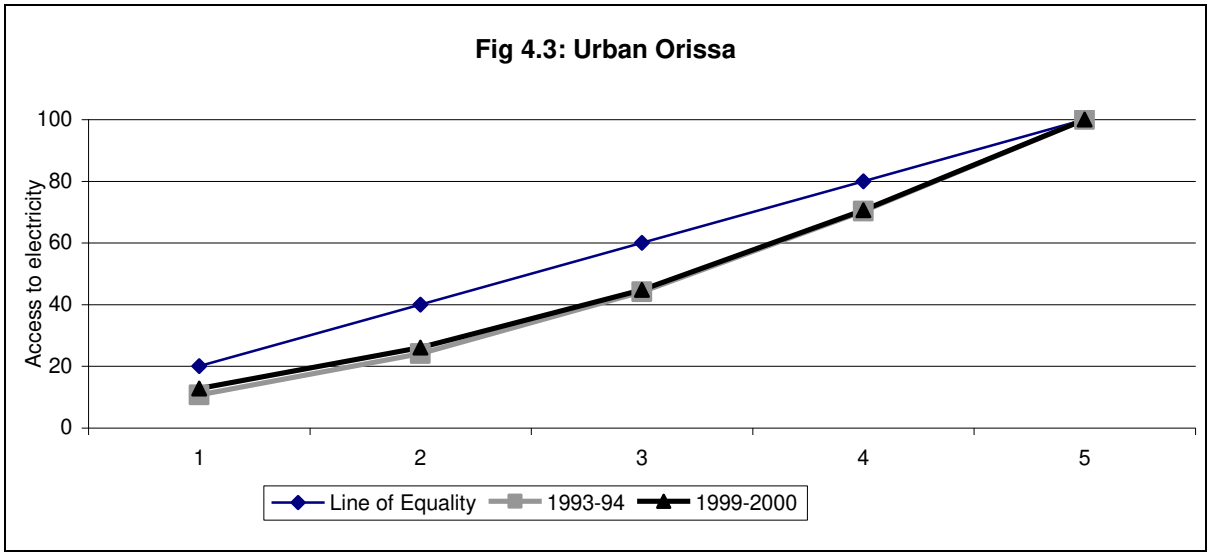


Fig 4.3: Urban Orissa
100
80
60
40
20
0
Access to electricity
1
2
3
4
5
Line of Equality
1993-94
1999-2000

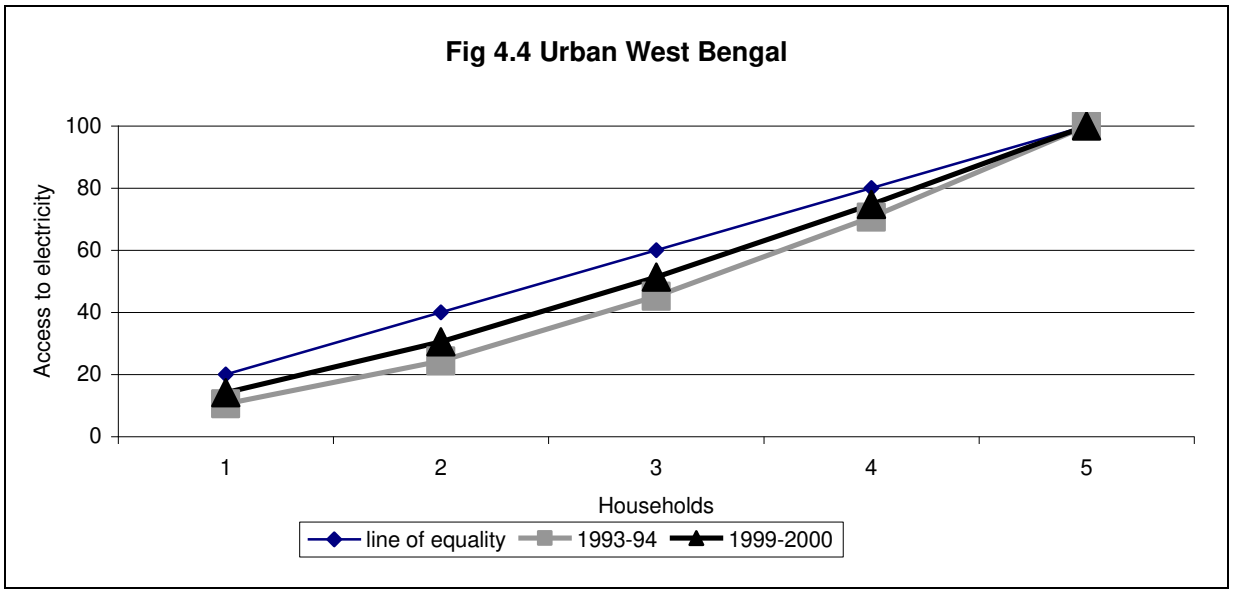
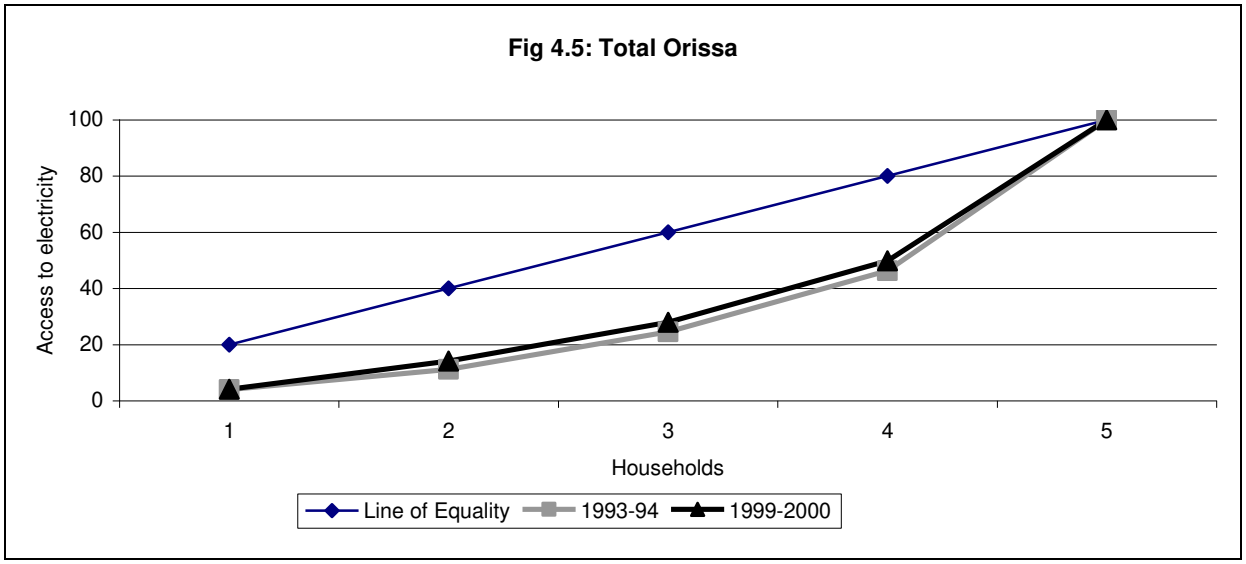
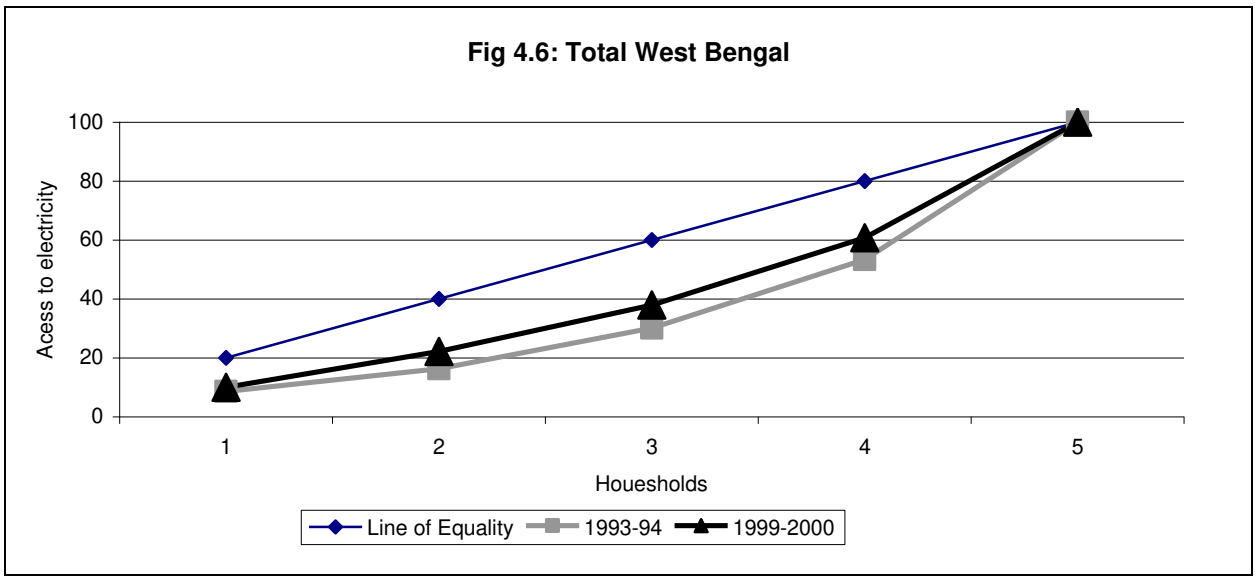


Fig 4.4 Urban West Bengal
100
80
60
40
20
0
Access to electricity
1
2
3
4
5
Households
line of equality
1993-94
1999-2000





Inequality in Affordability of Electricity:

Based on the similar method, Table 9 gives the concentration index of affordability of electricity.

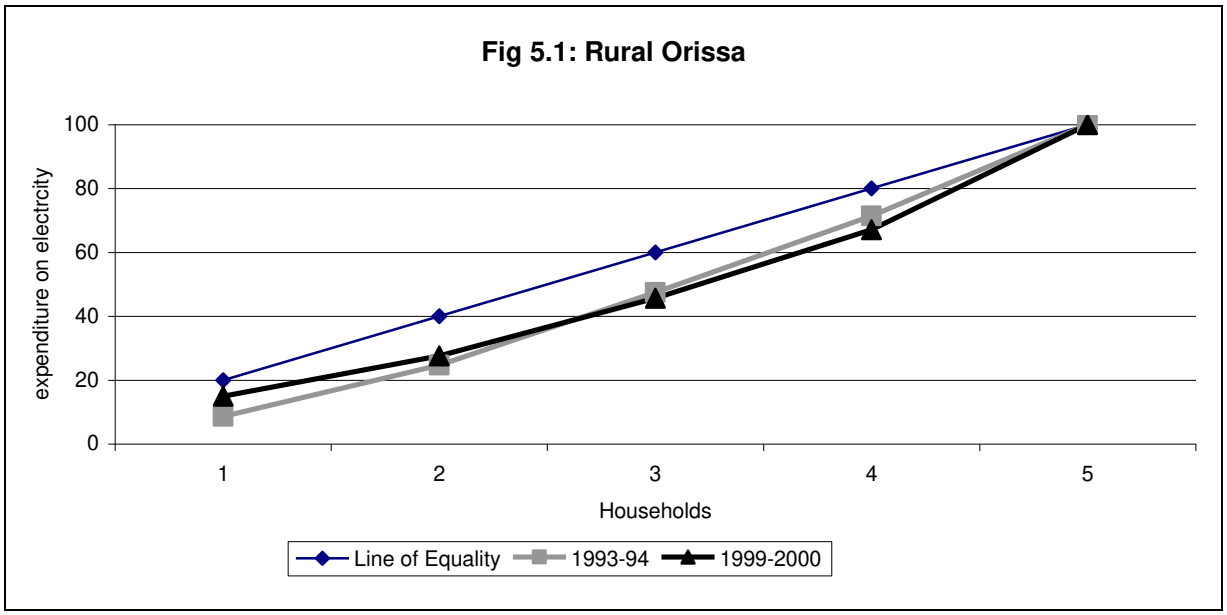
Table 9: Concentration index for expenditure on electricity

	Rural		Urban		Total	
	1993-94	1999-2000	1993-94	1999-2000	1993-94	1999-2000
Orissa	0.19	0.37	0.22	0.18	0.20	0.21
West Bengal	0.15	0.32	0.27	0.17	0.32	0.28

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure.

It is to remind that we use expenditure on electricity by households as proxy for affordability. It is important to note here that the CI is calculated by using the average expenditure on electricity by those households who have access to electricity (this is given in Table 7). The interpretation of the CI in the case of electricity expenditure is slightly unusual. Here, decline in the value of CI would mean that the burden of electricity expenditure on poor households are increasing which can be taken as a worse off case rather than better off case. Therefore, higher the value of CI, lower will be the burden of electricity expenditure on the poor. In earlier we discussed the factors that affect the burden of electricity expenditure on households. Concentration curve is derived to give visual clarity (Figure 5.1 to 5.6). Y-axis in concentration curve shows the cumulative share of expenditure on electricity while X-axis represents the cumulative population percentage. The value of CI for rural Orissa has increased from 0.19 in 1993-94 to 0.37 in 1999-2000, which implies that the burden of electricity expenditure on the poor have declined. But this is not due to the reduction in price rather reduction in access and overall consumption by the bottom quintiles following drastic increase in price. During the same period, for rural West Bengal, CI increased from 0.15 to 0.32. This is on account of drastic increase in the electricity expenditure by upper quintiles, i.e., the share of upper quintiles in total expenditure on electricity has experienced very significant increase (Table 7). The value of CI has declined for urban areas in both the states but more progressively for West Bengal. This would mean that burden of expenditure on electricity for the poor have increased in urban areas.

Figure 5: Concentration Curve for Expenditure on Electricity



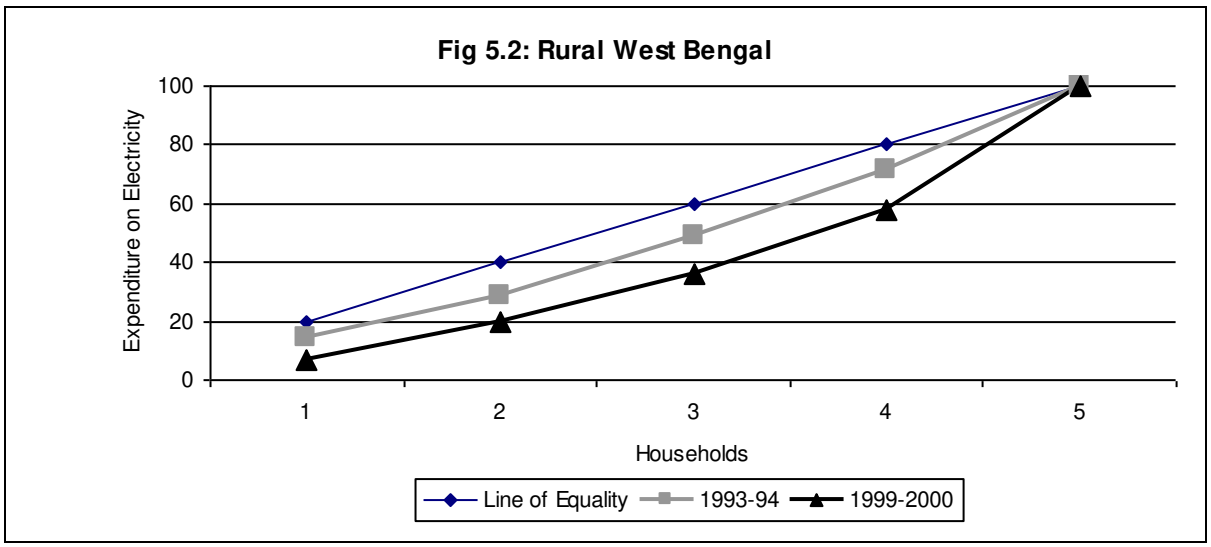


Fig 5.3: Urban Orissa

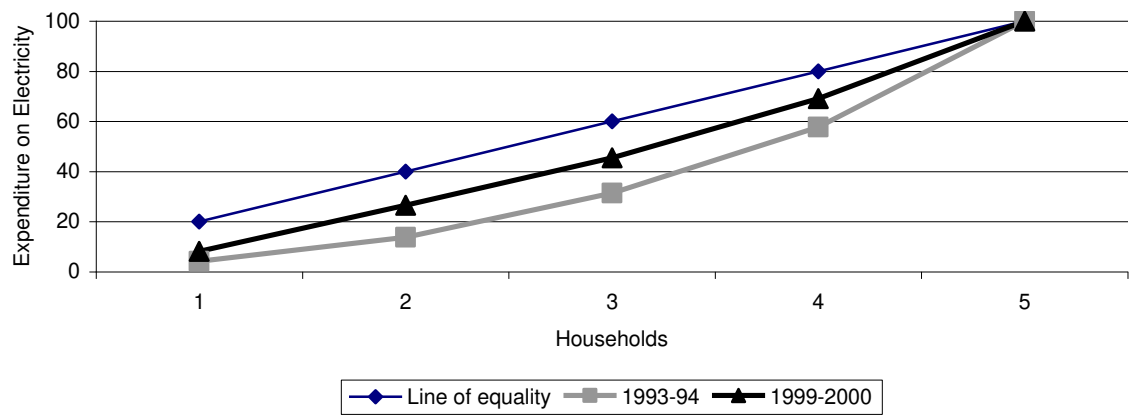
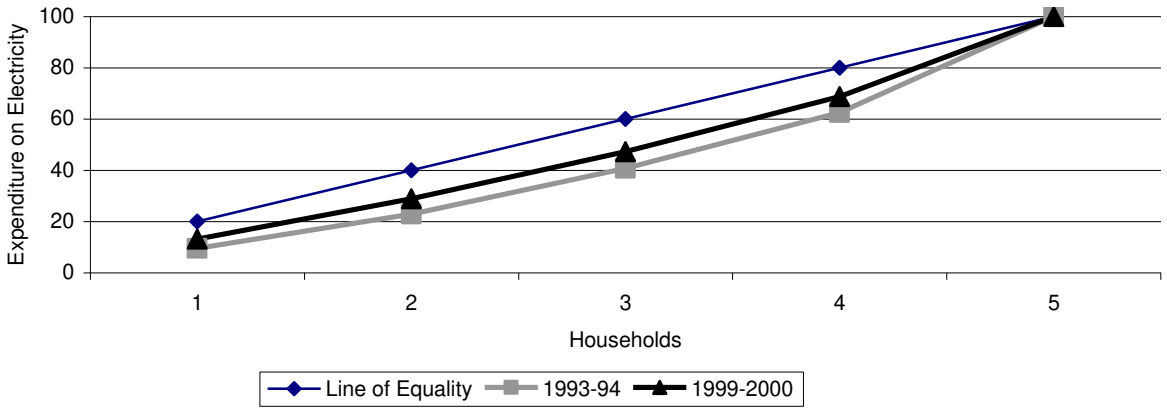
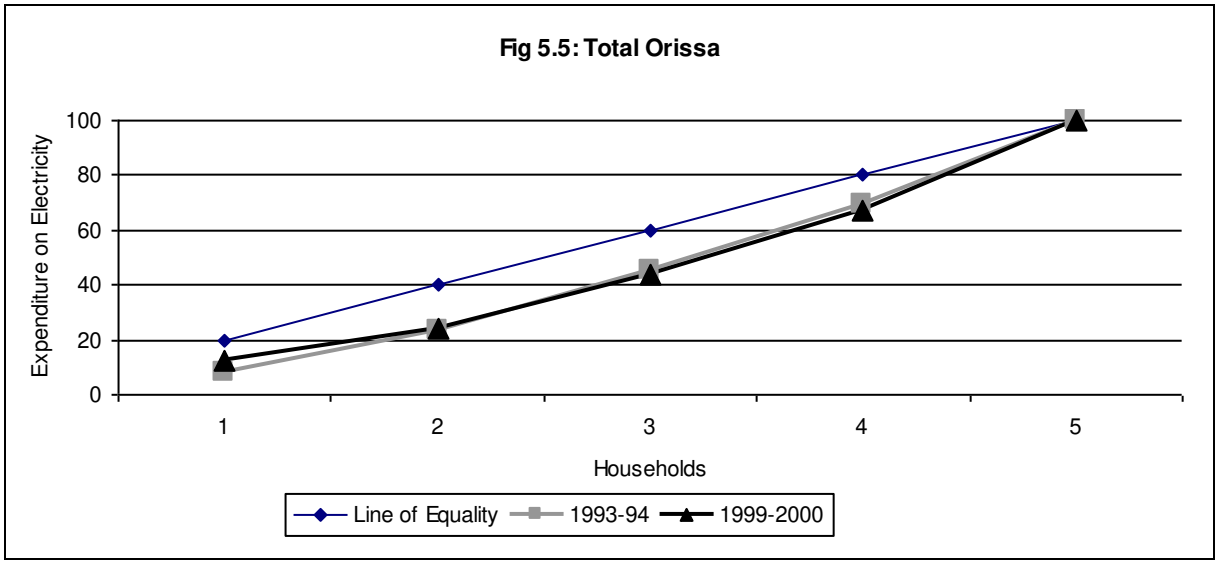
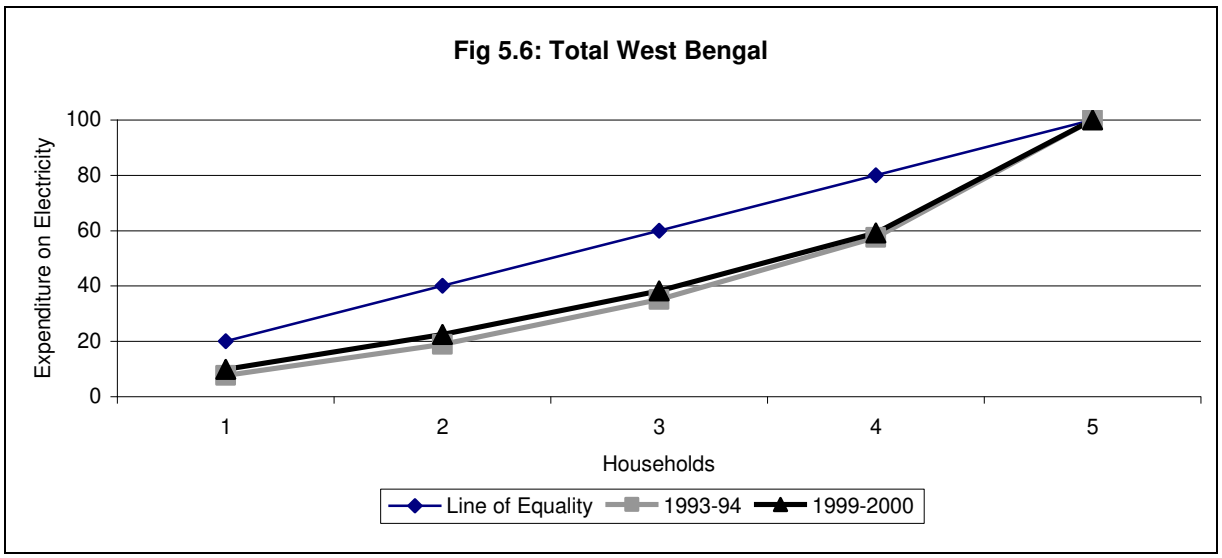


Fig 5.4: Urban West Bengal







7. Conclusion

From the analysis of NSS data (50th and 55th round) we found that ignorance of policy towards possible negative impacts of power sector reforms on poor sections of society have left the poor at losers end. The situation of poor in a non-reform state like West Bengal is better than that of Orissa, which went for reform in 1995-96. Poor in West Bengal have definitely faired better than the poor of Orissa both in terms of access and burden of expenditure. The inability of Staff Appraisal Report to spell out any instrument to mitigate the possible negative effect of power sector reform on poor was the most important weakness of the World Bank's reform package. It is surprising to see that even though academic works by World Bank experts have

always recognised the undesirable impacts of infrastructure reforms on poor. The practice has been far away from those recommendations.

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Appendix -1

⇒ The Talcher Thermal power station of the OSEB has been transferred to NTPC (3rd june 1995)

⇒ The OSEB was Corporatised into the Grid Corporation of Orissa (GRIDCO) with wiring and distribution functions and the Orissa Hydro Power Corporation (OHPC) in charge of the hydropower projects (1 April 1996).

⇒ The Orissa Electricity Regulatory Commission (OERC) established (august 1996)

a) Issued seven tariff orders till date

b) Level of cross subsidy is being reduced

c) Tariff has experienced a huge hike

⇒ The Orissa Power generation corporation (OPGC) which was established in 1984 got privatised in 1998 with transfer of 49 percent of stake to the private operator , AES consortium, for Rs 603 Crore.

⇒ The distribution and retail supply of electricity was vested in four distribution companies initially as wholly owned subsidiary companies of the GRIDCO, namely the Central Electricity Supply Company of Orissa limited (CESCO), the North Eastern Electricity Supply Company of Orissa limited (NESCO), the Southern Electricity Supply Company of Orissa limited (SOUTHCO) and the Western Electricity Supply Company of Orissa limited (WESCO). Three of these distribution companies i.e., except the CESCO were privatised on 1st April 1999 (acquired by BSES) and the CESCO on 1st September 1999 after dis-investment of its 51 percent share (Acquired by AES consortium, a global Power company from US but now the CESCO is administered by a government official as it backed AES backed out from managerial responsibility of the company). The GRIDCO received Rs 1.6 billion for 51 percent of the stake of the distribution companies (DISTCOS). While the GRIDCO retains only high voltage wiring business under single buyer model. Figure 1 depicts the process of restructuring of the Orissa Electricity board (OSEB).

Appendix 2

Table : Monthly average household total consumption expenditure (HMCE) and their coefficient of variation

	Households with Access to Electricity						**Households without Access to Electricity**					
	Rural		***Urban***		***Total***		***Rural***		***Urban***		***Total***	
Quantile	***Mean***	***CV***	***Mean***	***CV***	***Mean***	***CV***	***Mean***	***CV***	***Mean***	***CV***	***Mean***	***CV***
	West Bengal -1993-94						**West Bengal 1993-94**					
1	608.67	3.71	605.52	3.73	595.11	3.79	568.54	3.97	577.86	3.90	571.30	3.95
2	893.18	2.53	1065.37	2.12	932.15	2.42	892.56	2.53	1021.62	2.21	917.20	2.46
3	1180.24	1.91	1529.87	1.47	1248.85	1.81	1160.95	1.94	1475.62	1.53	1223.15	1.84
4	1522.53	1.48	2184.90	1.03	1691.86	1.33	1511.60	1.49	2123.30	1.06	1645.57	1.37
5	2965.95	0.76	4292.68	0.53	3420.47	0.66	2755.49	0.82	3453.56	0.65	3087.63	0.73
Total	**2149.54**	**1.05**	**2346.65**	**0.96**	**2284.10**	**0.99**	**1297.21**	**1.74**	**1155.57**	**1.95**	**1278.23**	**1.76**
	Orissa 1993-94						**Orissa 1993-94**					
1	387.81	5.82	580.43	3.89	389.42	5.79	377.53	5.98	558.18	4.04	391.79	5.76
2	649.78	3.47	1013.64	2.23	680.53	3.31	649.27	3.47	1003.86	2.25	678.24	3.33
3	902.38	2.50	1482.90	1.52	943.65	2.39	872.27	2.59	1431.91	1.58	922.01	2.45
4	1199.42	1.88	2088.25	1.08	1305.37	1.73	1176.06	1.92	2017.78	1.12	1259.79	1.79
5	2318.06	0.97	3574.71	0.63	2589.92	0.87	1965.19	1.15	3688.84	0.61	2188.29	1.03
Total	**1699.45**	**1.33**	**2106.09**	**1.07**	**1865.45**	**1.21**	**935.09**	**2.41**	**1271.15**	**1.77**	**959.81**	**2.35**
	West Bengal 1999-2000						**West Bengal 1999-2000**					
1	1098.44	2.05	1166.11	1.93	1079.09	2.09	1046.57	2.16	1172.45	1.92	1068.94	2.11
2	1584.99	1.42	2036.33	1.11	1671.91	1.35	1581.30	1.43	1995.52	1.13	1650.18	1.37
3	2048.27	1.10	2833.80	0.80	2198.33	1.03	2044.11	1.10	2730.62	0.83	2173.21	1.04
4	2649.00	0.85	3980.16	0.57	2913.99	0.77	2615.62	0.86	3877.88	0.58	2849.16	0.79
5	4388.23	0.51	7776.51	0.29	5619.34	0.40	4207.53	0.54	6462.48	0.35	4730.35	0.48
Total	**2953.97**	**0.76**	**3986.48**	**0.57**	**3534.56**	**0.64**	**2157.99**	**1.05**	**2184.15**	**1.03**	**2160.48**	**1.04**
	Orissa 1999-2000						**Orissa 1999-2000**					
1	687.29	3.28	956.87	2.36	726.47	3.11	644.00	3.50	895.00	2.52	672.72	3.35
2	1072.45	2.10	1594.39	1.41	1131.48	1.99	1068.71	2.11	1575.95	1.43	1121.65	2.01
3	1428.11	1.58	2261.24	1.00	1572.71	1.43	1446.70	1.56	2248.12	1.00	1534.04	1.47
4	1958.63	1.15	3124.93	0.72	2196.24	1.03	1939.32	1.16	3047.65	0.74	2096.91	1.08
5	3819.82	0.59	5678.11	0.40	4253.29	0.53	3267.67	0.69	5623.38	0.40	3608.37	0.63
Total	**2782.00**	**0.81**	**3234.62**	**0.70**	**2973.96**	**0.76**	**1507.54**	**1.50**	**1889.80**	**1.19**	**1541.40**	**1.46**

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure

Appendix 3

Table: Average expenditure on electricity by households and co-efficient of variations.

Quantile	with and without Access to Electricity						with Access to Electricity					
	Rural		*Urban*		*Total*		*Rural*		*Urban*		*Total*	
	Mean	*CV*	*Mean*	*CV*	*Mean*	*CV*	*Mean*	*CV*	*Mean*	*CV*	*Mean*	*CV*
	Orissa 1993-94						**Orissa 1993-94**					
1	0.46	1183.14	8.43	64.01	0.78	695.88	23.52	9.98	8.43	27.85	20.67	11.35
2	2.09	258.20	19.17	28.14	2.74	196.65	43.75	5.36	19.17	2.50	40.31	5.82
3	5.42	99.54	35.26	15.30	7.26	74.28	61.99	3.79	35.26	2.91	57.30	4.10
4	8.89	60.67	52.76	10.22	13.11	41.13	65.22	3.60	52.76	3.39	63.39	3.70
5	26.84	20.10	84.68	6.37	41.31	13.06	77.91	3.01	84.68	6.61	81.18	2.89
Total	**8.74**	**61.70**	**40.14**	**13.44**	**13.04**	**41.35**	**67.22**	**3.49**	**71.05**	**2.71**	**68.78**	**3.41**
	Orissa 1999-2000						**Orissa 1999-2000**					
1	1.65	525.94	19.90	43.58	3.12	277.56	73.24	3.20	50.93	4.61	61.62	3.81
2	5.06	171.42	46.45	18.67	7.53	115.19	61.75	3.80	115.11	2.04	60.84	3.86
3	9.06	95.75	67.29	12.89	16.90	51.31	88.51	2.65	117.94	1.99	99.78	2.35
4	19.63	44.17	116.07	7.47	31.99	27.11	105.42	2.23	147.39	1.59	118.45	1.98
5	74.47	11.64	172.87	5.02	103.95	8.34	161.27	1.46	192.96	1.22	168.55	1.39
Total	**21.99**	**39.44**	**84.61**	**10.25**	**32.71**	**26.51**	**128.24**	**1.83**	**138.73**	**1.69**	**132.86**	**1.77**
	West Bengal 1993-94						**West Bengal 1993-94**					
1	0.71	765.26	6.68	81.66	2.20	247.75	21.07	11.14	19.97	11.75	20.13	11.66
2	0.76	715.76	15.45	35.28	2.74	199.17	21.71	10.81	35.41	6.63	28.09	8.36
3	2.12	257.01	30.92	17.63	6.58	82.87	30.13	7.79	46.87	5.01	37.60	6.24
4	4.11	132.63	51.17	10.66	13.42	40.64	34.31	6.84	63.40	3.70	45.72	5.13
5	12.48	43.71	111.40	4.90	48.61	11.22	42.57	5.51	119.97	1.96	82.32	2.85
Total	**4.04**	**135.03**	**43.15**	**12.64**	**14.71**	**37.06**	**36.55**	**6.42**	**68.13**	**3.44**	**58.11**	**4.04**
	West Bengal 1999-2000						**West Bengal 1999-200**					
1	3.48	352.97	27.74	44.23	7.65	160.37	42.15	5.57	52.10	4.50	45.15	5.20
2	6.56	187.03	46.87	26.18	11.89	103.17	50.48	4.65	76.41	3.07	57.62	4.07
3	10.44	117.53	86.50	14.18	19.05	64.40	59.19	3.97	110.46	2.12	71.44	3.29
4	14.91	82.28	133.83	9.17	36.97	33.19	69.09	3.40	152.60	1.54	95.61	2.45
5	38.96	31.49	274.45	4.47	123.25	9.95	100.49	2.34	289.04	0.81	186.69	1.26
Total	**14.87**	**82.49**	**113.96**	**10.77**	**39.98**	**30.69**	**74.93**	**3.13**	**151.68**	**1.55**	**118.09**	**1.99**

Source: Calculated from NSS 50th and 55th round survey on consumption expenditure