



Electricity is not a right

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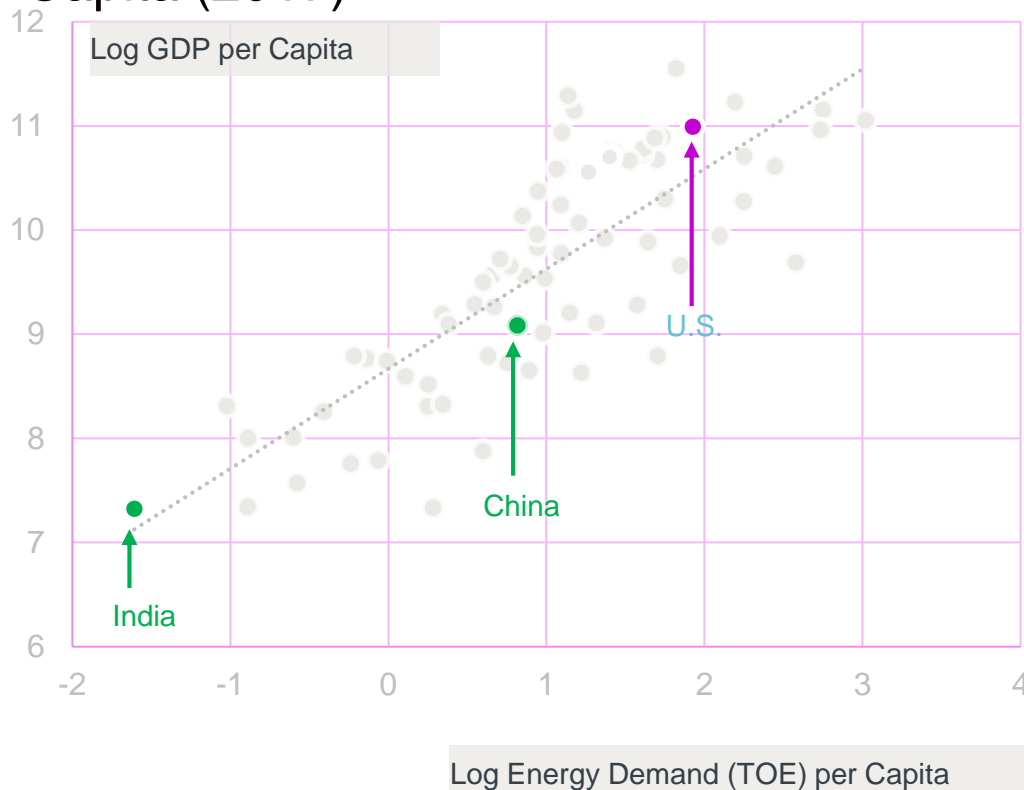
Electricity Around the World

Table 1
Key Electricity Summary Statistics, by Income Level

Quartile	Lowest	Lower-middle	Upper-middle	Highest
Panel A: World Electricity Overview				
Population (millions)	619	2,972	2,568	1,165
GDP per capita in 2016 (% of US)	2.9	10.7	26.7	79.8
Electricity consumption per capita (% of US)	1.1	5.9	27.2	69.9
Connection to Grid (%)	34.9	83.6	99.4	100.0
T&D Loss (%)	22.8	16.2	9.6	6.1
Firm losses due to outages (% of output)	8.7	6.6	2.1	1.6
Panel B: Pricing in Selected Countries				
Mean consumption of electrified households (kWh)	98	103	162	574
Mean price at mean consumption level (US cents/kWH)	3.6	6.3	7.6	18.8
Mean power purchase cost (US cents/kWH)	6.4	7.2	6.6	6.2
Power purchase cost after T&D loss adjustment (US cents/kWH)	7.8	8.3	7.5	6.6
Mean price less adj. power purchase cost (US cents/kWH)	-4.2	-2.0	0.1	12.2

Energy is Critical for Growth

Primary Energy Demand & GDP per Capita (2017)



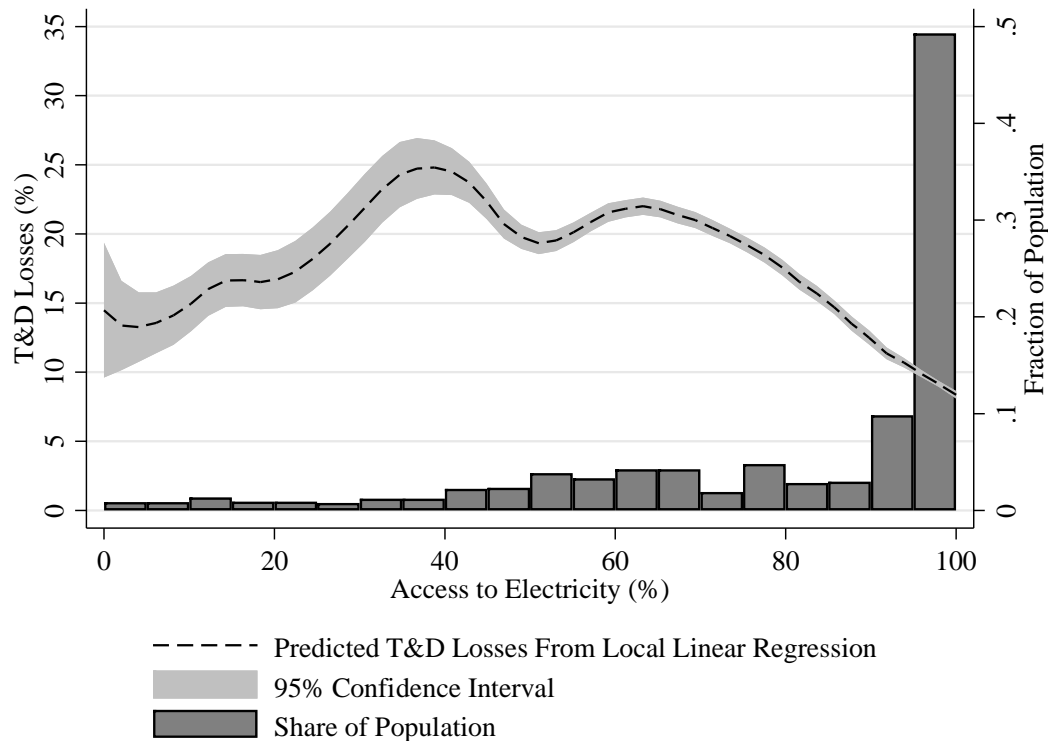
There is no economic growth without energy.

Continued growth in energy demand per capita is critical for improving quality of life in emerging economies.

In this sense, expanded energy access is not only desirable, it is fundamentally imperative and inevitable.

High Access Requires Low Losses

Global Trends in Transmission and Distribution (T&D) Losses



Countries which are trying to expand distribution (for example, into the countryside) face the highest rates of nonpayment for electricity

At the peak of the curve, countries with about 40% access to electricity lose 25% of their power before it is billed to any consumer
A 33% T&D loss rate implies the utility is giving away 1 in 3 units of electricity for free – in other words, the effective cost per kWh sold increases by 50%

Discuss how (paradoxically) viewing electricity as a right limits access and rations supply

There are 4 steps

1. Electricity is seen as a right
2. Electricity distribution is loss-making
3. Distribution companies ration supply
4. Supply and payment become delinked

→ and back to 1 = viscous cycle

Step 1: Electricity is seen as a right

Table 2

Customer Beliefs about Enforcement in Bihar, India

Percentage responses to:

If you did X, how likely would it be that you would incur any penalty from the distribution company?

	Likely	Neutral	Unlikely
Paying your bill late	10.1	13.6	76.3
Modifying your meter	7.9	18.2	73.9
Having an informal hooked connection	7.6	14.4	78.0
Bribing electricity officials	12.2	24.5	63.3

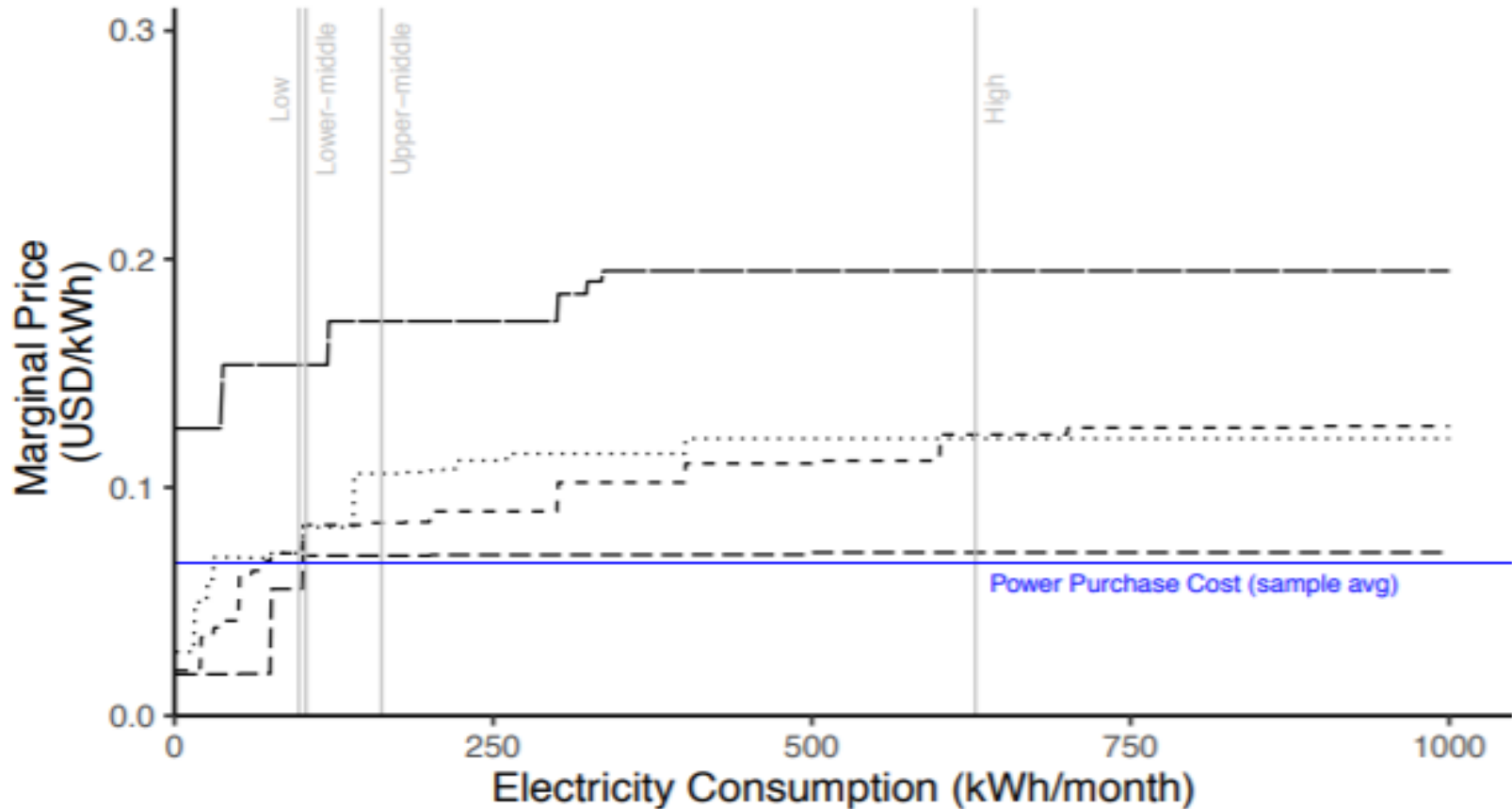
Source: Bihar Electrification Project endline household survey

Notes: Responses are from a survey of 7,071 households in rural Bihar. Modifying a meter, having an informal hooked connection, and bribing officials all prevent a utility from observing actual electricity consumed, and therefore constitute power theft.

Step 1: Electricity is seen as a right

Figure 5

Explicit Subsidies in the Marginal Price of Power

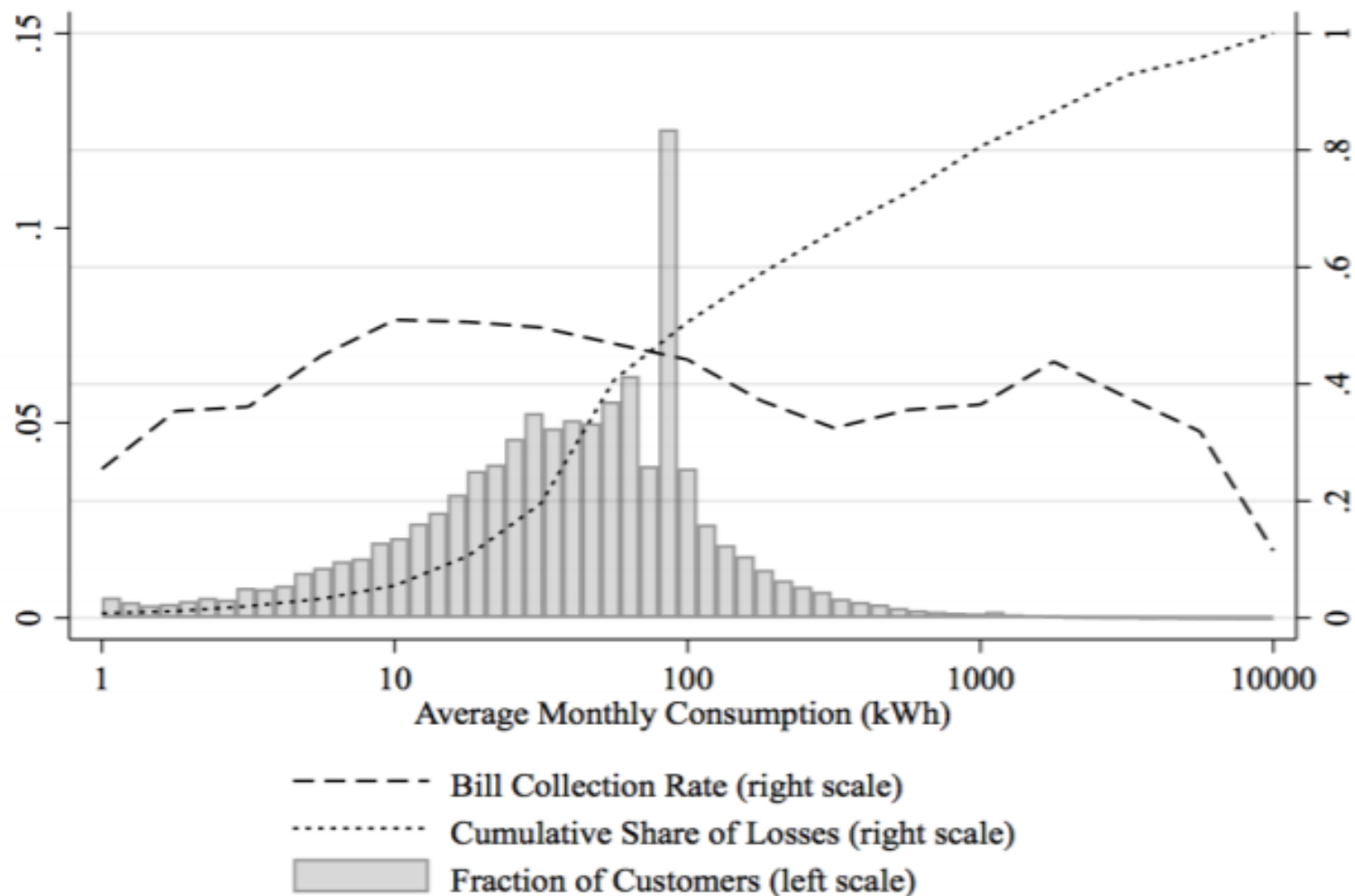


Country Income Range - - - - Low - - - - Lower-middle ······ Upper-middle - · - · High

Step 1: Electricity is seen as a right

Figure 6

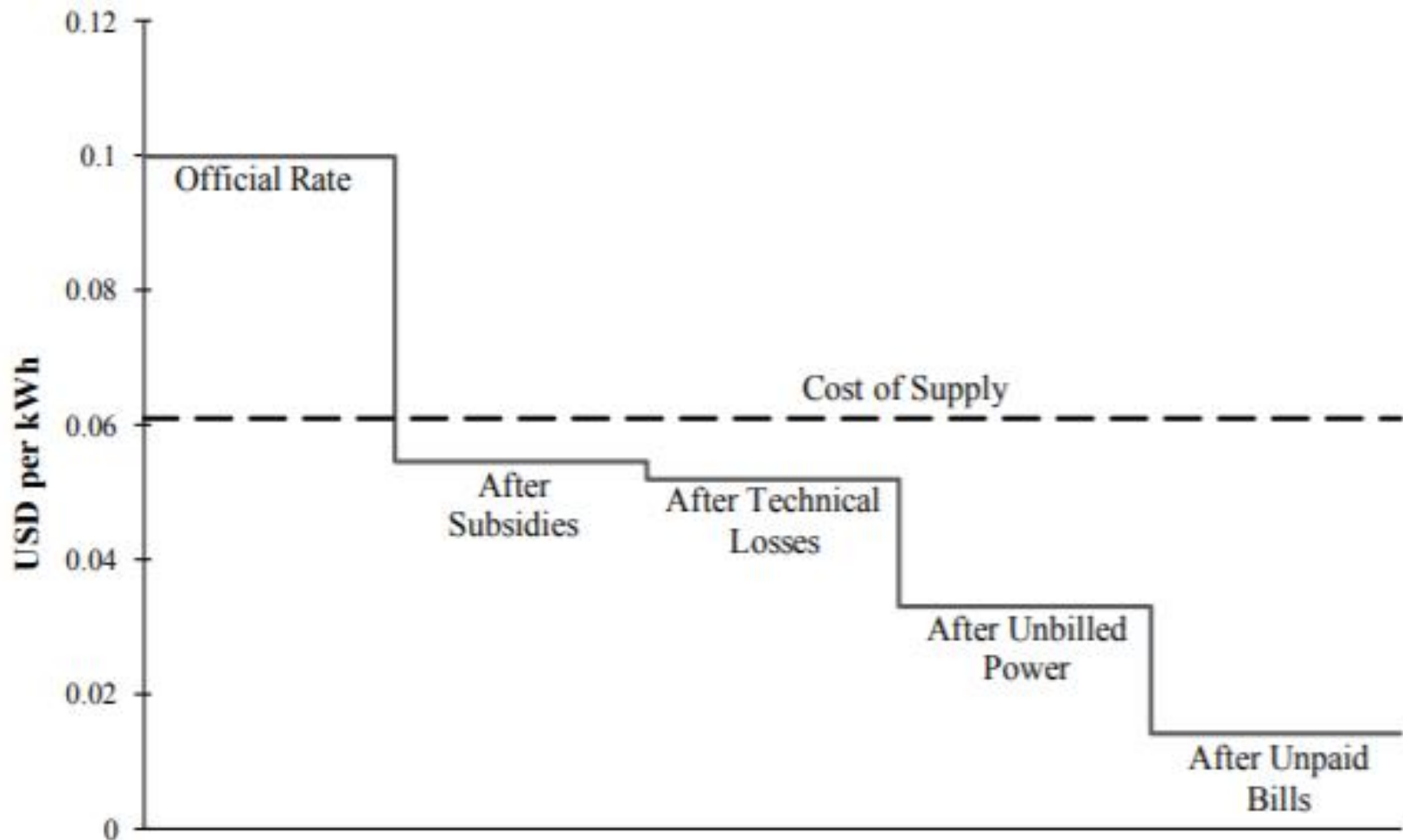
Cost Recovery and Bill Payment in Bihar



Step 2: Electricity Distribution is Loss-Making

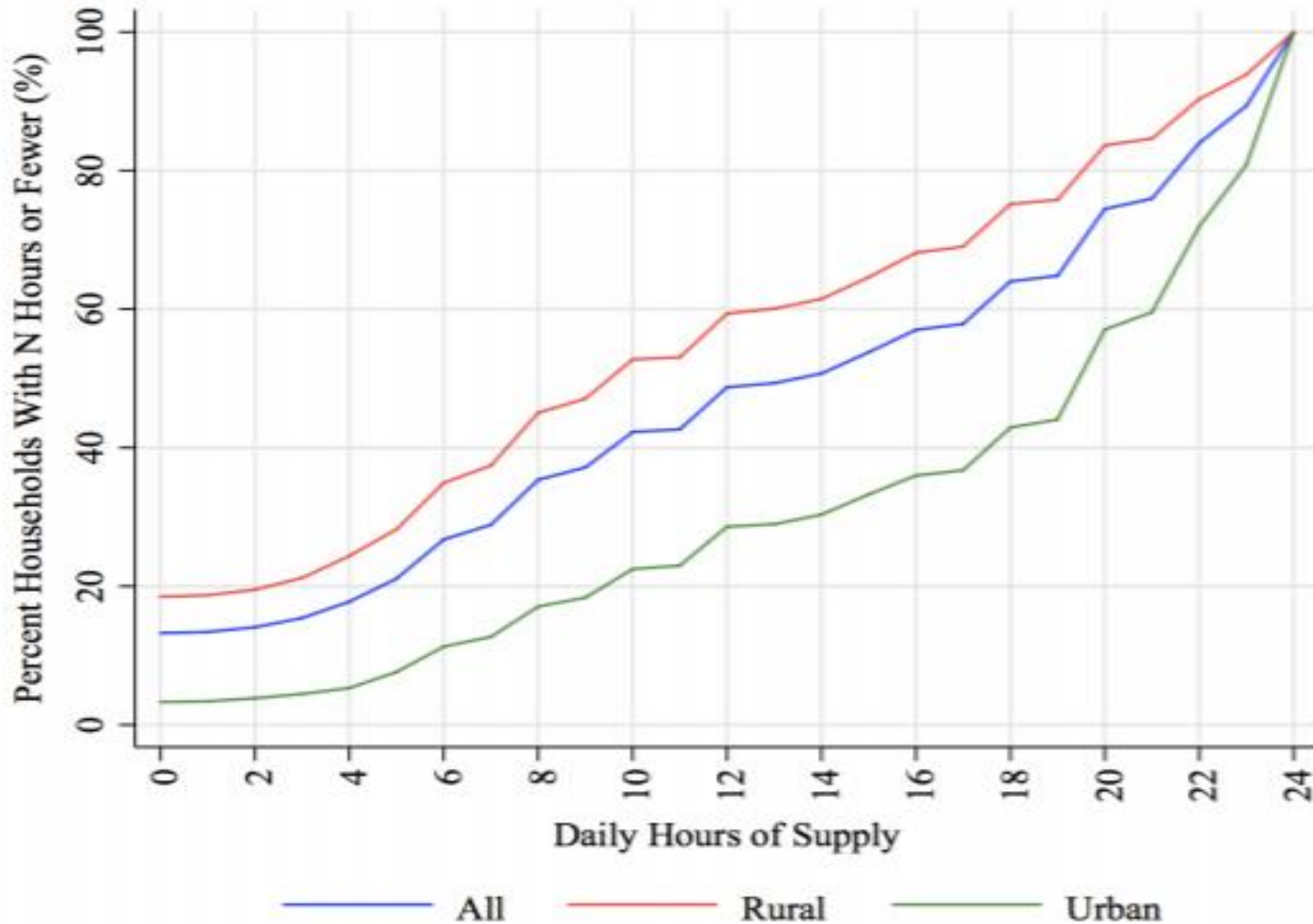
Figure 1

Electricity Losses in Bihar, India



Step 3: Distribution Companies Ration Supply

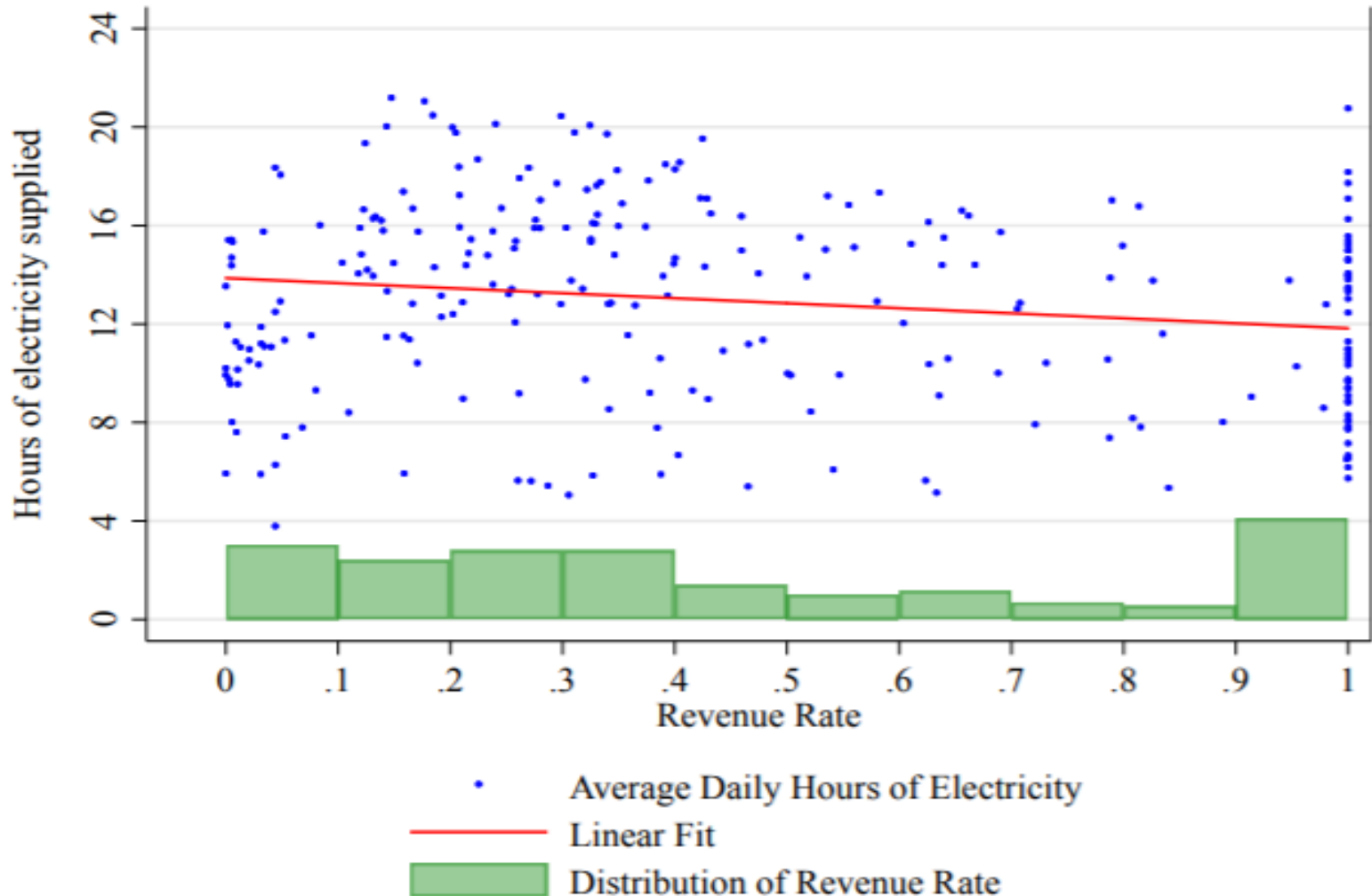
Cumulative Distribution Function of Hours of Power Supply in India



Step 4: Supply and Payment Become Delinked

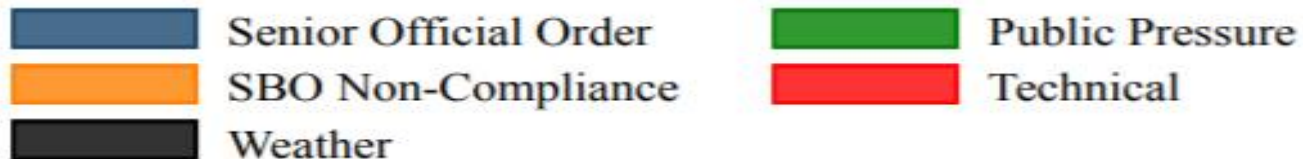
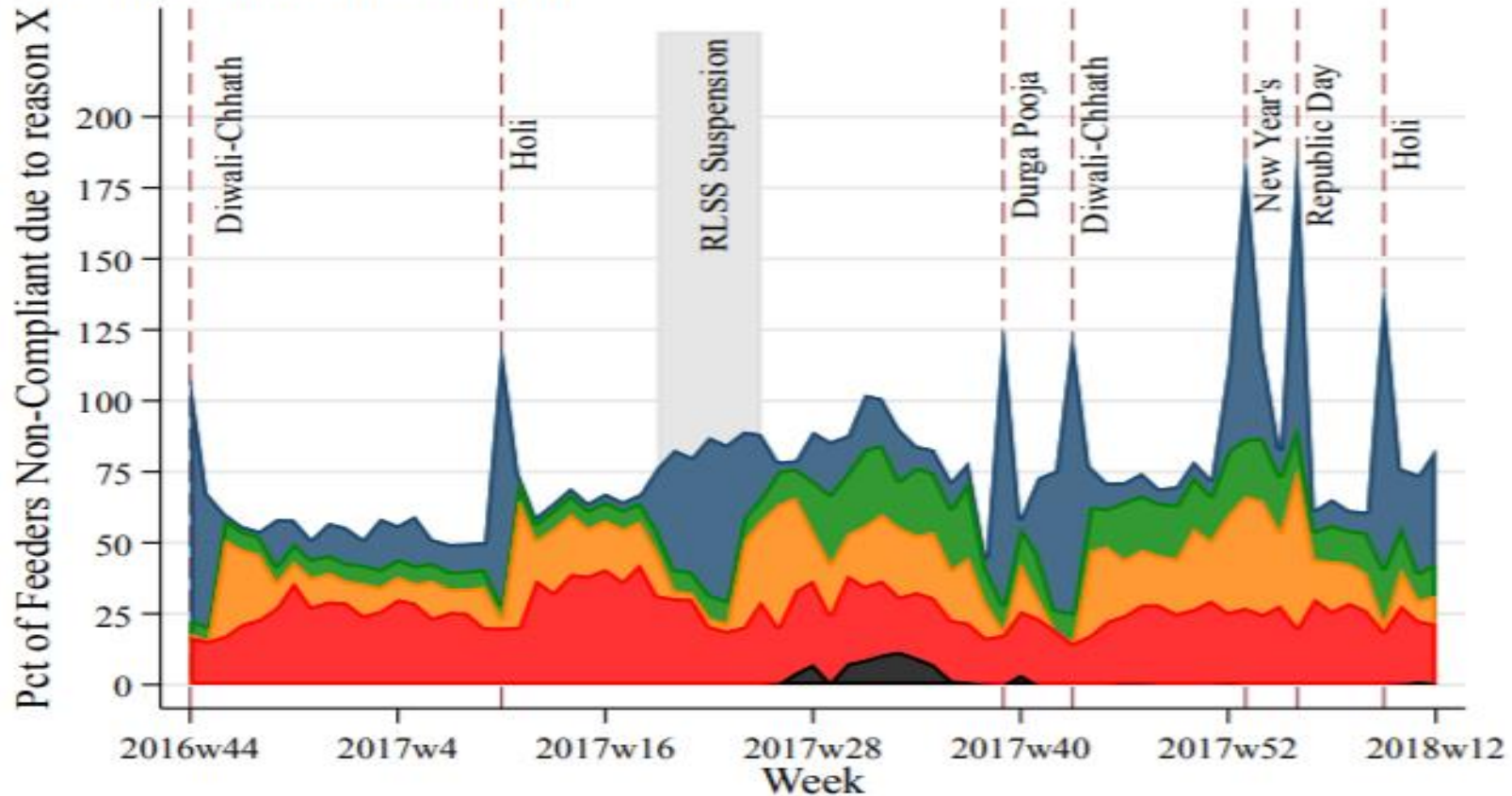
Figure 2

Hours of Electricity Provided in Bihar vs. Fraction of Revenue Collected



Step 4: Supply and Payment Become Delinked

Non-Market Influences on Supply



IGC

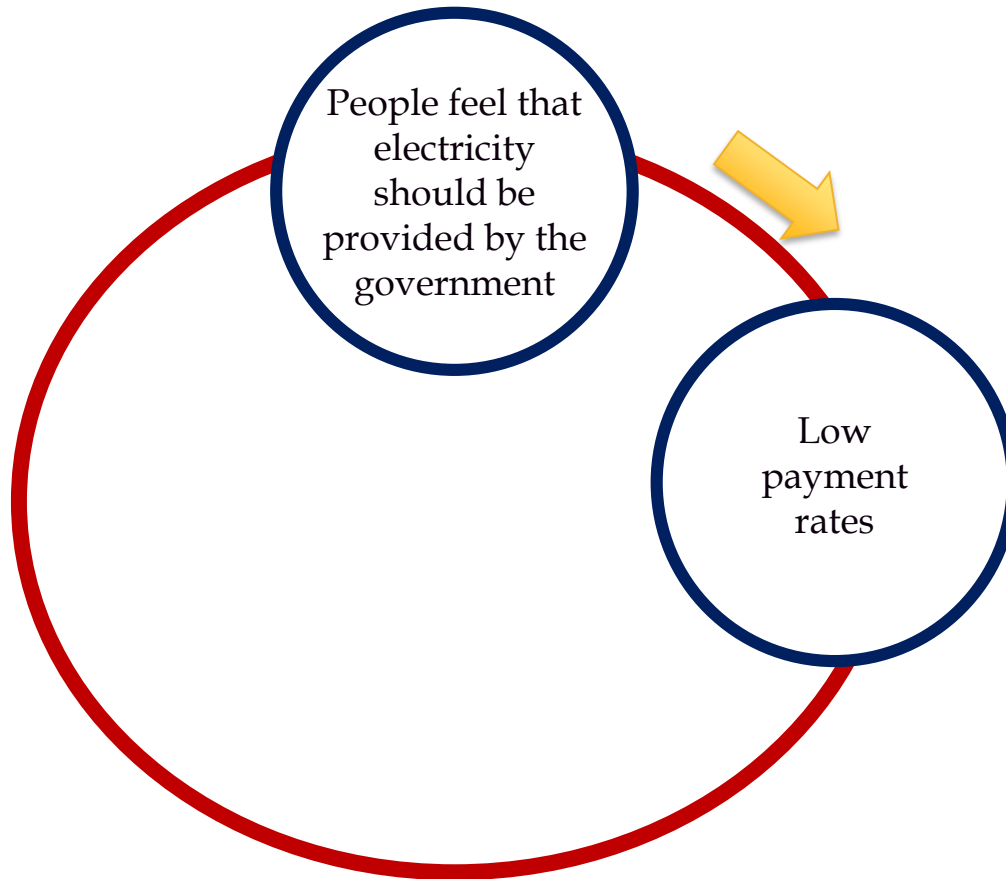
10
years

International
Growth Centre

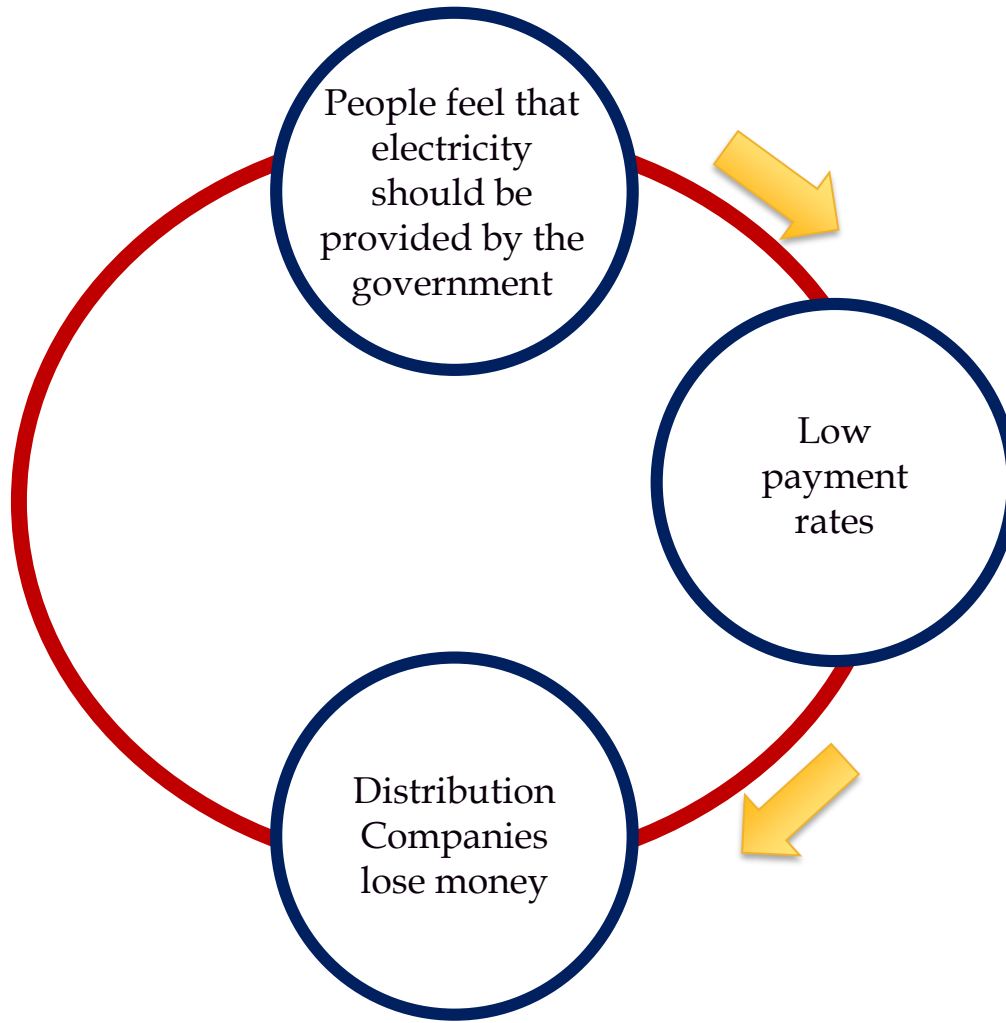
Vicious Circle of Low Payment and Restricted Supply

People feel that
electricity
should be
provided by the
government

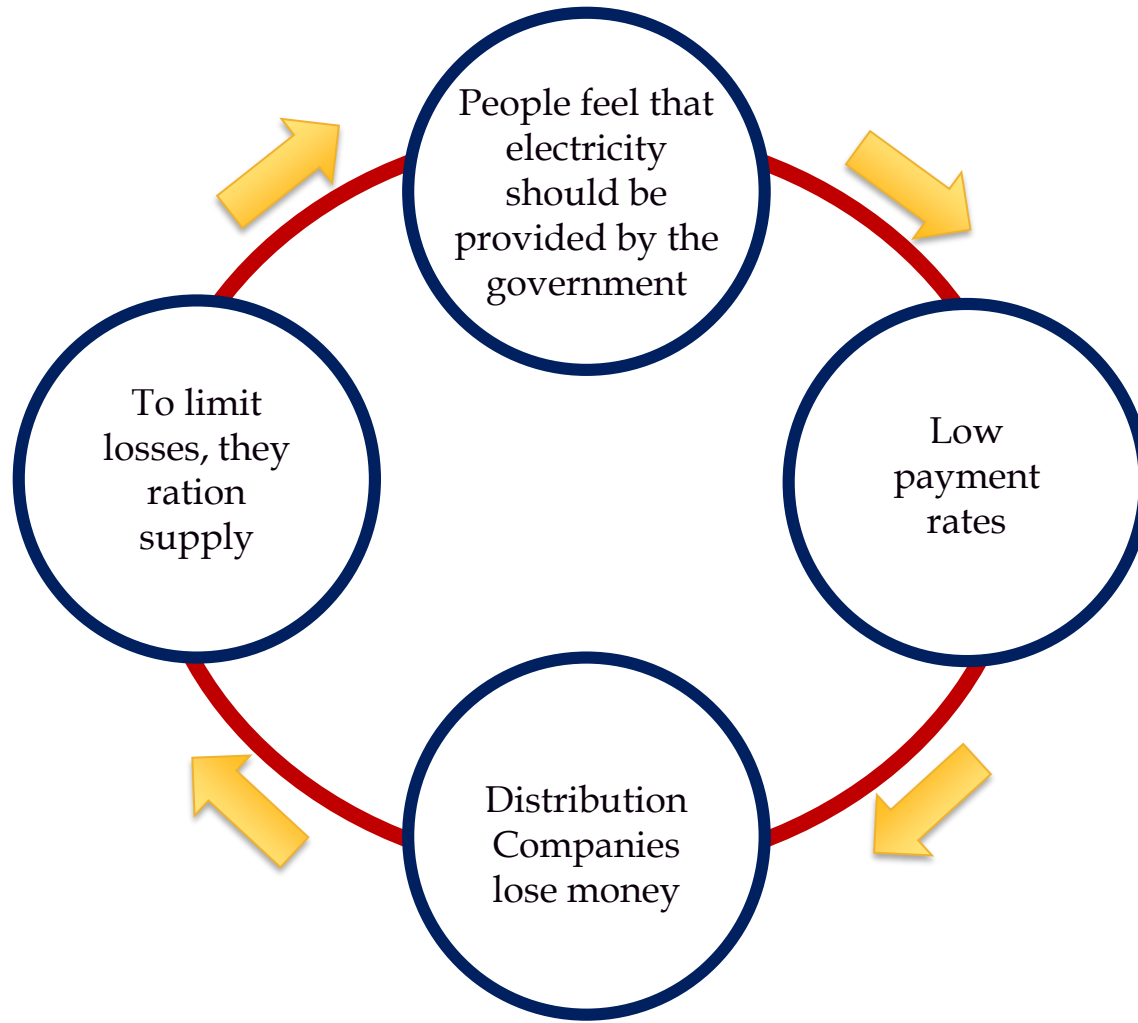
Vicious Circle of Low Payment and Restricted Supply



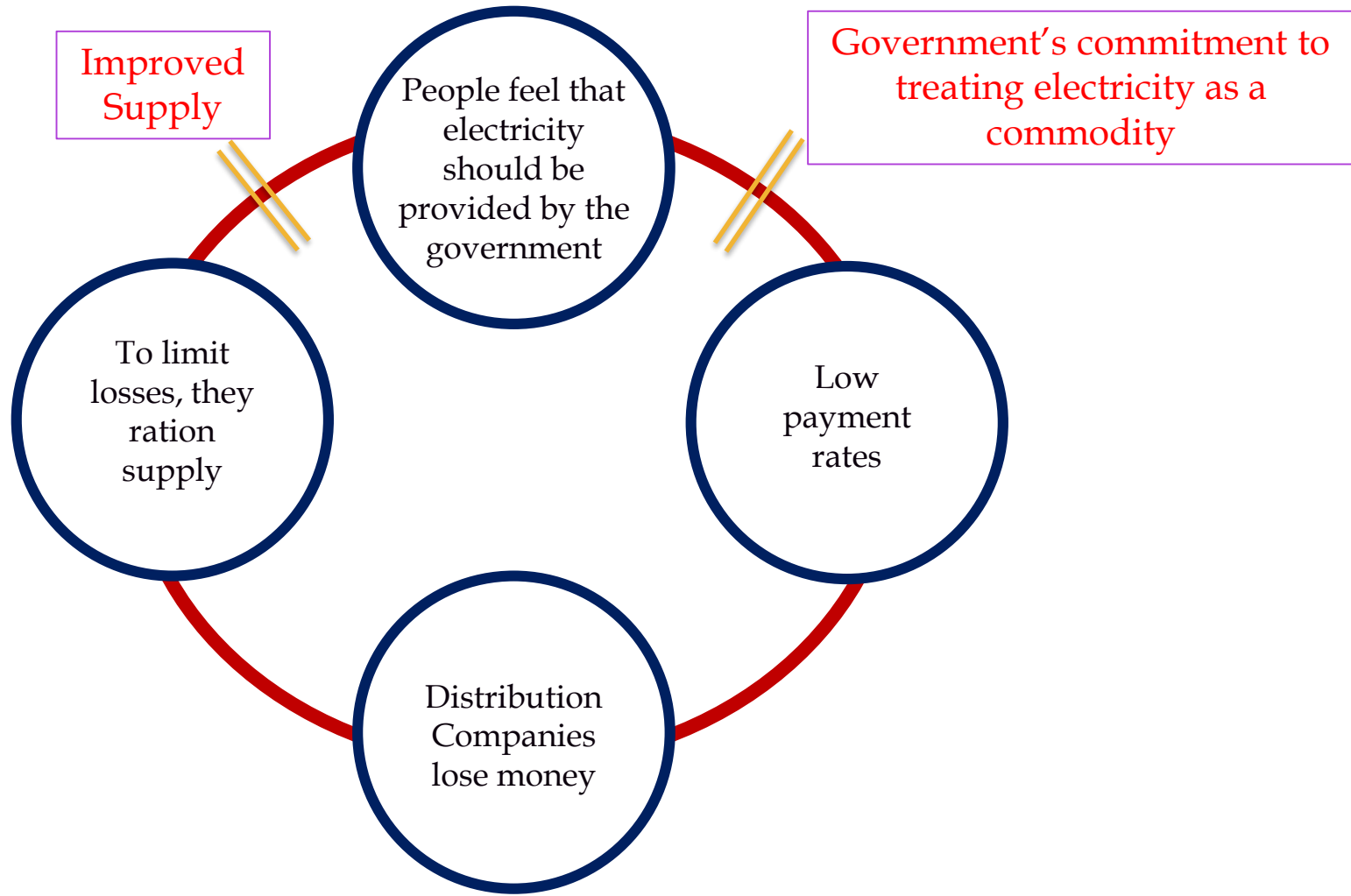
Vicious Circle of Low Payment and Restricted Supply



Vicious Circle of Low Payment and Restricted Supply



Vicious Circle of Low Payment and Restricted Supply



What can be done to break the cycle = challenge being taken up by IGC in India and elsewhere

1. Rationalize subsidies – DBT etc
2. Change the social norm – e.g. link hours of supply to payment – Anant
3. Incentivize bill collectors – ongoing
4. Bring in alternatives (e.g. off-grid solar) – Michael
5. Technology - better monitoring and enforcement (e.g. smart meters) – ongoing
6. Behavioral interventions

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