“Does the Internet Improve Health Behavior? Costly Information Acquisition under Heterogeneity in Health-Related Risk Perception”

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This project

- **Online health information (OHI):**
  - *Pros:* Decrease information gap between patient and physician.
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  - *Pros:* Decrease information gap between patient and physician.
  - *Cons:* Overconfidence, cyberchondria...
- **Question:**
  - Impact of the OHI on healthcare utilization.
  - Mechanism of the OHI acquisition.

Methodology

- **Theory**
  - Costly information acquisition — Rational Inattention model (RI).
  - Heterogeneity in level of perception to miss sick state.

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- **Empirics**
  - Data
    - Health Information National Trends Survey (HINTS).
      Data on health related risk perception, healthcare utilization, SD characteristics. State level geocodes. Year 2005.
    - Federal communication commission (FCC 447).
      High-Speed Lines by state. Years: 2004, 2005.
  - Focus on hypochondria.
  - Instrumental variable regression (IV).

Findings

- **Theoretical results:**
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- **Empirical results** support theoretical results:
  - For average consumer, usage of OHI increases number of physician visits.
  - Cancer related OHI for consumers with cancer risk induces healthcare utilization.

Related literature

- OHI impact on health related decisions:
  Kenkel (1990), Dwyer and Liu (2013), Macher et al. (2016)...

  Contribution: *Mechanism of OHI aquisition.*

- Rational Inattention Model
  Sims (2003), Caplin and Dean (2013), Matejka and McKey (2015)...

  Contribution: *Health information acquisition specific cost function.*

Model ingredients

- Two states of the world: {sick, healthy}.
- Two actions: {utilize healthcare, not}.
- Payoff: {sick, healthy} x {utilize healthcare, not}.

cost function

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- Action chosen based on posterior belief γ: prior + newly received information.

cost function

Findings

- Average increase in awareness.

- Overconfidence.

$$\text{High cost to acquire information that is not in line with the type.}$$
$$\Downarrow$$
$$\text{Choose information that supports.}$$
$$\Downarrow$$
$$\text{Reassurance.}$$

▸ Numerical example

Ideal test

- Hypothesis: $\beta_1 > 0$

$$level\ of\ healthcare\ utilization_i = \beta_0 + \beta_1 * use\ Internet\ for\ healthcare\ questions_i$$

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$$\begin{gathered} level\ of\ healthcare\ utilization_i = \alpha_0 + \\ \alpha_1 * Hypohondriac_i * use\ Internet\ for\ healthcare\ questions_i \\ + \alpha_2 * Hypohondriac_i + \alpha_3 * use\ Internet\ for\ healthcare\ questions_i \end{gathered}$$

Complications

- Do not observe hypochondria status.

  Solution:

  - Instead of diagnoses use symptoms.

    History of cancer in the family.

▸ variation

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    History of cancer in the family.

- Endogeneity of use of Internet for health.

  Solution:

  Instrument for Internet usage:

  - Normalized by the area of state change in number of wires.

$$\uparrow \text{Wire deployment} \rightarrow \uparrow \text{Use of Internet} \rightarrow \uparrow \text{Use Internet for health.}$$

variation

IV regression: Frequency of visit $\sim$ use OHI

1st stage

$$\mathcal{I}(\textit{use OHI for cancer questions})_i = \mathbf{Z'}_i * \alpha + \epsilon_i$$

Z: {*normalized change in the number of wires*; *S-D characteristics; healthcare access; health status; history of cancer in the family*}.

2d stage

$$\textit{Healthcare utilization outcome}_i = \gamma_0 + \gamma_1 * \hat{\mathcal{I}}(\textit{use OHI for cancer questions})_i + \gamma_2 * \widehat{\mathcal{I}(\textit{use OHI for cancer questions}) * \mathcal{I}(}\textit{history of cancer in the family}) + \mathbf{X'}_i * \gamma + u_i$$

X: { *S-D characteristics; healthcare access; health status; history of cancer in the family*}.)

Second Stage: Frequency of visit $\sim$ use OHI for cancer questions

	Dependent variable:
	number of visits
use OHI for cancer	-0.387
	(4.238)
(history cancer in the family) * (use OHI for cancer)	11.598^{*}
	(5.944)
history of cancer in the family	-3.012^{**}
	(1.351)
insuarance	1.287^{***}
	(0.359)
poor health	2.795^{***}
	(0.575)
Observations	3,554
Note:	*p<0.1; **p<0.05; ***p<0.01

Controls: age, race, marriage, education, employment, health level, house ownership, number of individuals in HH.
errors: HSE, clustered on the State and health level.

Consumers with history of cancer who use OHI for cancer related questions have higher number of physician visits compared to both just OHI users and non OHI users with history of cancer. first stage

Conclusion

- **Results**
  - Low degree of perception to miss sick state drives overconfidence.
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Conclusion

- **Results**
  - Low degree of perception to miss sick state drives overconfidence.
  - Theoretical model is in line with the empirical evidence.
- **Extensions and ongoing work:**
  - Incorporate overconfidence to the patient/physician interaction.
  - Socially optimal OHI provision.

Thank You!

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Information acquisition cost function

Costs = Net value of the posterior.

For each fixed realization of posterior γ we get:

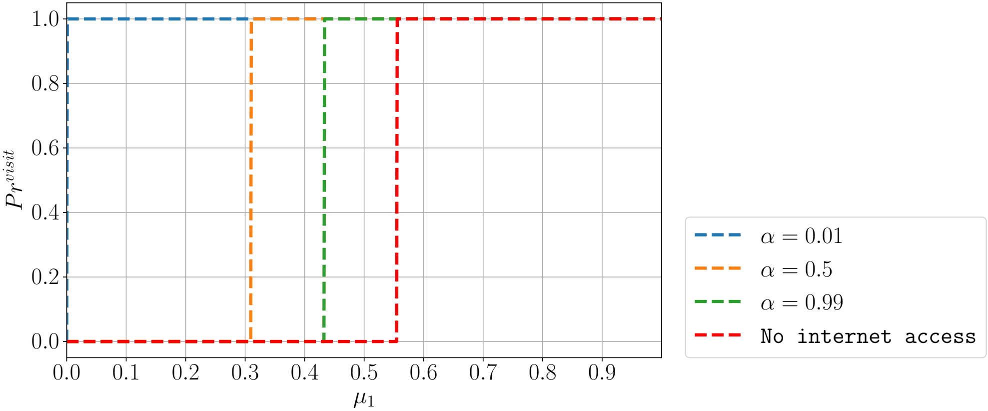
$$\kappa * \left[\tilde{H}(\mu) - \tilde{H}(\gamma)\right] = \kappa * [$$

$$\underbrace{\alpha * [\mu * \ln(\mu) - *\gamma * \ln(\gamma)]}_{\textit{tollerance to be wrong that you are not healthy * new information of being in healthy state}} +$$

$$\underbrace{\beta * [(1-\mu) * \ln(1-\mu) - (1-\gamma) * \ln(1-\gamma)]}_{\textit{tollerance to be wrong that you are not ill * new information of being in ill state}}$$

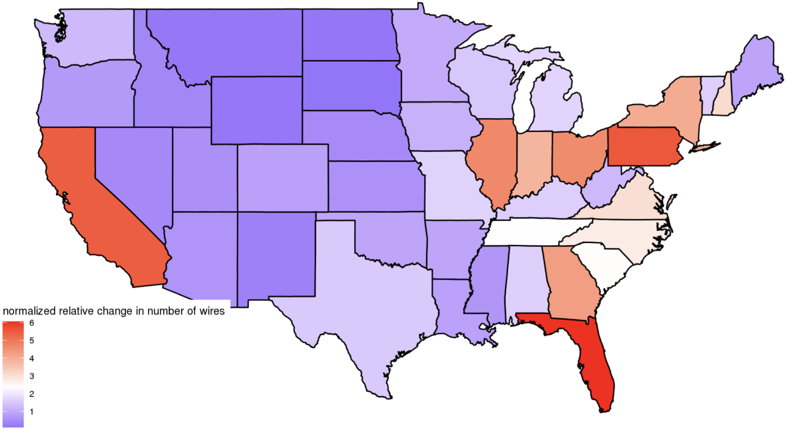
▸ model ingredients

Findings



Findings

Variation in change of the number of wires per 1sq.m.



Coefficient of variation =1.4 cmplications

First Stage: use OHI for cancer

	Dependent variable:
	use OHI for cancer
normalized change in the number of wires	0.006***
	(0.002)
insuarance	0.064***
	(0.022)
male	−0.058***
	(0.015)
log(income)	0.028***
	(0.007)
history of cancer in the family	0.085***
	(0.015)
Constant	−0.230*
	(0.127)
Control: age, race, marriage, education, employment, health level	YES
Observations	3,560
Note:	*p<0.1; **p<0.05; ***p<0.01

errors: HSE, clustered on the State and health level.

second stage