Who Benefits from Utility Subsidies? 
Consumption and Connection Subsidies in Africa

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Tariffs & Subsidies - Context

- Large subsidies for electricity and water in developing countries (tariffs below cost)
- Use of Inverted Block Tariffs for protecting small customers (ex.: lower tariff/kwh for consumption below 40kwh per month, higher tariff/kwh for additional consumption above 40kwh, etc.)
- Alternative to IBTs is VDT
- Alternative to consumption subsidies is subsidies for network expansion
- Which subsidies are well targeted?
Targeting/benefit incidence measure

- Parameter $\Omega = \frac{\text{share of subsidies in tariff structure received by the poor}}{\text{share of poor in population}}$

  - Example: if poverty is at 62% in Rwanda, and the poor get 6% of a subsidy, $\Omega = 0.1$

- Objective: $\Omega$ as large as possible (if $\Omega > 1$, subsidies considered as pro-poor)
Analytical framework

- Five determinants of \( \Omega \)
  - \( A \) = access to electricity in neighborhood
  - \( U \) = take-up of electricity given access
    \[ \Rightarrow A \times U = \text{actual household access rate} \]
  - \( T \) = share of households with subsidy
  - \( R \) = rate of subsidization
  - \( Q \) = quantity of electricity consumed
  - \( C \) = average cost of production & distribution
    \[ \Rightarrow R \times Q \times C = \text{subsidy value among beneficiaries} \]
Analytical framework

- **Average benefit among the poor**
  \[ B_p = A_P U_P T_P R_P Q_P C \]

- **Average benefit among population**
  \[ B_n = A_n U_n T_n R_n Q_n C \]

\[ \Omega = \left( \frac{A_P}{A_N} \right) \left( \frac{U_P}{U_N} \right) \left( \frac{T_P}{T_N} \right) \left( \frac{R_P}{R_N} \right) \left( \frac{Q_P}{Q_N} \right) \]
Example – Burkina Faso

- **National, electricity**

  - $A_p=0.09, A_n=0.22 \rightarrow A\;\text{ratio} = 0.40$
  - $U_p=0.09, U_n=0.43 \rightarrow U\;\text{ratio} = 0.21$
  - $T_p=1.00, T_n=1.00 \rightarrow T\;\text{ratio} = 1.00$
  - $R_p=0.46, R_n=0.35 \rightarrow R\;\text{ratio} = 1.32$
  - $Q_p=21.4, Q_n=36.7 \rightarrow Q\;\text{ratio} = 0.58$
    \[ \rightarrow \Omega = 0.06 \]
    \[ \rightarrow \gamma < 0.03 \]
Cross-country data: $\Omega$ for electricity

<table>
<thead>
<tr>
<th>Country</th>
<th>Omega</th>
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<tbody>
<tr>
<td>Burkina</td>
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<tr>
<td>Uganda</td>
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Cross-country data: Ω for water
Cross-country data: Access vs. subsidy design factors - Electricity
Cross-country data: Access vs. subsidy design factors - Water
Connection subsidies: simulations

- **1st scenario:** Distribution of connection subsidies mirrors distribution of existing connection (least favorable)
- **2nd scenario:** Households with access in neighborhood and no connection get subsidy
- **3rd scenario:** Connection subsidy randomly allocated to households without connection, even if access in neighborhood is not there (most favorable long term scenario)
Cross-country data: Potential targeting of connection subsidies - Electricity

- **Scenario 1**: all unconnected households receive subsidy
- **Scenario 2**: only hhs with access but no connection receive subsidy
- **Scenario 3**: distribution of connection subsidies mirrors distribution of existing connections

Country-specific distribution comparisons are shown for each scenario.
Cross-country data: Potential targeting of connection subsidies - Water

- Scenario 1: all unconnected households receive subsidy
- Scenario 2: only hhs with access but no connection receive subsidy
- Scenario 3: distribution of connection subsidies mirrors distribution of existing connections
Utility consumption subsidies through tariffs are badly targeted vs. other subsidies (educ./health/social prot.)

Coverage of networks is low, esp. in poor countries

Impact on poverty of higher tariffs is relatively low because coverage is low and not for the poor

Utilities loosing money cannot expand networks

Gain from access to network for the poor is much larger than gain from consumption subsidies (2 reasons: externalities & unit costs - Niger example)

Despite affordability concerns, willingness to pay studies suggest non-connected households would rather pay higher tariffs and get access

→ Increasing tariffs and using proceeds for investments in capacity and network expansion is probably pro-poor
How to raise tariffs/reduce subsidies in sensible way?

- Lower threshold for “lifeline” bracket in tariff structure (examples: 20kWh, 4-6m³)
- VDT is a useful alternative to IBT – large savings in cost of subsidies (but discontinuity)
- Control of pricing at public fountains (Niger)
- Better cost recovery for pirate connections
- Evaluation of targeting of connection subsidies: many may still not be reaching the poor properly
- Reduction in cost structure and improvement in efficiency & management of utilities