

Monopoly insurance with endogenous information acquisition

Johan N.M. Lagerlöf* and Christoph Schottmüller**

*University of Copenhagen and CEPR

**University of Copenhagen and TILEC

August 27, 2014

Motivation I

- How economists usually model insurance:
 - people know their risk
 - insurance does not
 - which contracts does the insurer offer in this asymmetric information situation?
 - (sometimes we add a bit of moral hazard: not today)

Motivation I

- How economists usually model insurance:
 - people know their risk
 - insurance does not
 - which contracts does the insurer offer in this asymmetric information situation?
 - (sometimes we add a bit of moral hazard: not today)
- What we thought:
 - Do you know your risk or do you know your life style?
- Our goal:
 - model where people do not know risk but can exert effort to find out more about their risk
 - simple model that is comparable to current literature
 - insurance company with market power

Motivation II

- Common sense
 - People can search for information about their risk before buying insurance.
health insurance:
 - quantify impacts: impact of life style on health risks, genetic predisposition etc.

Motivation II

- Common sense
 - People can search for information about their risk before buying insurance.
health insurance:
 - quantify impacts: impact of life style on health risks, genetic predisposition etc.
- Theory
 - Are the results of standard insurance models robust to endogenous information acquisition?
 - Endogenous information acquisition literature has mainly focussed on procurement/regulation models.
 - (How) are insurance models different?

Motivation II

- Common sense
 - People can search for information about their risk before buying insurance.
health insurance:
 - quantify impacts: impact of life style on health risks, genetic predisposition etc.
- Theory
 - Are the results of standard insurance models robust to endogenous information acquisition?
 - Endogenous information acquisition literature has mainly focussed on procurement/regulation models.
 - (How) are insurance models different?
- Policy
 - DG SANCO describes
EU-wide collation and analysis of health data to provide objective, comparable and timely information [to consumers]
as “focus of effort” in order to “empower consumers”.
 - Are such policies welfare enhancing? consumer surplus enhancing?

Model I

- monopoly insurer
- consumers with wealth w lose amount D with probability $\theta \in \{\theta^h, \theta^l\}$
(share of θ^h is $\alpha \in (0, 1)$)
- neither consumers nor insurer know $\theta!!!$

Model II

- timing:

- ① Monopolist offers menu of contracts (premium and indemnity).
- ② Consumers decide how much effort/time $e \geq 0$ they invest in information gathering:

- after investing effort e , consumers receive a noisy signal $\sigma \in \{\sigma^h, \sigma^l\}$
- with probability $g(e)$, σ corresponds to true risk θ
- with probability $1 - g(e)$, σ drawn from prior
- consumer utility with effort e and signal σ^i when buying insurance contract with premium p and indemnity R

$$U(e, \sigma^i) = \beta_i(e)u(w - p - D + R) + (1 - \beta_i(e))u(w - p) - c(e)$$

where $\beta_i(e) = \text{prob}(\text{loss}|\sigma^i, e)$ is updated loss probability

- ③ Consumers choose their preferred contract from the menu (given menu, signal and effort level).

Model III

Assumption

We assume:

- *risk aversion: $u' > 0$ and $u'' < 0$*
- *convex and increasing costs: $c'(0) = 0$, $c' > 0$ and $c'' > 0$*
- *positive but (weakly) decreasing marginal returns of the signaling technology:*
 - $g' > 0$
 - $g'' \leq 0$
 - $g(0) = 0$

Analysis: Stage 3 (consumers' contract choice)

- buy high coverage contract if updated loss probability is high
- buy low coverage contract or remain uninsured if updated loss probability is low

Analysis: Stage 2 (consumers' effort choice)

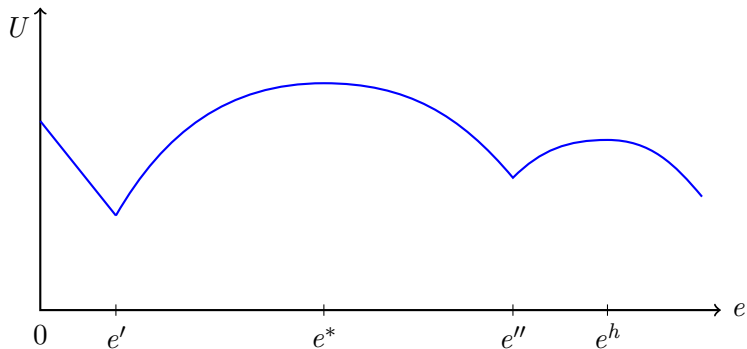
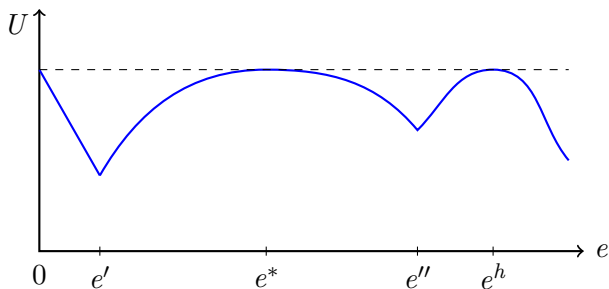


Figure: Utility as function of effort given optimal contract choice

Analysis: Stage 1 (insurer's menu choice) I



- constraints in profits maximization:
 - usual incentive compatibility and participation constraints are slack
 - instead the following constraints bind:
 - information gathering constraint
 - high effort deviation

Results: Distortion & sorting effect

Proposition (downward distortion)

Optimal contracts have strictly less than full coverage.

- monopolist benefits from low effort (*sorting effect*):
low effort \Rightarrow worse information \Rightarrow sorting into “wrong” contract:
 - high risks with low coverage
 - low risks with high coverage
- distortion at the top \Rightarrow contracts more similar \Rightarrow less effort

Results: Distortion & sorting effect

Proposition (downward distortion)

Optimal contracts have strictly less than full coverage.

- monopolist benefits from low effort (*sorting effect*):
low effort \Rightarrow worse information \Rightarrow sorting into “wrong” contract:
 - high risks with low coverage
 - low risks with high coverage
- distortion at the top \Rightarrow contracts more similar \Rightarrow less effort
- distortion at the top also discourages high effort deviation

Results: Robustness of Stiglitz model

- qualitative differences
 - pooling contracts possible
 - distortion at the top
- very small info gathering costs \sim standard model
 - let cost function be $\gamma c(e)$ with $\gamma > 0$

Proposition

If $\gamma > 0$ is sufficiently small, the optimal contract menu induces strictly positive effort. The optimal contract converges to the Stiglitz contract as $\gamma \rightarrow 0$.

As $\gamma \rightarrow \infty$, equilibrium coverage of all offered contracts converges to full coverage, i.e. $\Delta_1 \rightarrow 0$ and $\Delta_2 \rightarrow 0$.

Results: Comparative statics and Policy

- policy could lower costs of information acquisition (e.g. info website)
- let costs be $\gamma c(e)$

Result

Profits and expected utility can be increasing in γ , i.e. easing information acquisition can make everyone worse off.

- easier information acquisition \Rightarrow more distortion
- more information = more *asymmetric* information

Conclusion

- We endogenize information acquisition in a standard insurance model.
- All contracts are downward distorted (*sorting effect*).
- Standard insurance models are robust to the introduction of small costs of information gathering.
- Easing information acquisition can make consumers and insurance company worse off.

Conclusion

- We endogenize information acquisition in a standard insurance model.
- All contracts are downward distorted (*sorting effect*).
- Standard insurance models are robust to the introduction of small costs of information gathering.
- Easing information acquisition can make consumers and insurance company worse off.

Recall DG SANCO:

EU-wide collation and analysis of health data to provide objective, comparable and timely information [to consumers]

Appendix

	\bar{u}_1	\underline{u}_1	\bar{u}_2	\underline{u}_2	e	e^h	π	EU
$\gamma = 0.05$	1.6929	1.6439	2	1	0.5311	0.5311	0.1408	1.695
$\gamma = 0.1$	1.6946	1.6512	2	1	0.4223	0.4223	0.1424	1.695
$\gamma = 0.2$	1.7052	1.6576	1.9646	1.0954	0.3186	0.3347	0.1442	1.6995
$\gamma = 0.5$	1.7316	1.6415	1.8556	1.3671	0.1844	0.2429	0.1546	1.7066
$\gamma = 0.7$	1.7352	1.6378	1.8263	1.4348	0.1490	0.2165	0.1593	1.7069
$\gamma = 1.0$	1.7559	1.5970	1.7559	1.5970	0	0.1878	0.1643	1.7074
$\gamma = 1.3$	1.7512	1.6050	1.7512	1.6050	0	0.1729	0.1679	1.7067

Table: optimal contracts under parameter values: $w=4$, $D=3$,
 $u(x) = \sqrt{x}$, $c(e) = \gamma e^4$, $\theta^h = 0.35$, $\theta^l = 0.2$ and $\alpha = 0.7$ and linear
signaling technology