Insurer Risk and Public Risk-Sharing: Quantifying the Value of Reinsurance

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Outline

Motivation

Firm Uncertainty:

- Firms face considerable uncertainty in many markets
- EX: insurance (p&c, health), banking, pharmaceuticals, tech, R&D intensive industries

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Government Interventions to Reduce Uncertainty:

1. Loan guarantees (e.g., mortgages, student loans, pensions)
2. Reinsurance, deposit insurance
3. Risk adjustment, risk corridors

Background and Setting

IO Literature:

- Assumes firms are risk neutral expected profit maximizers
- Insurers buy reinsurance, banks hold capital reserves
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Study Setting: Public reinsurance in the ACA exchanges

- Transitional federal program and subsequent state programs - time and cross-section variation
- Rich data available
- Serves two purposes:
  1. Provides cost subsidy
  2. Provides risk protection to insurers

Descriptive Findings

1. Claims distribution in CO all-payer claims database has long right tail (substantial uncertainty)
2. Most health insurers purchase private reinsurance, particularly less financially solvent ones
3. Event study results on the effect of public reinsurance:
    1. Reduces premiums by 15%
    2. For every dollar the government spends on reinsurance, premiums go down by \$1.30 (must include both expected cost and cost of financial risk)
    3. Insurers substitute away from buying private reinsurance

Structural Model Estimates

Model estimates indicates:

1. Regional insurers have higher costs due to private reinsurance expenses and costs of holding risk
2. Financial risk (costs of holding risk) is at least as important as market power in high premiums for small regional insurers

Simulation Results

Effect of Public Reinsurance:

- Direct cost subsidy
- Improved risk sharing
- Greater competition

Public Reinsurance vs. Premium Subsidies:

- Reinsurance is more efficient
- Tradeoff:
  1. Reinsurance provides risk protection and reduces cost of risk (shifts down MC curve)
  2. Reinsurance flattens MC curve and raises markups

  Simulations indicate risk protection effect dominates

Outline

Theoretical Model

Firm Objective:

A monopoly firm chooses the premium p by maximizing

$$\max_{p} \quad \underbrace{pq(p)}_{\text{premium revenue}} - \underbrace{E\left[\tilde{C}|q(p)\right]}_{\text{expected claims cost}} - \underbrace{L\left(S\left(\tilde{C}|q(p)\right)\right)}_{\substack{\text{cost of financial risk} \\ \text{i.e. } \textit{risk charge}}}$$

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Institutional Background

ACA Exchanges

- Individual market coverage
- Eligible consumers receive premium subsidies for private insurance
- Modified community rating, guaranteed issue, essential health benefits

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Sources of Uncertainty:

- High consumer turnover
- Relatively small compared to group market
- Large or unpredictable claims costs
- Policy uncertainty

Institutional Background

3 R's:

1. Risk adjustment
2. Risk corridors
3. Reinsurance

Institutional Background

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1. Risk adjustment
2. Risk corridors
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Private Reinsurance:

- More common in property and casualty insurance
- Reinsurers cover about 4% of premiums (crowded out by public reinsurance?)
- Concentrated market; largest 4 reinsurers have 63% market share

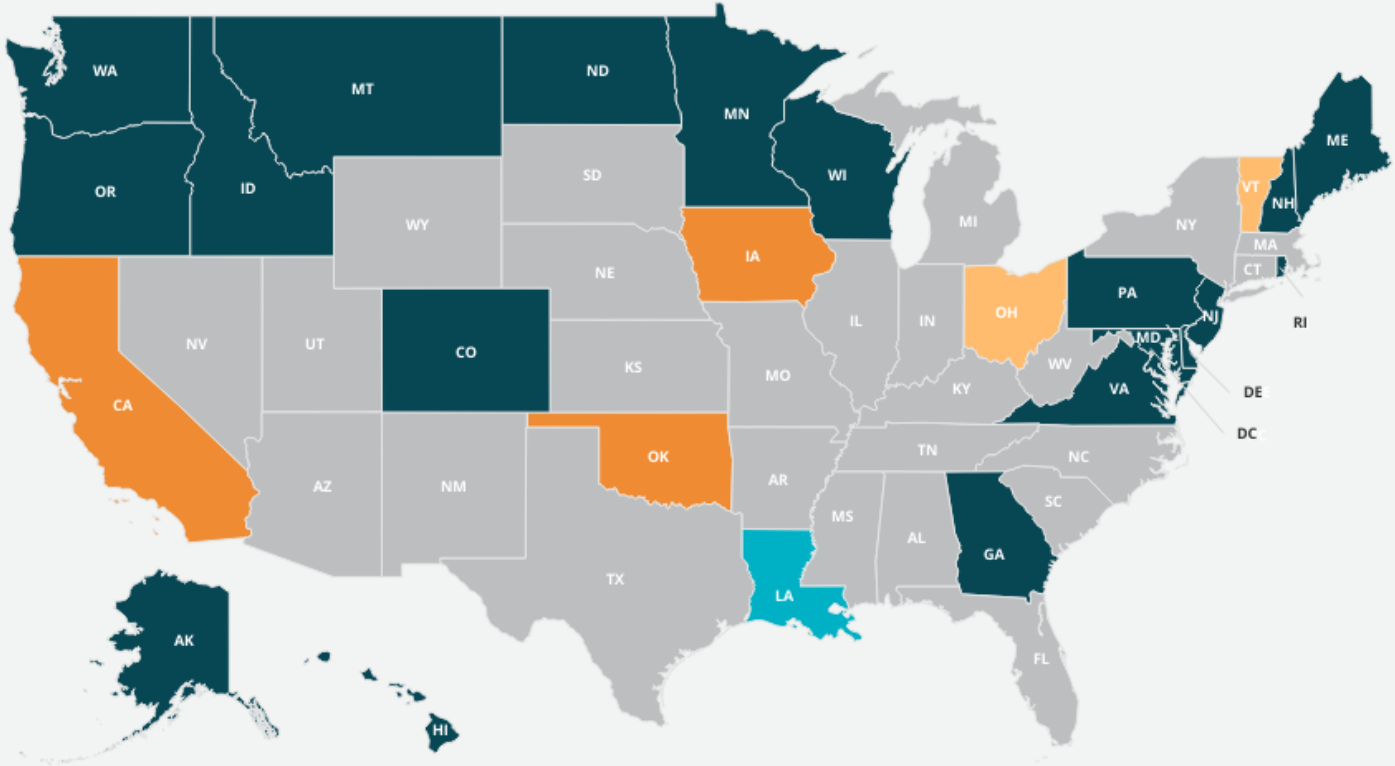
Institutional Background

Public Reinsurance:

- Federal transitional program:
  - Funding:
    - $10 billion in 2014; $6 billion in 2015, $4 billion in 2016
    - Funded by health insurers, (including those in ACA exchange) and self-insured group plans
    - Annual per-enrollee fee was $63 in 2014, $44 in 2015, and $27 in 2016
  - HHS sets attachment point, coinsurance, and reinsurance cap for each year - was too conservative in 2014
- State-based programs (started in 2018):
  - Established under Section 1332 waivers
  - States get subsidy pass-through funding (savings from lower CSRs and premiums subsidy payments); also may collect fees from insurers
  - Colorado: attachment point of $30k, cap of $40k, and coinsurance in three tiers of counties ranging from 40% to 80%

Institutional Background

1332 Waiver Development for State-Based Reinsurance Programs



19 states have received CMS approval of their 1332 reinsurance waiver proposals: Alaska, Colorado, Delaware, Hawaii, Georgia*, Idaho, Maine, Maryland, Minnesota, Montana, New Hampshire, New Jersey, North Dakota, Oregon, Pennsylvania, Rhode Island, Virgina, Wisconsin, Washington. **Georgia's waiver was suspended in 2022.*

1 state released a draft 1332 reinsurance waiver application but has not yet formally submitted to CMS: Louisiana.

3 states submitted 1332 reinsurance waiver applications that were later withdrawn: California, Iowa, and Oklahoma.

2 states submitted waiver applications to CMS but were determined incomplete: Ohio and Vermont.

No states are currenly awaiting review of 1332 reinsurance applications.

Data

Insurer-Level:

1. NAIC data on private reinsurance
2. CMS data on plan characteristics
3. CMS MLR reports

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Consumer-Level:

- Connect for Colorado administrative data on plan choices (age, gender, county, income bins, chosen plan, etc.)
- Colorado All Payer Claims Data
- SAHIE and MEPS for the uninsured population

Summary Statistics

Table 1. Sample statistics, insurers on the exchange

	(1) All	(2) Has Reins.	(3) No Reins.
(a). Health insurance status			
Mean health insurance premium per enrollee	5,160	5,087	5,279
Mean health insurance claim per enrollee	4,481	4,418	4,583
Mean health insurance margin	0.130	0.128	0.133
Number of members (millions)	0.341	0.338	0.373
(b). Private reinsurance status			
Mean reinsurance premium per enrollee	28	67	-
Mean reinsurance claim per enrollee	12	25	-
Mean reinsurance margin	-	0.544	-
Share has private reinsurance	0.623	1	-
Reins. premium over health ins. premium	0.021	0.033	-
(c). Characteristics			
RBC ratio	5.612	5.527	5.819
Share non-profit	0.452	0.438	0.474
Share Ind. mkt. premium over all mkt. premium	0.356	0.376	0.322

Outline

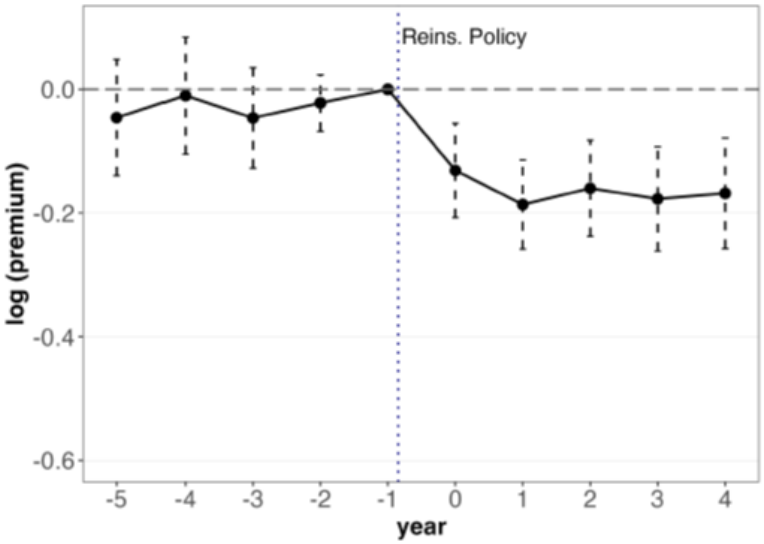
Event Study

Question:
What is the effect of Public Reinsurance on Premiums?

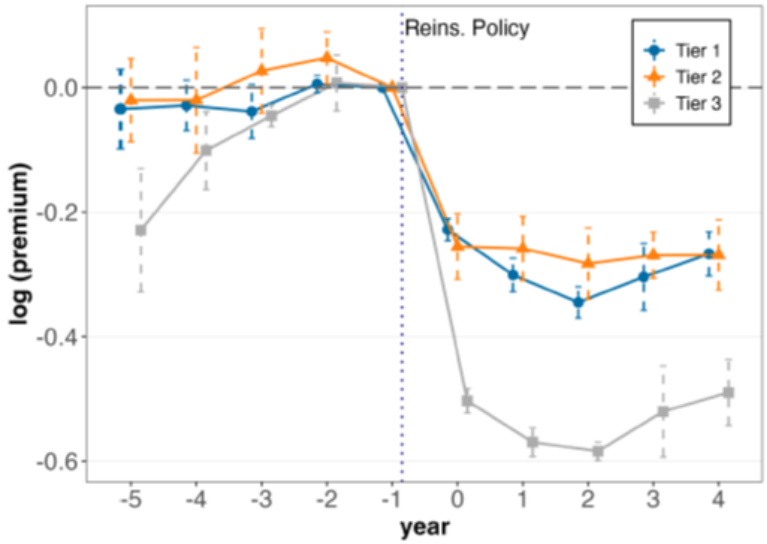
$$y_{fmt} = \sum_{n \in \{-6(+),-5,..,0,1,..,4,5+\}} \beta_n 1[t^*_{s(m)} + n = t] + \gamma_t + \gamma_{fm} + \varepsilon_{fmt},$$

Figure 5. The effect of public reinsurance on premium and private reinsurance

(a). logarithm of premiums, all states



(b). logarithm of premiums, CO across reins. tiers



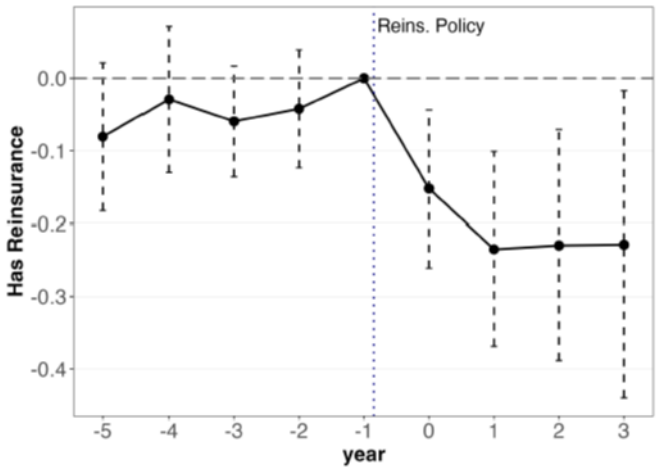
Event Study

Question:
What is the effect of Public Reinsurance on Private Reinsurance Purchases?

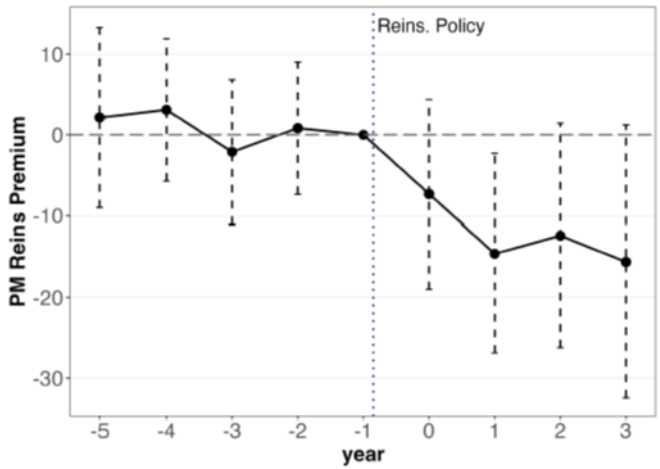
$$y_{fmt} = \sum_{n \in \{-6(+),-5,..,0,1,..,4,5+\}} \beta_n 1[t^*_{s(m)} + n = t] + \gamma_t + \gamma_{fm} + \varepsilon_{fmt},$$

Figure 6. The effect of public reinsurance on private reinsurance

(a). have private reinsurance



(b). Per member expenses on private reinsurance



Reinsurance and Financial Solvency

Question:

Are there larger responses from financially-constrained insurers?

$$y_{fmt} = \beta_1 D_{mt} + \beta_2 x_{fmt_0} D_{mt} + \gamma_t + \gamma_{fm} + \varepsilon_{fmt},$$

Table 2. Effect of public reinsurance subsidies, by financial solvency status

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		logarithm of premiums		Probability of purchasing private reinsurance		Per member reinsurance expenses	
reinsurance policy	−0.145***	−0.135***	−0.132***	−0.260**	−0.215	−19.428**	−6.840
	(0.041)	(0.037)	(0.036)	(0.117)	(0.132)	(9.342)	(4.233)
reinsurance policy		−0.161***			−0.347		−108.754**
× RBC ratio below 3		(0.050)			(0.243)		(43.639)
reinsurance policy			−0.187***				
× significant private reins.			(0.045)				
N	16,112	16,112	16,112	1,525	1,525	1,508	1,508
Baseline mean	633	633	633	0.616	0.616	28.33	28.33
Share of insurers w. RBC below 3		0.102			0.15		0.148
Share of insurers w. significant private reins.			0.074				

Outline

Consumer Demand

Consumer Utility Function:

$$u_{ijmt} = \alpha_i(p_{jmt}\iota_\theta - subsidy_{\theta jmt}) + \beta_i X_{jmt} + \xi_{\theta jmt} + \epsilon_{ijmt},\ j \neq 0;, \tag{10}$$

$$\alpha_i = \alpha_\theta + \alpha_r + \nu_i,\ \log(\nu_i) \sim N(0, \sigma_1^2). \tag{11}$$

$$\beta_i = \beta_\theta + \beta_r. \tag{12}$$

Plans grouped by metal tier (gold, silver, bronze) for each insurer

Premiums vary by age bin and market in the model

Subsidies cannot be calculated precisely due to lack of income data

Firm Profit

Firm Profit Function:

Firms choose the vector of premiums $\overline{p}_{ft}$ and private reinsurance deductible κ_{ft} to maximize

$$\max_{\kappa_{ft},\vec{p}_{ft}} = \underbrace{\Pi(\vec{p}_{ft};\vec{p}_{-ft})}_{\text{premium revenue}} - \underbrace{\mathbb{E}[C_{ft}(\vec{p}_t,\kappa_{ft};\vec{p}_{-ft})]}_{\text{claims costs}} - \underbrace{R_{ft}(\vec{p}_t,\kappa_{ft};\vec{p}_{-ft})}_{\text{reinsurance costs}} - \underbrace{L_{ft}(\vec{p}_t,\kappa_{ft};\vec{p}_{-ft})}_{\text{risk charge}}.$$

The first-order conditions are

$$\underbrace{p_{jmt} + \frac{Q(\vec{p}_t)}{Q'(\vec{p}_t)}}_{\text{marginal revenue}} = \underbrace{\frac{\partial E[C_{ft}]}{\partial p_{jmt}}}_{\text{marginal claims costs}} + \underbrace{\tau\frac{\partial E[R_{ft}]}{\partial p_{jmt}}}_{\text{marginal reins. costs}} + \underbrace{\rho_{ft}\frac{\partial \text{Std}[C_{ft}]}{\partial p_{jmt}}}_{\text{marginal risk charge}} \tag{17}$$

Where is risk adjustment? Risk corridors?

Outline

Consumer Preferences

Estimation

- BLP-style estimation
- Use two-step approach of Goolsbee and Petrin (2004) - constrained maximum likelihood with parameters

Identification of Premium Parameter:

- Exogenous age rating regulation
- Other sources?

Supply-Side Parameters

Parameters to Estimate:

1. Marginal claims
2. Risk charge parameter ρ_f
3. Markup of private insurance τ

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Estimation:

- Use GMM
- Use FOCs with respect to premiums and FOCs with respect to how much private reinsurance to purchase (do not observe deductible directly in data)

Risk Preference Estimates

Table 3. Estimates of private reinsurance deductible and risk preferences

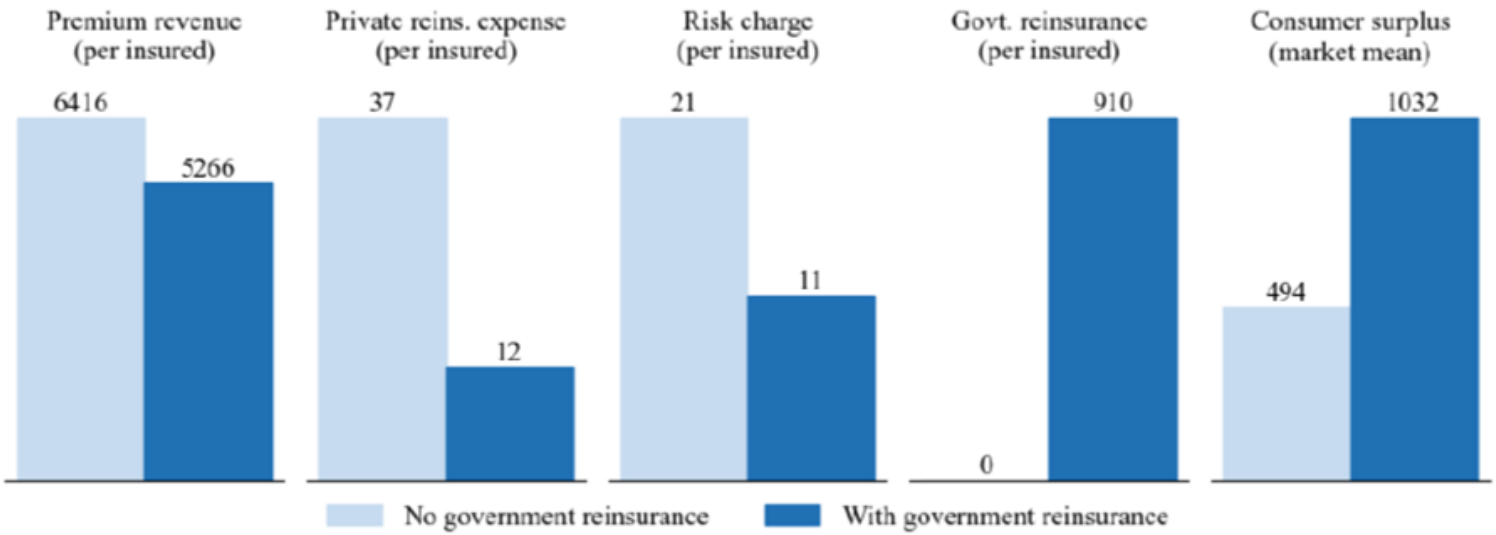
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Private reins.	Coeff. of	Mean per member price/cost				Share over total premium		
Insurer	deductible (κ_f)	risk charges (ρ)	Premium	Medical claims	Private reins.	Risk charge	Medical Claims	Private reins.	Risk charge
Insurer A	-	0.000	6,378	5,711	0	0	89.66%	0.00%	0.00%
Insurer B	-	0.000	9,875	8,846	0	0	89.73%	0.00%	0.00%
Insurer C	4.13	0.840	6,934	6,266	22	163	90.51%	0.32%	2.36%
Insurer D	4.71	0.266	11,598	10,612	50	338	91.69%	0.43%	2.92%
Insurer E	0.84	0.637	6,338	5,514	190	455	87.11%	3.00%	7.18%
Insurer F	1.02	1.559	10,674	8,884	323	786	83.37%	3.03%	7.37%
Insurer G	0.71	2.589	5,931	5,081	186	437	85.77%	3.15%	7.37%

Notes: This table reports insurers' estimated private reinsurance deductibles and risk preferences in 2018. We assume private reinsurance is in a stop-loss format, and the deductible reported in Column (1) is in millions. Columns (1)-(2) are parameter estimates; Column (3) is observed data; and Columns (4)-(9) are derived statistics. The averages reported are enrollment-weighted. The reinsurance deductible in Column (1) is reported in millions.

Outline

Effect of Public Reinsurance

Figure 7. Effect of public reinsurance



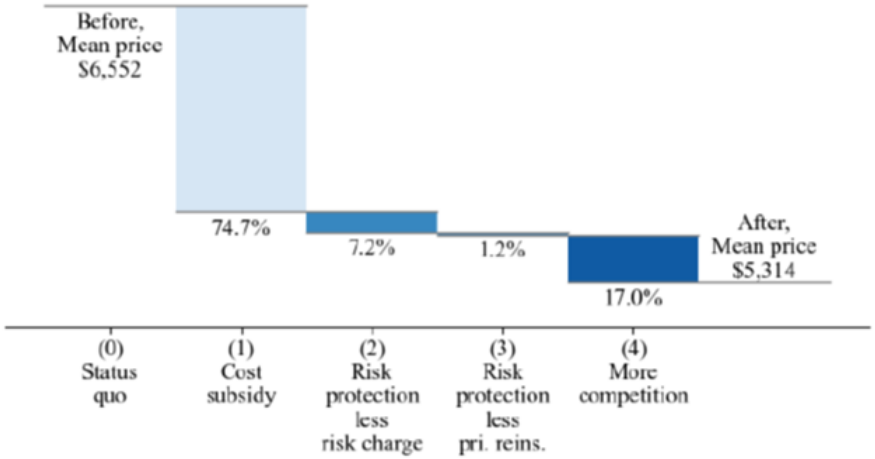
Notes: This figure plots the simulated equilibrium objects in the scenario with (in dark bars) and without (in light bars) government reinsurance for markets in reinsurance tier 1. The per-insured measure is averaged across all insurers.

Why are consumer surplus gains so large with price-linked subsidies?

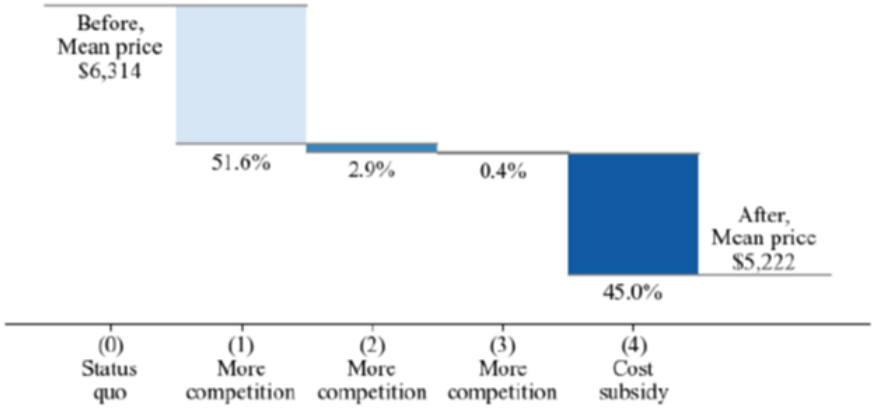
Decomposing Effect of Public Reinsurance on Premiums

Figure 8. Decompose the effect of public reinsurance on equilibrium prices

(a). Regional insurers

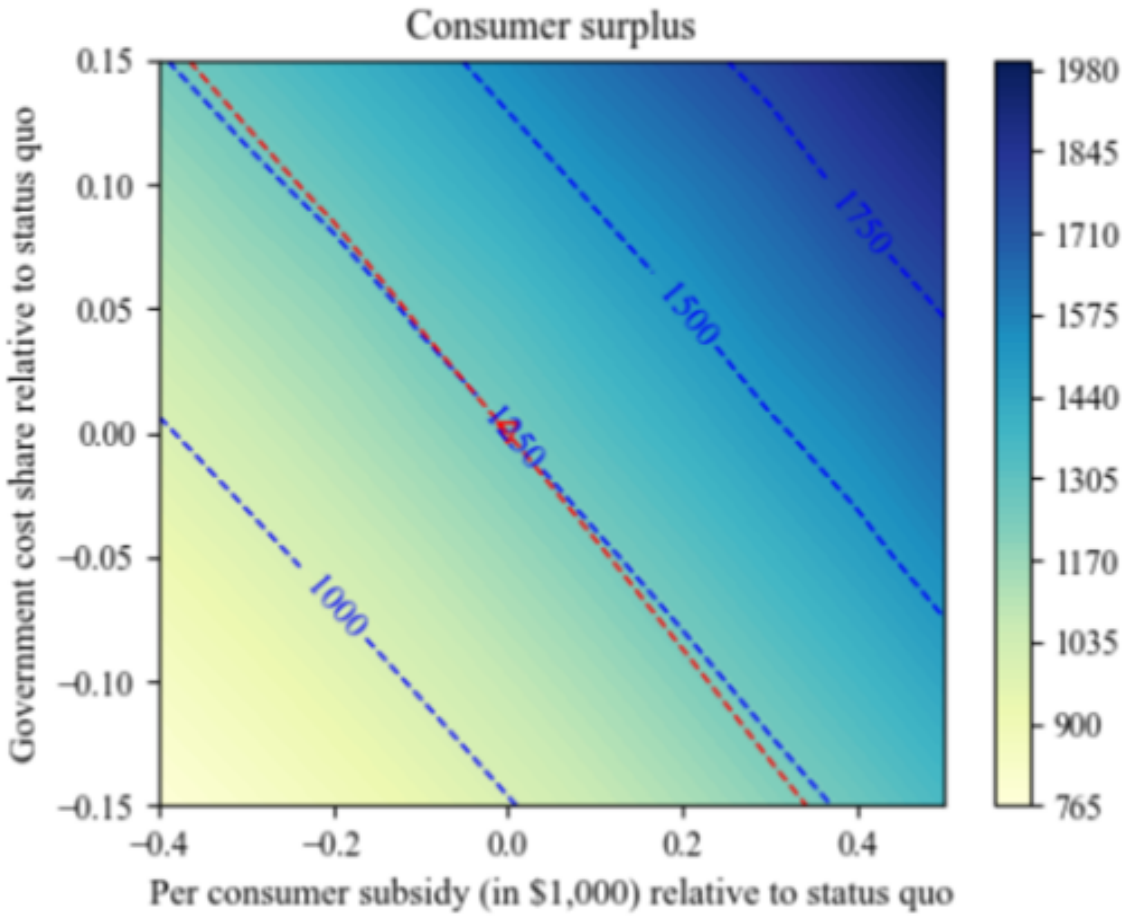


(b). National insurers



Consumer Surplus Under Alternative Policies

Figure 9. Consumer surplus under alternative policy scheme



Outline

Strengths of Paper

1. Great data! I'm jealous
2. Intuitive theoretical model
3. Nice reduced-form results
4. Thoughtful structural model of demand and supply
5. Novel counterfactual exercises
6. Advances the IO literature by modeling financial risk in firm objective

Issues to Consider

1. "These state-level reinsurance programs function as **free** reinsurance contracts with **zero premiums**, reducing both the expected cost and the variance of cost."
   Public reinsurance is not free and involves either a fee paid by insurers or an implicit reduction in premiums
2. Why assume the premium subsidy is paid in fixed proportion to premiums that the insurers set? Don't you lose the key feature of premium subsidies shielding consumers from premium increases?
3. Not modeling risk adjustment
4. Not modeling the individual mandate penalty
5. Specification of loss in firm objective
6. Why are plans grouped into metal tiers? Data limitations? What are you losing by doing this?
7. Why are consumers grouped into age bins?