Short-run subsidies and long-run demand for health and environmental products: Evidence from two randomized trials in East Africa

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Background

• Majority of households are not connected in Rwanda – only 37% connected nationally
• Pneumonia is the leading cause of death - indoor air pollution from kerosene smoke is a major risk factor (Barron & Torero, 2017)
• The proposed solution is for-profit distribution of solar
• Yet adoption of such technologies remains low
• Preliminary evidence that most households are unable to afford even the cheapest lights (Grimm et al, 2016b; Barron, Clarke & Visser, 2017a).
• Should for-profits or governments distribute lights?
• What are the most effective pricing strategies?
• How do one-off short-run subsidies affect long-run demand?
• Subsidies are common but controversial in the development world
Experimental Design: Phase I

• The study includes two separate randomized field experiments.
  • One randomly varying upfront price of lights
  • One randomly varying user fee

• Phase I: lights are sold to consumers

• Randomly assign discount vouchers

• Goal: determine optimal pricing policy and impact on long-run use.
  • e.g., do households that paid for lights use them more?
Experimental Design: Phase I

• Rural Huye, Rulindo, and Ruhango districts

• 1987 households from 18 villages

• Following the methodology of Cohen and Dupas (2010), Dupas (2014a), and Meredith et al, (2013).

• Household level randomization

• Prices include 0, 200, 300, 500, 800, 1000, 1500, 2000, and 3000 RWF
Data

- Two data sources:
  - First, collected purchase information, voucher IDs, serial numbers.
  - Second, we specially develop remote data capturing technology using cellular GSM transmission.

- This unique data collection technology allow us to measure actual usage rates, instead of relying on surveys.

- Surveys change behavior
Experimental Results: Short-run adoption, Phase I

- The experimental results are shown in figure 1.
Take-up and price

• We estimate the following equation

\[ Y_{iv} = \beta_0 + \sum_{j=200}^{3000} \beta_j P_{ivj} + \gamma Village_{iv} + \varepsilon_{iv} \]

• Coefficient interpretation: percentage point reduction in demand compared to demand when the price is zero.
Take-up and price

• At 500RWF ($0.67) demand drops significantly by 17.1 percentage points.

• When 1000RWF ($1.33) is charged demand falls by 45 percentage points.

• Other than 200, each price increase reduces demand further and is statistically significant with the highest price of 3000RWF ($4) reducing demand by 88 percentage points.

• Looking at the R squared, we also see 40% of the variation in demand can be explained by price alone
Take-up and Price

• Inline with literature on health products.

• Price is the most important factor driving

• Credit constrained or households simply do not value LEDs as much as their market price.

• To ensure high take-up zero, or very low prices, are required
Conclusion

• This study
  • estimates demand curves for both the initial price of low-cost LEDs as well as the subsequent user fee for repeated purchases
  • Estimates the impact of short-run subsidies on long-run demand.

• We find uptake is highly sensitive to initial price.

• Strong evidence that the initial upfront price of LEDs should be subsidized aligning with a new literature with the same results (Grimm et al., 2016).
Thank you!