

Threats to Privacy versus Saving Money: A Multi-Period Panel Study of Consumer Choices in the Automobile Insurance Industry

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Abstract

How consumers make tradeoffs between privacy and economic and social benefits are important questions for technology firms and the government. To empirically examine this issue, we study consumers' adoption and usage of Usage-Based Insurance (UBI) by developing a finite-time horizon dynamic structural model. UBI, a recent auto insurance innovation, enables insurers to collect individual-level driving data, provide feedback on driving performance, and offer individually targeted prices. In UBI programs, consumers make tradeoffs between their concern for privacy and the premium savings gained by allowing their driving behavior to be monitored for up to 6 months. Once enrolled, customers can drop out at any time, but receive a lesser discount the earlier they do so.

UBI is an excellent setting for studying the economic significance of privacy for several reasons. First, UBI is an option that the customer can choose to enroll in or not. In other words, the customer can obtain the same auto insurance policy with or without agreeing to be monitored; the only difference is that the monitored customer is able to earn a discount on the premium paid. This is unlike many innovations, such as Google Maps, where disclosing private information is not optional if the full benefit of the service is to be realized. Second, the consumer knows what information is being monitored, as compared to many apps in which it is unclear what behaviors are actually being tracked. Third, the consumer receives a direct economic benefit, so that the cost of adopting and being monitored can be compared to the monetary value to each individual consumer. Fourth, adoption rates are sufficiently high, 30% among the customers in our study, that not only technophiles are adopting the program. In addition, a major, but exogeneous data breach, allows us to employ a quasi-experimental design

to examine the effect of changing privacy perception on consumers' decision to adopt or drop the UBI monitoring program.

Using detailed information on insurance premiums, adoption and retention decisions, and individual driving behavior (as measured by sensor data) for the UBI adopters, we develop a dynamic structural model that allows us to estimate the (possibly heterogeneous) costs of using UBI including the privacy cost. As customer decisions depend upon their driving behavior over time and the consequently changing expected benefits, it is important to have a dynamic structural model to capture the state dependency and the forward-looking behavior of customers.

The estimated parameters of the dynamic structural model indicate the crucial role of both initial and ongoing costs on the customers' adoption and dropout decisions and their heterogeneity across demographic characteristics. In a natural experiment design, we find that a major data breach that occurred during our data collection period is associated with a decrease in retention rates among customers who are currently being monitored, consistent with the view that consumers trade off privacy costs against economic benefits.

[Key words: Privacy, Data Breach, Usage Based Insurance, Dynamic Structural Model](#)