

THE VALUE OF (ENERGY) DATA PRIVACY AND ITS EFFECTS ON PRIVACY-SEEKING BEHAVIOR

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Extended Abstract

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Abstract Summary

The digitalization of electricity systems creates a fundamental trade-off between efficiency gains and privacy risks. High-frequency smart-meter data enable utilities to optimize forecasting, maintenance, and tariff design, but also allow increasingly accurate inferences about households' daily routines, occupancy patterns, and appliance usage. The key economic question is therefore not whether such data are valuable, but how households value these benefits relative to the behavioral privacy risks they generate. This paper studies how belief-dependent perceptions of inference accuracy shape individuals' valuation of energy data privacy and their subsequent privacy-seeking behavior.

We implement a survey experiment with an embedded information treatment to examine both valuation and behavior. First, we elicit privacy valuation using a discrete choice experiment in which respondents choose between electricity contracts that differ in price, data granularity, and reliability. Second, we exogenously shift beliefs by providing factual information on the inferential power of smart-meter data to a randomly selected treatment group. Third, we link post-treatment valuation to intended privacy-seeking behavior (e.g., reducing data sharing or reviewing privacy settings). To identify causal effects, we employ an instrumental variable strategy that leverages the interaction between baseline belief errors and the information treatment in a two-stage least squares framework.

Evidence from a pilot study in Germany (N = 194) suggests that respondents substantially underestimate the accuracy with which smart-meter data reveal household activities. Correcting this misperception increases perceived accuracy and raises willingness to pay for privacy by approximately €1.4 per month. Instrumental variable estimates further indicate that higher privacy valuation causally increases intended privacy-protective actions.

Overall, the findings suggest that privacy demand is belief-dependent and sensitive to information. If households form privacy preferences under misperceived risks, market-based outcomes may be inefficient. A larger-scale study in Luxembourg will provide more precise and externally valid estimates to inform policy design in digitalized energy systems.

Presenting Author Biography

Boris Ortega is a postdoctoral researcher at the Interdisciplinary Centre for Security, Reliability and Trust (SnT) of the University of Luxembourg. His research interests lie at the intersection of energy and behavioral economics and applied microeconometrics.