Asymmetric Information in Health Insurance: Evidence from the National Medical Expenditure Survey.

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This paper separately estimates adverse selection and moral hazard.

Two-stage decision.

- First stage: health shocks are not realized. individuals choose health plans that maximize their expected utility. Advserse selection. Data on health plan choice

- Second stage: health shocks are realized. Individuals determine the optimal level of health care spending. Moral Hazard. Data on spending on health.

Second Stage

Given income and health status, individuals maximize their utility by choosing optimal health spending.

$$U^*_{ij}(s_i) = U^*(y_i, s_i, Z_j) = Max_{x_i} U(m_i, h_i)$$

subject to the budget constraint

$$m_i + C_j(x_i) = y_i - p_j$$

y_i : income
p_j :premium of policy
$C_j(x)$: spending for policy j.
$Z_j = [p_j, C_j]$: characteristics of policy j.
x_i : health expenditure.
m_i : consumption of other goods.
s_i :realized health state.
$h_i = x_i + s_i$: health consumption

First Stage: health insurance plan choice.

Value of health plan j

$$V_{ij}(\omega_i, a_{ij}) = E[U^*_{ij}(s_i) \mid \omega_i] + a_{ij}$$

a_{ij}: policy specific random taste. i.i.d., extreme value distributed. Expectation is taken with respect to the distribution of final health state, given signal ω_j, and demographics D_j

Individual chooses the health plan that maximizes her expected utility:

$$j_i = argmax_j V_{ij}(\omega_i, a_{ij})$$

Functional Form Specification

Consumer preference:

$$U(m_i, h_i) = \phi_1 m_i + \phi_2 h_i + \phi_3 m_i h_i + \phi_4 m_i^2 + \phi_5 h_i^2$$

Out of pocket health expenditure:

$$c_j(x_i) = \begin{cases} x_i & if \quad x_i \leq DED_j \\ DED_j + c_j(x_j - DED_j) & if \quad x_i > DED_j \end{cases}$$

Second Stage:

- Compute the optimal choice given health spending is below deductible limit DED_j: $x_{ij}(y_i - p_j, s_i, 1, \phi)$

- Compute the optimal choice given health spending is above deductible limit DED_j: $x_{ij}(y_i - p_j - DED_j, s_i, c_j, \phi)$

- Corner Solution: Spending only on health. $m_i = 0$, $c_j(x_i) = y_i - p_j$

- Corner Solution: No spending on health: $x_i = 0$, $m_i = y_i - p_j$

- Choose whichever function that gives higher utility.

First Stage:

$$V_{ij}(\omega_i, a_{ij}) = E[U^*_{ij}(s_i) \mid \omega_i] + a_{ij}$$

or, to incorporate risk aversion:

$$V_{ij}(\omega_i, a_{ij}) = E[-exp[-rU^*_{ij}(s_i)] \mid \omega_i] + a_{ij}$$

where the distribution of health shock is:

$$s_i = -exp[K(D_i) + \omega_i + \epsilon_i]$$

$\omega_i \sim N(0, \sigma^2_\omega)$: signal at first stage

$\epsilon_i \sim N(0, \sigma^2_\epsilon)$: signal at second stage

D_i: demographics

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Health plan choice: assume a_{ij} is i.i.d. extreme value distributed. Then,

$$P_{ij}(\omega_i) = \frac{exp(V_{ij}(\omega_i))}{\sum_{k=1}^{J} exp(V_{ik}(\omega_k))}$$

Moment Conditions:

Compare the sample statistics of the model with that of the data.

Insurance plan choice probability and given the insurance choice, the health spending with those of the model simulation.

Prediction error:

$$u_i(\theta, D_i) = \begin{cases} P_{i0}(\theta, D_i) x^e_{i0}(\theta, D_i) - I_{i0} x_{i0} \\ P_{ij}(\theta, D_i) x^e_{ij}(\theta, D_i) - I_{i0} x_{ij} \\ P_{i1}(\theta, D_i) - I_{i1} \\ P_{ij}(\theta, D_i) - I_{ij} \end{cases}$$

$P_{ij}(\theta, D_i)$: predicted health plan j choice probability, integrated over ω, given parameter θ and demographic D_i

$x^e_{ij}(\theta, D_i)$ predicted health spending given plan j, integrated over ω and ϵ

0: No health insurance, out of pocket health spending.

Moment Condition:

$$G(\theta_0) = E\left[W \otimes u(\theta_0, D_i) \mid W_i, D_i\right] = 0$$

Instruments: demographics, health plan choice.

- Data: National Medical Expenditure Survey:

- Single individuals of working age. (18 to 65).

- Data: has health plan for individuals, not only choices that she made but also choices that were available. Restrict the choice of plans: each person has at most 4 choices.

- Spending on health.

Results:

No evidence for asymmetric information (t-stat)

	No Demogr.	Demogr.	Demogr.+risk
σ_ω	0.53(2.50)	0.12(0.43)	0.06(0.11)
σ_ϵ	0.99(2.87)	1.75(7.00)	1.95(4.22)

After demographics are controlled for and risk incorporated, signal variance is insignificantly different from zero.

Asymmetric Information.

- How to estimate moral hazard and asymmetric information separately.

- Different individuals face different coinsurance rates: that estimates moral hazard.

- The insurance plan choice that cannot be explained by coinsurance rates and premium: adverse selection.

- If observationally equivalent individuals under similar health plans make different choices, then it is attributable to adverse selection.

- How would you separately estimate σ_ω from the logit error of the health plans ϵ?

- σ_ω: creates variation in health plan choice.

- σ_ϵ : increase in this increases choice for all insurance, because it increases risk.

- Even if σ_ω is zero, there will be health plan choice variability and different health plans will have different health expenditures.

Endogeneity of health insurance plan offered:

Probit regression

$$y = 1(X\beta + \epsilon)$$

y: employer offers health insurance or not.

Parameter	Estimate	t-stat
Income	0.223	6.79
Income sq.	-0.0003	-5.94

It is not true that individuals in need are offered health insurance for lower wage.