The Impact of Public-Private Partnership Health Insurance Plans on Private Insurance Decisions

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Motivation

- Insufficient public health insurance *V.S.* unaffordable or ineligible private insurance
- Public-private partnership (PPP) health insurance plans: **Urban-Customized Supplemental Medical Insurance (UCSMI)** in China
  - collaboration between local governments and private insurers
  - providing complementary insurance to public insurance coverage at a low price for the mass population
- Heated discussions on the effects of insurance coverage expansion *V.S.* the ambiguous role and impact of PPP model
  - little evidence on: (*1*) its interaction with and spillover effects on private insurance; (2) its impact on allocation of resources within the entire health insurance system

Motivation

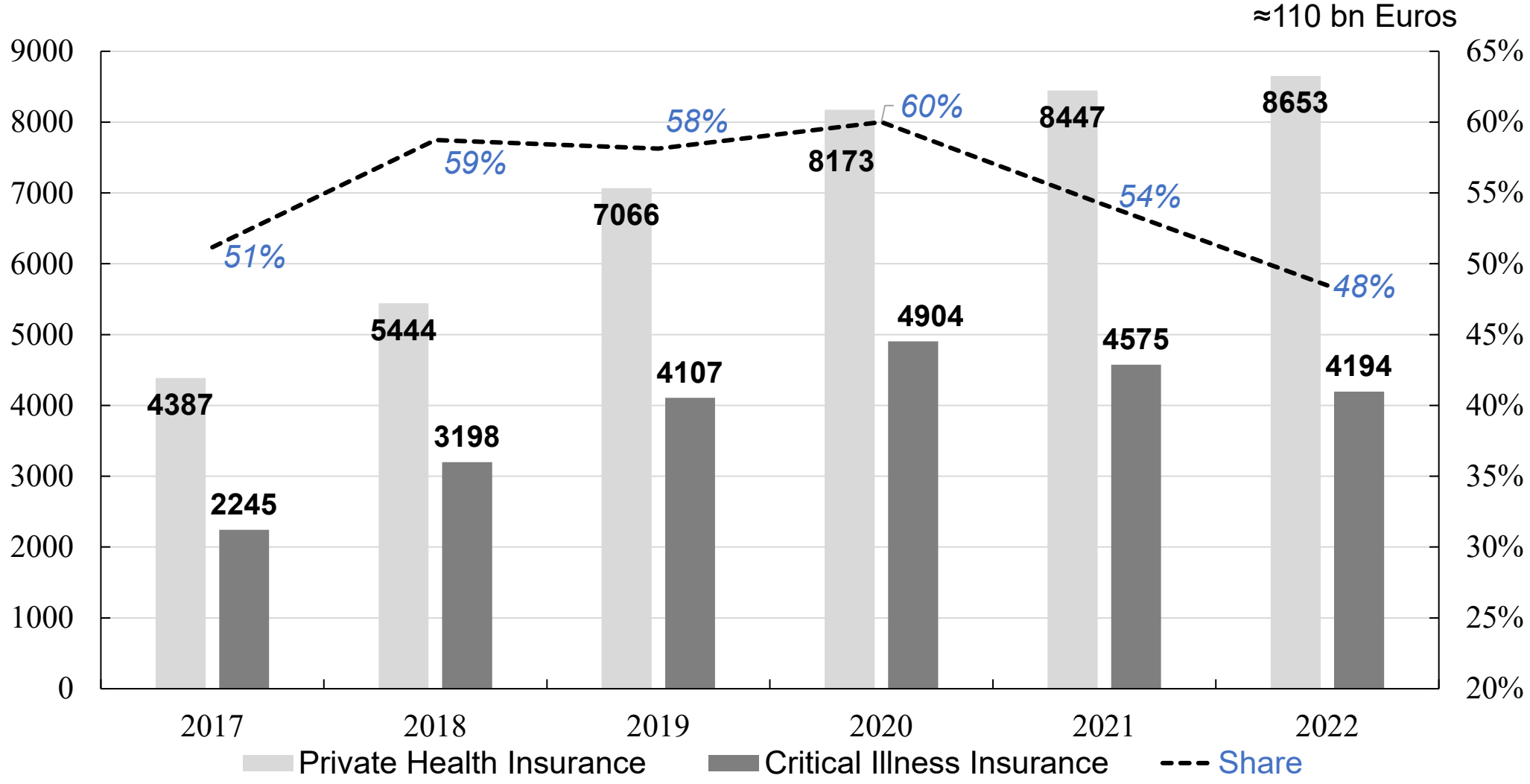
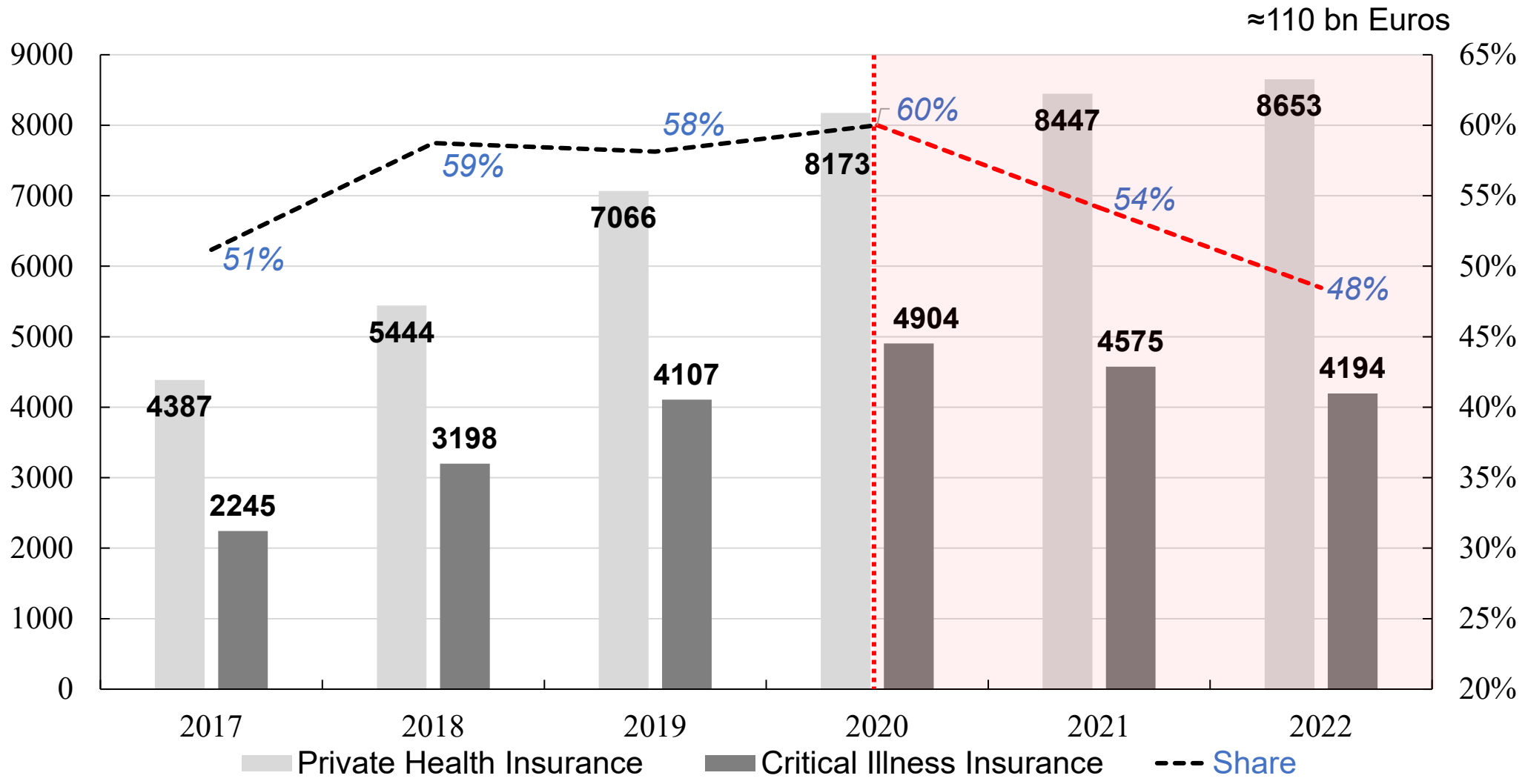


Figure 1: The Development of Private Health Insurance in China (2017~2022)

Motivation



- "*Opinions on Deepening the Reform of the Medical Security System*" (March 2020) stated the importance of supplementary insurance, and in turn boosted the *staggered* implementation and development of UCSMI.

Our Study

- **Research question**: How does private health insurance respond to the introduction of UCSMI across cities along t he *extensive margin* and *intensive margin*?

- **Data**: a novel transaction-level dataset of private health insurance (critical illness insurance) from one representative life insurer

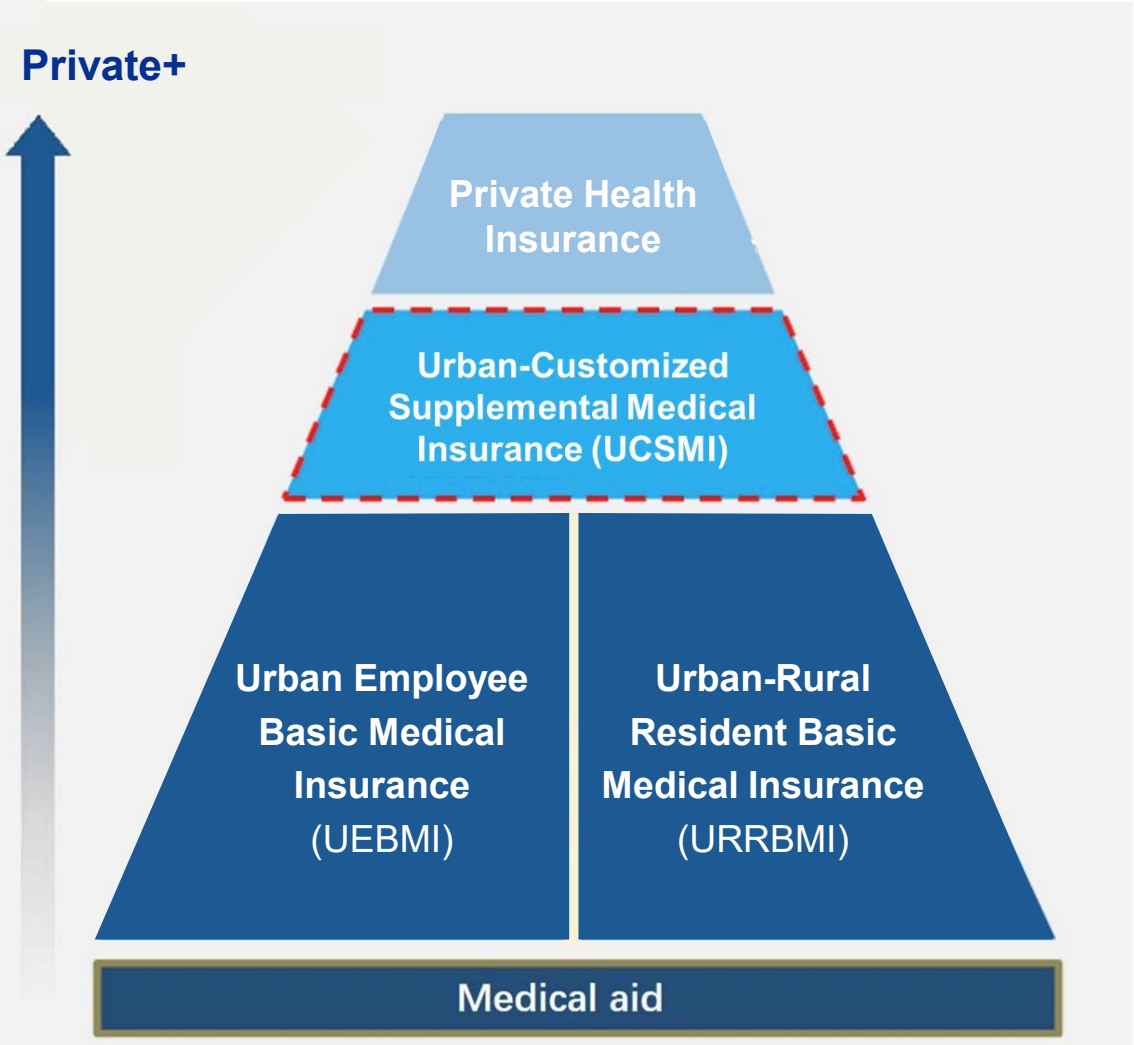
- **Results**: **crowding out effects**
  - Extensive margin
    - insurance purchases decline
  - Intensive margin
    - average coverage amount of each policy declines (***substitution*** *effect* > ***composition*** *effect*)
    - annual premium decreases

Contribution

- Extend research on the effects of enrollment spillovers beyond the traditional focus on public-private crowding out (Brown & Finkelstein, 2008; Lin *et al.*, 2014)
  - Interactions between a public-private partnership plan and a private program with a markedly different design
- Contribute to studies on decision-making in partnership insurance, *which focused primarily on whether PLTC increases the uptake of LTC* (Li & Prince, 2013; Costa-Font & Naut, 2021)
  - A clearer (*exogenous*) context for understanding the impact of PPP program on decision-making
- Enhance the understanding of innovation in micro-finance programs *designed to stimulate demand and mitigate adverse selection* (Banerjee *et al.*, 2014; Fang *et al.*, 2020)
  - The effects of developing such a plan may fall short of overall expectations for the entire health insurance system due to crowding out among various programs

Institutional Background

Figure 2: Health Insurance System in China

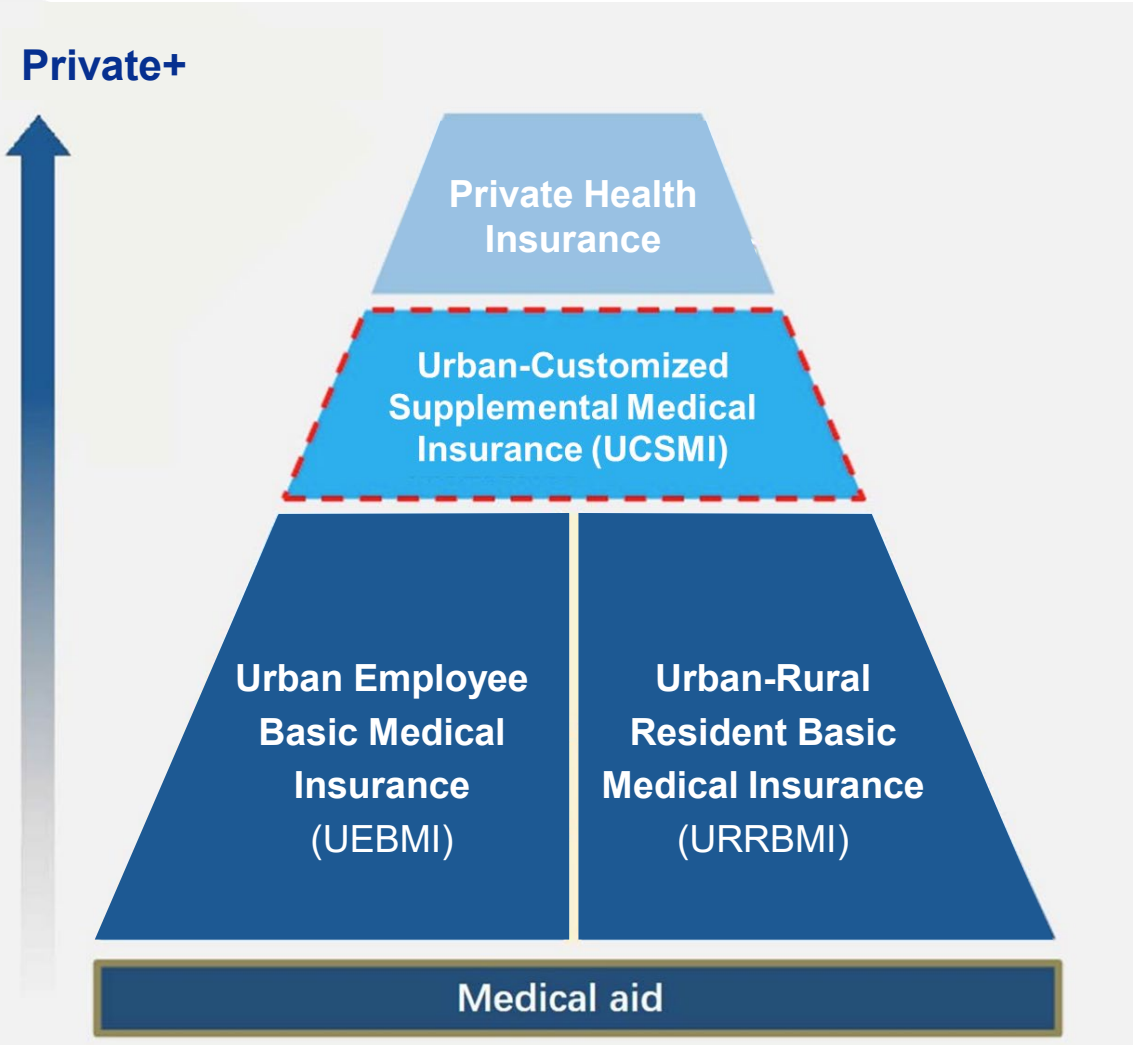


Urban-Customized Supplemental Medical Insurance (UCSMI)

- local governments do not pay subsidies; step in to promote the sales instead
- low price: mostly ranging from 40 to 150 RMB (*5 to 20 Euros*)
- mass population: around 280 products, 300 million policyholders
- medical reimbursement insurance plans: offering benefit items of inpatient, outpatient, special drug products, etc.
- NO discrimination enrollment or pricing
- ONE-year policy; purchasing window limited to 2~3 months in a year

Institutional Background

Figure 2: Health Insurance System in China



Private Health Insurance: Critical Illness Insurance (CII)

- market share: around 50% of the private health insurance market
- simple design: paying a lump-sum (the coverage) upon diagnosis of a severe condition
- sorting insurance choices primarily based on a single dimension, namely insurance coverage (the lump-sum payment)
- annual premium (on average): 5000+ RMB *(600+ Euros)*

Data

- **UCSMI data:** manually collected product information of 18 first-tier and second-tier cities
  - Introducing date
  - Purchasing window in each year
  - Benefit items; the list of special medications
- **Private health insurance (critical illness insurance) transaction-level data:** obtained from one representative life insurer
  - 302,750 policies sold by the insurer in these cities from 2017~2022
  - **Policy characteristics:** purchasing date, coverage, annual premium paid, duration of payment period
  - **Personal characteristics:** gender, age, high-income label

Data

Table 1: The Introducing Date of UCSMI Products across Cities

City	Introducing Date	City	Introducing Date
Nanjing	2018.12.17	Wuxi	2021.01.15
Foshan	2019.12.24	Wuhan	2021.01.15
Suzhou	2020.04.10	Hangzhou	2021.01.20
Chengdu	2020.05.07	Shanghai	2021.05.01
Xiamen	2020.09.10	Changsha	2021.07.22
Jinan	2020.10.24	Beijing	2021.07.26
Chongqing	2020.11.06	Dongguan	2022.04.13
Shijiazhuang	2020.11.10	Shenyang	2022.05.16
Guangzhou	2020.12.01	Tianjin	2022.07.19

Source: Manually Collected

Data

Table 2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	p25	p50	p75
Dependent Variables						
ln(# Policies)	1,293	4.322	1.514	3.219	4.344	5.252
ln(Coverage)	302,750	13.268	1.094	12.429	13.008	14.270
ln(Premium)	302,750	8.818	0.465	8.471	8.782	9.112
Independent Variables						
Introduce (0/1)	302,750	0.250	0.433	0	0	1
PurchasingWindow (0/1)	302,750	0.066	0.248	0	0	0
Policy Characteristics						
Age	302,750	24.639	14.163	11	29	35
Female (0/1)	302,750	0.565	0.496	0	1	1
HighIncome (0/1)	302,750	0.019	0.139	0	0	0
PaymentPeriod	302,750	23.633	5.115	20	20	29

Empirical Strategy: Extensive Margin

We first aggregate the number of policies (purchases) by city and month to construct a city-month level panel dataset of private insurance.

By estimating the following equation **(Staggered DiD design)**, we test the **effects of the introduction of UCSMI products** across cities **on the purchases of private health insurance**.

$$\ln(Purchases)_{c,t} = \alpha + \beta Introduce_{c,t} + \rho \mathbf{X}_{c,t} + \gamma_c + \tau_t + \epsilon_{c,t}$$

- $\ln(Purchases)_{c,t}$: the natural logarithm of number of policies purchased in city c and month t
- $Introduce_{c,t}$: whether UCSMI has been introduced in city c by month t
- $\mathbf{X}_{c,t}$: city-time level controls (including city × calendar month FEs)
- γ_c: city FEs
- τ_t: year-month FEs

Baseline Results: Extensive Margin

Table 3: Effects of UCSMI on Private Insurance Purchases

	ln(**Number of Policies**)		
	(1)	(2)	(3)
Introduce	**-0.266*** **	**-0.270*** **	**-0.295*** **
	(0.067)	**(0.070)**	**(0.079)**
PurchasingWindow		0.012	0.037
		(0.046)	(0.054)
FEs: city	Y	Y	Y
FEs: year-month	Y	Y	Y
FEs: city × calendar month	N	N	Y
Mean of Dependent Variable	233.87 (4.32)	233.87 (4.32)	233.87 (4.32)
Observations	1,293	1,293	1,293
R^2	0.901	0.901	0.908

Baseline Results: Extensive Margin

- An average of **29.5% decrease** in the number of private health insurance policies purchased following the introduction of UCSMI across cities

Empirical Strategy: Intensive Margin

We then use the policy-level dataset of private insurance.

By estimating the following equation, we test the **effects of the introduction of UCSMI products** across cities **on the coverage amount and annual premium of private health insurance**.

$$Y_{i,c,t} = \alpha + \beta Introduce_{c,t} + \rho \mathbf{X}_{c,t} + \theta \mathbf{Z}_i + \gamma_c + \tau_t + \sigma_i + \epsilon_{i,c,t}$$

- $Y_{i,c,t}$: the natural logarithm of coverage (lump-sum payment) selected / annual premium paid for policy i
- $Introduce_{c,t}$: whether UCSMI has been introduced in city c by time t
- $\mathbf{X}_{c,t}$: city-time level controls
- $\mathbf{Z}_i$: policy characteristics*: gender, age, high-income label, duration of payment period, etc.*
- γ_c: city FEs
- τ_t: year-month FEs
- σ_i: product FEs

Baseline Results: Intensive Margin

Table 4: Effects of UCSMI on Private Insurance Coverage and Premium

	Panel A: ln(**Coverage**)		Panel B: ln(**Premium**)		
	(1)	(2)	(3)	(4)	(5)
Introduce	**-0.126*** **	**-0.123*** **	**-0.043*** **	**-0.046*** **	**-0.019*** **
	(0.009)	**(0.009)**	**(0.004)**	**(0.004)**	**(0.003)**
PurchasingWindow	0.025**	0.025**	0.007	0.007	0.001
	(0.011)	(0.011)	(0.005)	(0.005)	(0.004)
Coverage					**0.215*** **
					(0.001)
Policy Characteristics	N	Y	N	Y	Y
FEs: city	Y	Y	Y	Y	Y
FEs: year-month	Y	Y	Y	Y	Y
FEs: city × calendar month	Y	Y	Y	Y	Y
FEs: Product	Y	Y	Y	Y	Y
Mean of Dependent Variable	1,106,698 (13.27)	1,106,698 (13.27)	7582.35 (8.82)	7582.35 (8.82)	7582.35 (8.82)
Observations	302,750	302,750	302,750	302,750	302,750
R^2	0.269	0.283	0.185	0.274	0.459

Baseline Results: Intensive Margin

- An average of **12.3% decrease** in the coverage amount (lump-sum payment) selected of each private health insurance policy

- The annual premium paid for each policy decreases by an average of **4.6%**, without accounting for coverage amount
- When controlling for coverage amount, the annual premium decreases by an average of **1.9%**
  - The difference between these two estimates (4.6%-1.9%) indicates that **two-thirds of the decrease in the annual premium can be attributed to customers opting for insurance plans with narrower coverage amount**.

Different Age Groups' Responses

- To better illustrate the economic significance of the coefficients, we split the sample into three age groups:
  - Children: $0 \leq \text{age} < 10$
  - Middle-aged: $10 \leq \text{age} < 40$
  - Elderly: $40 \leq \text{age} \leq 65$

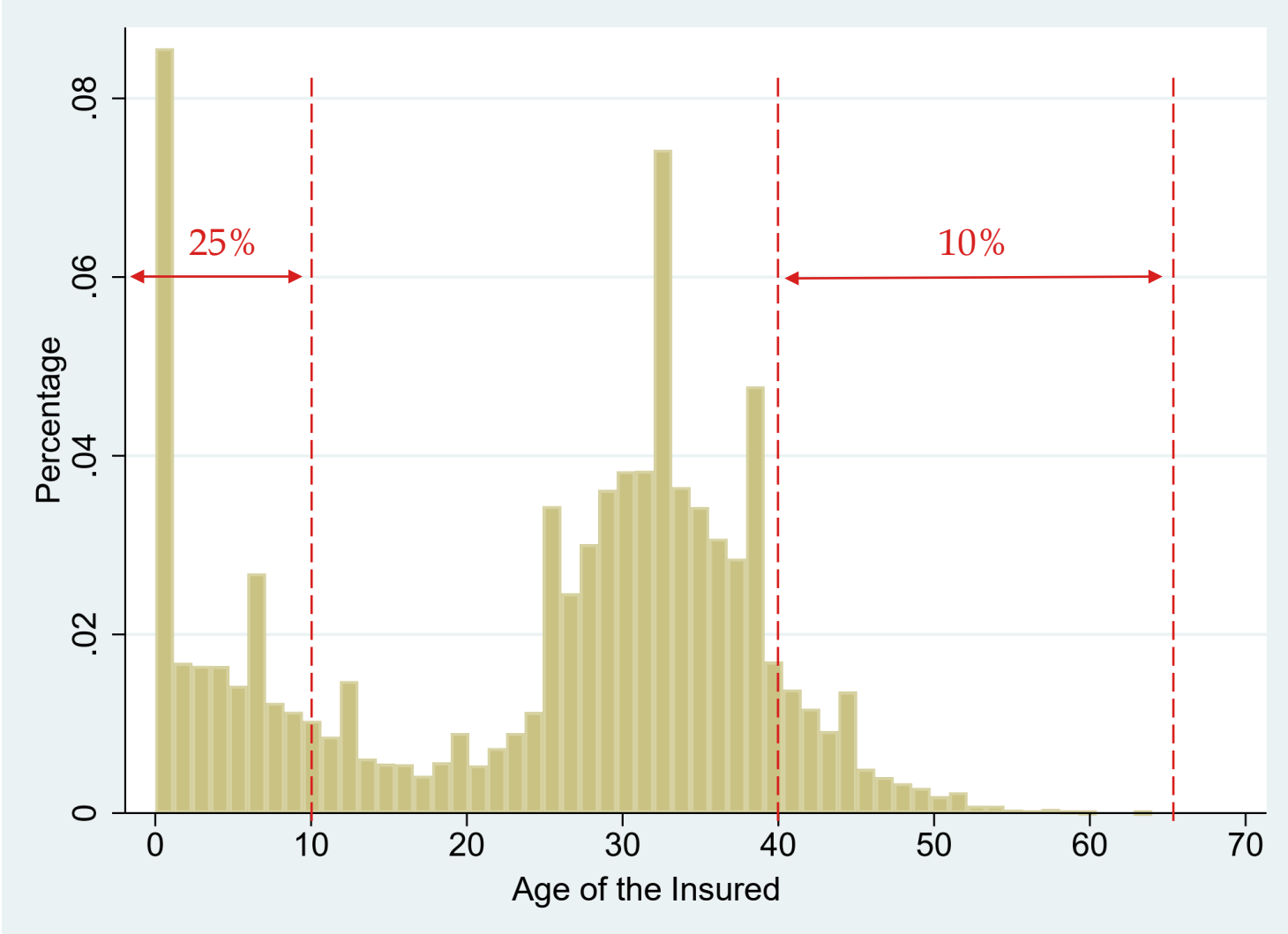
- **Age groups** *V.S.* **Risk groups**: different ages → varying probabilities of disease occurrence (risks) → varying premium rates of Critical Illness Insurance

- UCSMI products do not discriminate in terms of enrollment or pricing.

- Consequently, the responses of different age groups to UCSMI may vary.

Different Age Groups' Responses

Figure 3: Age Distribution



Different Age Groups' Responses

Table 5: Heterogenous Effects of UCSMI on Different Age Groups' Private Insurance Decisions

	Panel A: Share of **Policies** (percent)			Panel B: ln(**Coverage**)			Panel C: ln(**Premium**)		
	(1) [0,10)	(2) [10,40)	(3) [40,65]	(4) [0,10)	(5) [10,40)	(6) [40,65]	(7) [0,10)	(8) [10,40)	(9) [40,65]
Introduce	**-0.929***	**1.557*****	**-0.628****	**-0.052*****	**-0.142*****	**-0.163*****	**0.003**	**-0.018*****	**-0.018***
	(0.507)	**(0.555)**	**(0.290)**	**(0.015)**	**(0.011)**	**(0.033)**	**(0.005)**	**(0.004)**	**(0.010)**
PurchasingWindow	0.055	-0.867	0.812**	-0.008	0.043***	-0.016	0.012*	-0.003	0.005
	(0.899)	(0.933)	(0.386)	(0.018)	(0.014)	(0.039)	(0.007)	(0.005)	(0.013)
Coverage							0.212***	0.214***	0.312***
							(0.001)	(0.001)	(0.002)
Policy Characteristics	N	N	N	Y	Y	Y	Y	Y	Y
FEs: city	Y	Y	Y	Y	Y	Y	Y	Y	Y
FEs: year-month	Y	Y	Y	Y	Y	Y	Y	Y	Y
FEs: city × calendar month	Y	Y	Y	Y	Y	Y	Y	Y	Y
FEs: Product	N	N	N	Y	Y	Y	Y	Y	Y
Mean of Dependent Variable	23.73	65.90	10.37	1,091,591 (13.21)	1,152,603 (13.28)	881,048 (12.87)	5890.25 (8.61)	7710.77 (8.84)	10637.97 (9.13)
Observations	1,293	1,293	1,293	71,832	199,524	31,391	71,832	199,524	31,391
R^2	0.640	0.516	0.757	0.241	0.306	0.276	0.442	0.436	0.549

Different Age Groups' Responses

- Policy shares for both children and the elderly decreases by **0.929** and **0.628 percentage points**, respectively.
  - At the extensive margin, a higher proportion of children and elderly are crowded out of the private health insurance.
- The coverage amount selected of each policy for **children** decreases by an average of **5.2%**, which is lower than the average decreases of 14.2% for the middle-aged and 16.3% for the elderly, and also lower than the overall average decrease of 12.9% for the full sample.
  - ***The composition effect*** is more pronounced among children.
- The annual premium decreases by 1.8% for both the middle-aged and the elderly, similar to the full sample (1.9%), while there is no statistically significant change in the premium paid for children.

Different Coverage Groups' Responses

- We divided the sample into three groups based on coverage amount of each policy:
  - Low coverage: 0 < coverage amount ≤ 300,000 RMB
  - Median coverage: 300,000 < coverage amount ≤ 600,000
  - High coverage: coverage amount > 600,000

- One of the most important features of UCSMI products is the low premium rate.
- UCSMI plans may compete more directly with private health insurance policies with lower coverage amount (lower willingness-to-pay), and be more attractive to those who select lower coverage amount.

Different Coverage Groups' Responses

Table 6: Heterogenous Effects of UCSMI on Different Coverage Groups' Private Insurance Decisions

	Panel A: Share of **Policies** (percent)			Panel B: ln(**Premium**)		
	(1) Low Coverage	(2) Median Coverage	(3) High Coverage	(4) Low Coverage	(5) Median Coverage	(6) High Coverage
Introduce	**2.402***	**-3.357*****	**0.956**	**-0.023*****	**-0.016*****	**-0.008**
	(1.271)	**(0.779)**	**(1.304)**	**(0.003)**	**(0.005)**	**(0.005)**
PurchasingWindow	0.101	2.904***	-3.004*	0.002	-0.003	-0.003
	(1.429)	(0.899)	(1.563)	(0.003)	(0.005)	(0.008)
Coverage				0.853***	0.768***	0.020***
				(0.002)	(0.004)	(0.002)
Policy Characteristics	N	N	N	Y	Y	Y
FEs: city	Y	Y	Y	Y	Y	Y
FEs: year-month	Y	Y	Y	Y	Y	Y
FEs: city × calendar month	Y	Y	Y	Y	Y	Y
FEs: Product	N	N	N	Y	Y	Y
Mean of Dependent Variable	34.05	33.26	32.69	214,949 (12.23)	445,046 (12.98)	2,718,723 (14.64)
Observations	1,293	1,293	1,293	103,080	100,701	98,969
R^2	0.791	0.854	0.905	0.793	0.608	0.334

Different Coverage Groups' Responses

- Policy share for low coverage group increases by 2.402 percentage points, while the share for median coverage group decreases by 3.357 percentage points.
  - Consumers shift from groups with higher coverage to groups with lower coverage.

- The annual premium decreases more for the low coverage group (**2.3%**) than for the median coverage group (1.6%) and the full sample (1.9%).
  - Adjustments in private insurers' pricing strategies are more pronounced in the low coverage group, which is the most closely affected.

- There is no statistically significant change for the group with the highest coverage.

Concluding Remarks

- Exploiting proprietary data from one life insurer in China, we investigate the effects of China's PPP insurance plans, Urban-Customized Supplemental Medical Insurance (UCSMI) on private insurance decisions along the extensive margin and intensive margin.

- Following the introduction of UCSMI across cities:
  - # private health insurance policies: ↓ 29.5%
  - coverage of each policy: ↓ 12.3%; annual premium ↓ 1.9% (when controlling for coverage)

- Heterogenous responses from different age/coverage groups

Thank you for your attention!

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