Unveiling the Winners and Losers: The Distributional Effects of Net Metering Policies

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Overview

This paper investigates the impact of net metering policies on residential solar photovoltaic (PV) adoption and their distributional effects across different wealth groups, comparing with two alternative incentive policies: feed-in premiums and upfront subsidies. The findings highlight the importance of funding sources for renewable energy subsidies. When subsidies are financed through electricity consumption by volumetric pricing, all three policies result in low-income households cross-subsidizing high-income ones, with net metering generating slightly higher inequality. Moreover, the three policies affect PV adoption sizes: net metering aligns PV capacity with actual electricity consumption, feed-in premiums encourage larger PV installations, and upfront subsidies promote smaller capacities. While feed-in premiums are the most equitable, they increase the electricity surplus returned to the grid, requiring higher grid costs. Upfront subsidies are the most cost-effective but demand substantial subsidies. Net metering compromises cost efficiency and rooftop utilization. This paper is an important input to the debate on the net metering policy.

Methods

A two-level nested logit model of residential PV installation is estimated, and counterfactual scenarios are simulated using the estimates.

Results

The result shows that the regressive effect of net metering remains when it is replaced with upfront subsidies or feed-in premiums but at a lower level. Furthermore, this paper finds that intensive margin is important in evaluating incentive policies. Given the total installed capacity, compared to net metering policies, households tend to install smaller solar panels under upfront subsidies and larger sizes under feed-in premiums. There are two main consequences; first, due to large size benefits from economies of scale, the installation costs under upfront subsidies are higher. Second, a small capacity size implies a larger self-consumption rate, and hence lower burden on distributional grids. The selection of policies depends on the objective. Upfront subsidies should be considered if the government wants to minimize the total installation and grid costs. On the other hand, if the government wants to mostly utilize the rooftops to maximize the residential capacity and cares about equity, feed-in premiums are best.

Conclusions

This paper disagrees with the widespread consensus that net metering should be replaced with other incentive policies. It provides insights into subsidy finance. Net metering is most inequitable if the subsidy is funded within the residential energy sector, but this problem cannot be solved by replacing the policy alone. The regulator should consider compensating for the subsidies through other sectors, such as adjusting income or wealth taxes.