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

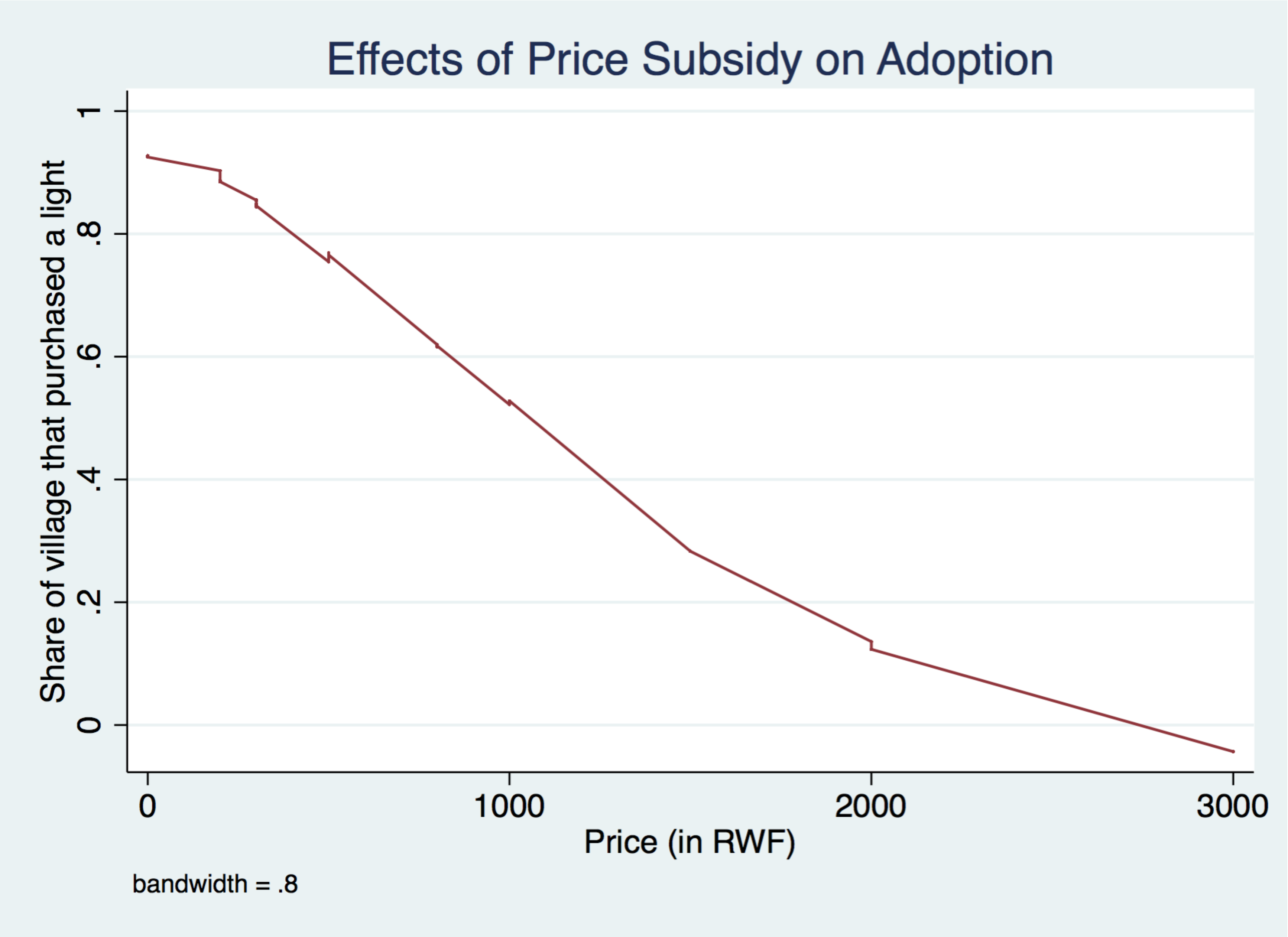
- Rural Huye, Rulindo, and Ruhango districts
- 1987 households from 18 villages
- Following the methodology of Cohen and Dupas (2010), Dupas (2014a), and Meredith et al, (2013).
- Household level randomization
- Prices include 0, 200, 300, 500, 800, 1000, 1500, 2000, and 3000 RWF

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

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

- 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!