

HOUSEHOLD ENERGY SECURITY IN THE POST-ADOPTION PERIOD: EVIDENCE FROM RESIDENTIAL SOLAR TRANSITION IN VIETNAM

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Extended Abstract

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Abstract Summary

The global target of net-zero emissions necessitates a profound transition in energy consumption. While Distributed Energy Resources (DER), such as residential solar power, are central to enhancing household energy security, their long-term impact on grid demand is often complicated by behavioral shifts. In the Global South, the effectiveness of these transitions is frequently debated due to the potential rebound effect, where lower perceived marginal costs lead to increased consumption. This study investigates the causal link between solar adoption and grid electricity consumption in Vietnam, focusing on the stability of energy-saving gains over a 72-month period.

This research utilizes a high-frequency panel dataset and employs two rigorous econometric frameworks to ensure robust causal inference. First, a staggered Difference-in-Differences approach (Callaway and Sant'Anna, 2021) is used to identify the dynamic treatment effects of solar adoption while accounting for variations in adoption timing. Second, a dynamic GMM model is applied to analyze the persistence of electricity consumption and the role of socio-demographic and structural determinants in the post-adoption period.

The findings reveal no evidence of an immediate solar rebound effect; instead, adoption initially triggers a significant displacement of grid demand. However, the analysis identifies a reversal trend in the later post-adoption years, where initial energy-saving gains partially erode. Furthermore, the GMM results indicate that the long-term reliability of these gains is heterogeneous. Highly educated households demonstrate significantly lower and more stable grid consumption patterns. Conversely, residents of recently constructed dwellings exhibit higher grid demand, which may attenuate the security benefits provided by solar generation over time.

These results suggest that while residential solar transition effectively bolsters initial energy security, the energy trilemma requires more than technological adoption. Promoting self-

consumption schemes and adjusting rooftop solar Feed-in tariff rates regionally should go with implementing inclusive and sustainable housing standards.

Presenting Author Biography



I am on my PhD journey in Development Economics at Erasmus University, the Netherlands. My research focuses on Energy Economics, Resource Economics, and Environmental Economics. My academic journey began at Kiel University in Germany, where I earned Master's degrees in both Economics and Environmental & Resource Economics. With a strong passion for economics and addressing global environmental challenges, I explore behavioral economic tools to provide insights for interdisciplinary, evidence-based policies that foster energy transitions toward a sustainable future. My research focuses on generating actionable insights to support decision-making in the renewable energy sector.