Pervasive Insurance Markets and their Consequences

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Abstract

One problem of insurance markets is the information asymmetry, specifically the lack of information on insurer side about its customers. In this short paper, we argue that pervasive computing technologies could reduce this information gap and therefore insurers will have a strong motivation of deploying such technologies. Some of the resulting deep social implications and of the possible positive environmental consequences are presented.

1 Introduction

The large-scale deployment of pervasive and ubiquitous computing technologies may have both positive and negative impacts on environment and society, as has been analyzed in detail [2, 3]. Some of the potential environmental benefits (like avoiding traffic jams through the use of 'smart' cars and thus burning less fuel when driving from A to B) may be outweighed by the so-called rebound effects (people driving more often because of the fuel and time economy per way) [3].

In this paper, we do not study these various direct implications of pervasive computing on society and environment. Instead, we take a detour by arguing that pervasive computing technologies could have a strong impact on the insurance markets, which again will be reflected in social and environmental consequences, and analyze these consequences only.

2 Market Transparency and Information Asymmetry

Many well-known market weaknesses originate from the lack of information the market players have about their counterparts. Since pervasive computing is about gaining and processing more and more information, it seems natural that this lack of information could be reduced or in some cases even eliminated.

Berkeley professor George Akerlof defined back in 1970 the problem of *information asymmetry* in his seminal work "The Market for Lemons" [1], for which he received the 2001 Nobel Prize in Economics. Akerlof recognized that when participants on one market side are better informed than participants on the other side about the traded goods, some markets may fail to work.

Usually, markets allow people to trade fairly. When the information is asymmetric, the fair-trade-situation ceases to exist. Akerlof exemplifies his theory with the familiar transaction of buying a used car. In this market, the seller has more information than the buyer about the car's condition. The buyer is suspicious about it: will he buy a high quality car, or one with accidents in the past, leaking oil and having an almost broken-down engine – in other words a 'lemon'? Because the buyer is suspicious, he will always try to pay the price as if the vehicle was a lemon, even if it is a high-quality one (which the buyer cannot know). However, for such a low price nobody will want to sell a quality car. Thus, only lemons will be sold. The lemons push the good quality vehicles out of the market and the entire market for high-quality used cars fails to emerge.

The same phenomenon often occurs in insurance markets. A health insurer, for example, would provide nonsmokers with a better rate than smokers, since the latter represent a larger risk. But since he cannot check if someone smokes or not (the buyer is in this case the party with more information), he will provide the same average rate to all customers. The "high-quality products" (the nonsmokers) are pushed out of the market by the "low-quality products" (the smokers).[1]

Similarly, today's vehicle insurances typically depend only on the driver's experience and the type of car she

[1] The authors are both low-quality products.

drives. These parameters being set, the insurance rate is flat. In particular, it does not depend on the per-year-mileage, the actual time of day when the car is used, or the kind of route (highway vs. country road vs. city) that is most often taken.

3 Pervasive Insurance Markets

In both cases, health and vehicle insurances, it is in the insurer's best interest to gain more information about its customers through the use of ubiquitous computing. By providing low-risk customers (nonsmokers, low-mileage drivers) with a more accurate and thus advantageous rate, the insurer would gain new market shares in a very attractive market segment.

Customers might also welcome such a model. A distance-based vehicle insurance, for example, would lead low-mileage drivers to buy this advantageous rate instead of a flat one. Having that rate, they would tend to reduce their mileage even more, as a pilot project from 1998[2] suggests. Drivers with a mileage-based insurance reduced their mileage by an average of 13%, resulting in up to 25% savings over their previous flat rate [4]. With a higher percentage of high-mileage drivers (i.e., low-quality products) left in the flat rate pool, rate adjustments reflecting the increased overall risk of the remaining drivers would further increase the potential savings of a change to the mileage-based rate, possibly prompting cash-strapped flat-rate customers to switch and reduce their mileage subsequently.

Other criteria could further determine the instantaneous rate, such as the kind of route, the time of driving and the traffic density, weather conditions, the way the insured person drives, whether she lets other people drive, and the driving habits of these other people. Most of these criteria could be monitored and transferred to the insurer rather easily in a state-of-the-art car.

4 Social and Environmental Implications of Pervasive Insurances

It has been argued that this kind of distance-based pricing would make vehicle insurances more accurate and would thus give drivers an incentive to reduce their mileage [4]. Furthermore, since 70% of crashes imply another vehicle, if *all* drivers would reduce the driving by 10%, this would result in 17% less crashes. Thereby, a 10% decrease of traffic would result in 10% less air pollution and even 17% less injuries [4].

Through such highly-customizable rates, insurers could thus give incentives to their customers, like: Don't smoke! Drive less! Drive safely! These are in fact similar effects as if the legislator would increase the tobacco or the gas tax, or would increase the fines for traffic violations. With the important difference that they would not be imposed on, but freely chosen by the customer.

Although customers would have to give up large chunks of their privacy to participate in such insurance models, it has been shown by several examples in the past that people are willing to give up privacy if savings are expected. Even for small savings many are willing to give up much of their privacy, as the nowadays very popular loyalty cards show.

Another source of concern is the substantial increase in insurance costs that higher-risk customers would face. Does a pressure towards social conformity and homogeneity result from such pervasive insurances?

However, since insurers have an economic interest and low-risk buyers are disposed (to a certain extent) to participate in such intrusive models, it seems that more accurate and privacy invasive insurances are to be expected for the future, with possible positive environmental and safety consequences on the one side, but also with large and hardly foreseeable social implications on the other side. Legislators have to take these evolutions into account and set the borders.

[2] Progressive Auto Insurance. Project XL. Survey available at: http://www.epa.gov/projectxl/progressive/index.htm.

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