

# Insurance in the World of Big Data



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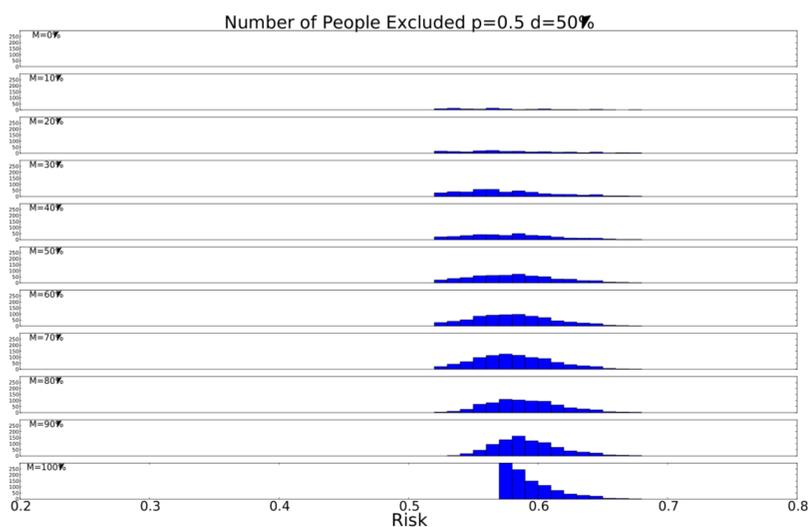
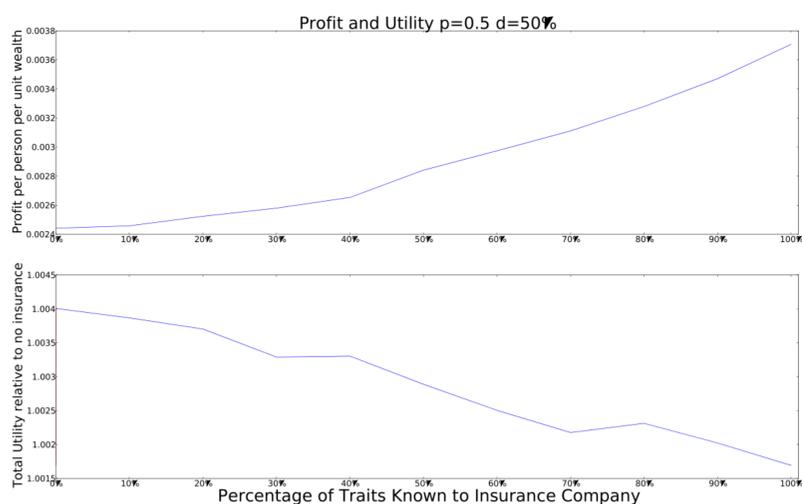
## Abstract

- In the recent decade, a business model where people trade their personal information for web services has become increasingly popular.
- We explore the implications of this increasing availability of personal information in the context of insurance markets.
- Now that full collection of information and accurate data analysis are possible, we study how varying the availability of personal information to insurance companies can affect welfare.
- We show computationally that in a monopolistic market, people are worse off as the insurance company gains free access to more personal information since they can discriminate people more accurately.
- We explore variants of our model including letting people charge for their information, a competitive insurance market, and inaccurate use of data.
- By introducing costly information, both the insurance company and the population as a whole can benefit from making information available.
- In a competitive market, more public information is better for the prospective buyers as a whole.
- However, the common theme is that it always comes at the expense of making the higher-risk group worse off.
- Finally, we explore the importance of accurate data analysis tools for the insurance company, and how the prospective buyers could potentially game the system to their benefit if the data analysis is inaccurate.

## A Simple Model

- We assume full insurance policies parameterized by the premium  $\alpha$
- Prospective Buyers
  - Each starts with a fixed wealth,  $W$
  - In the future, one is either healthy with unchanged wealth, or in an unfortunate accident where  $d$  (between 0% to 100%) of his wealth is lost
  - Thus, each person has an associated risk  $R$  of being in an accident
  - Assume each is risk-averse and maximizes expected utility
  - Decides to buy insurance if expected payoff with insurance is higher than without
- Information Structure
  - Each person has a fixed  $J$  number of *traits*, which are either 0 or 1 with some prob.  $p$ , and are i.i.d.
  - A person's risk is the average of these traits. Ex. Someone with 60 1's and 40 0's would have a risk of 60% of being in an accident
  - Assume that the insurance company knows this information structure but does not know the value of the traits
- Insurance Company
  - Assume uniform premium for everyone
  - Maximizes expected profit summed across everyone
  - Decides how high of a premium to charge
  - Can exclude certain people from buying based on the observed information traits

## Results



### Charges for Information:

