Experimental Evidence on the Impact of Telematics Devices on Welfare

In a behavioral experiment with around 500 participants, we measured the willingness of insurance policyholders to pay for a telematics contract. We find that there are significant welfare costs associated with digital monitoring for which individuals need to be compensated. Our results suggest that digital monitoring causes a reduction in the willingness to pay (WTP), which is in the range of 25 to 50 percent of the expected loss. Our findings set a benchmark for the demand-side costs of telematics contracts that need to be contrasted with the benefits of using this technology.

Motivation

With the rise of new technologies, insurance companies increasingly use telematics devices to monitor the insured and to condition the premium on the observed behavior. For example, health insurers use wearables or smartphones to track and record information about the fitness and activity levels of their customers and give premium discounts or rewards if customers are active and achieve (daily) activity goals. The most common applications of telematics devices in insurance can be found in the motor insurance segment and applications vary between countries. Whereas drivers in Italy, in the United Kingdom, and in the United States show a high demand for telematics contracts (due to premium discounts), demand in other markets appears to be low (e.g., Germany, Austria, and Switzerland). So far, data concerns, uncertainty about negative consequences and technological implementation seem to impede a rapid market penetration.

Our results show that the loss of privacy in telematics contracts substantially reduces the potential profit an insurer might earn. We find that the reduction in the WTP from introducing digital monitoring is in the range of 25 to 50 percent of the expected loss. With our analysis, we contribute to the discussion of welfare implications of digital monitoring in insurance and related economic fields. In this context, digital monitoring has the potential to resolve market failure as it mitigates information asymmetries. However, welfare from proper functioning of the market for risk transfer needs to be balanced against welfare from individual privacy. Our research could help to understand if mandatory data sharing with insurance companies – for example, through a legal obligation for telematic devices in auto insurance – is welfare-increasing.
Experimental Design

In a behavioral experiment, we aimed at identifying the difference in the willingness to pay between a full insurance contract and a telematics contract. For this purpose, we conducted a laboratory experiment in which our participants decided whether or not to purchase insurance in a risky environment. At the beginning of the experiment, our participants received an initial endowment of EUR 17. With this money, they were facing the risky situation that they could lose EUR 15 with a probability of 20 percent. To simulate the risky situation, participants had to roll a 10-sided die and if the die showed a 1 or 2, they lost EUR 15, and if not, they kept the initial endowment of EUR 17. However, participants could have purchased a full insurance contract against the loss, and we asked participants for their willingness to purchase the insurance under a variety of premiums ranging from EUR 0.50 to EUR 7.50. In one condition, we included the obligation to share live location data with us if insurance was purchased. With this setup, we could analyze if the WTP actually goes down under the telematics contract and if participants need to be compensated for data sharing. We varied the duration of location data sharing (i.e., one or eight hours) to investigate if the implied compensation required increases with the duration of data sharing. If participants bought insurance, the premium was deducted from their initial endowment and if the insurance contract required location data sharing, participants were obliged to share such data for one or eight hours with us. For data sharing and tracking, we used the built-in GPS live data sharing feature in WhatsApp, where the time horizon of location data sharing can be set to one or eight hours.

Results

First, we analyzed if giving up privacy implies a reduction in the WTP. i.e., the WTP for the telematics contract is lower than the WTP for the standard full insurance contract. Second, we investigated if the reduction in the WTP depends on the duration of data sharing. Our treatment effects provide strong support for both hypotheses. We find that the impact of mandatory sharing of live location data reduces the WTP relative to the expected value of an insurance policy by 25 to 50 percentage points.

While the disutility of sharing data is significant in economic terms, we also find that it is a function of the intensity of sharing data as we observe a decreasing WTP for an increasing duration of location data sharing. The impact of sharing live location data for one hour is around –25 percentage points in units of expected value from the insurance policy, while the impact of eight hours of live location data sharing is around –50 percentage points. The treatment effects are economically relevant considering that the potential profit margins that can be generated from insurance policies are cut down from 63.5 percentage points to 13.9 percentage points when introducing a monitoring scheme. To put this into perspective, actual market estimates for markups on the expected loss are in the range of 20 percent or more.

Altogether, our results suggest that the economically and statistically significant costs of introducing monitoring devices into an insurance setting need to be considered in conjunction with the generated benefits (e.g., risk selection, behavioral change). Our results are also relevant to welfare analyses considering that telematics contracts are becoming more important in actual markets. At some point, one might argue for mandatory monitoring in order to ensure insurability, for example, in situations of potential market failure indicated by significantly increasing costs, such as those observable in many health insurance markets worldwide. Our results show, that costs (i.e., the utility loss from monitoring) and benefits (i.e., access to insurance) need to be carefully considered in such discussions.

Implications

With this experiment, we quantified the impact of telematics devices on the WTP for insurance in a behavioral experiment. Our experimental results suggest that agents care a great deal about their privacy. Our findings have implications for
insurance firms and policymakers. We show that a large fraction of the potential profit margin is marginalized by the discount agents demand to opt into a transparency contract. At the same time, telematics contracts reduce the costs implied by moral hazard and monitoring schemes could be used to promote prevention measures.

Our results set a benchmark for the demand-side costs of telematics contracts that need to be contrasted with the benefits of using this technology. In the evaluation of potential mandatory data-sharing regulations that could counteract market failure, policymakers need to consider individual welfare losses from giving up privacy. Current examples of such discussions can be found in life and health insurance where mandatory sharing of genetic test results is considered, or in motor insurance with mandatory use of telematics devices.

Our study focuses on the estimation of pure demand-side costs and our design is not intended to infer anything about welfare gains from potential behavioral change implied by transparency contracts. The existing empirical evidence seems mixed. Furthermore, leaving no room for asymmetric information, transparency contracts could be welfare increasing if the benefits of a lower premium due to behavioral changes outweigh the effort of the behavioral change.

To continue, field experiments would be a natural next step.

References