

Progressive Subsidies in Healthcare

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Background

- Healthcare in Singapore is provided through a multi-payer, mixed financing system
- State subsidies are one of the unique features of this system
 - All citizens can receive healthcare subsidies; lower-income receive more
 - State subsidies cover virtually every healthcare scenario: prescription drugs, clinic visits, hospitalization, etc.
- Post-subsidy out-of-pocket costs are borne by the patient
 - Pay via combination of healthcare savings, insurance and cash
- For hospital care, patients can choose from 4 types of wards (C, B2, B1, A) that vary in their price and amenities
 - This project is interested in subsidy design and how patients choose a ward type under Singapore's healthcare system

Questions

1. How are choices affected by state subsidies for treatments with hospitalization?
 - E.g. do better-off patients choose non-subsidized healthcare when their subsidy rates decrease?

2. What are the fiscal costs of a progressive system of subsidies, and how does total welfare change if the slope of subsidy rates change?
 - E.g. what if we increase benefits for the lower-income and reduce benefits for the high-income?

Key features of healthcare financing in Singapore

1. Medisave (healthcare savings)

- Employer and employee share contributions of 8-10.5% of monthly wage
- Contributions are compulsory for all full-time employed (including self-employed)
- Uses: hospitalization, selected outpatient treatments, premiums for selected health insurance plans
- Annual withdrawal limits to ensure sufficient balances for the future

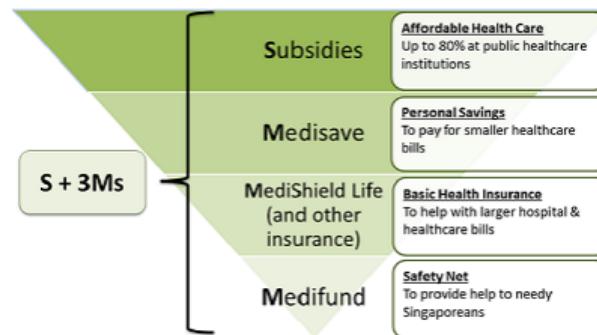
2. MediShield Life (health insurance for large hospital bills)

- Compulsory basic health insurance with universal coverage; requires deductibles and co-payments
- State-administered health insurance (state decides the premiums)
- Additional coverage from private insurance ("Integrated Shield Plan")

3. MediFund (welfare)

- Last safety-net for those who cannot afford out-of-pocket costs after subsidies, Medisave and MediShield

A multi-payer healthcare system



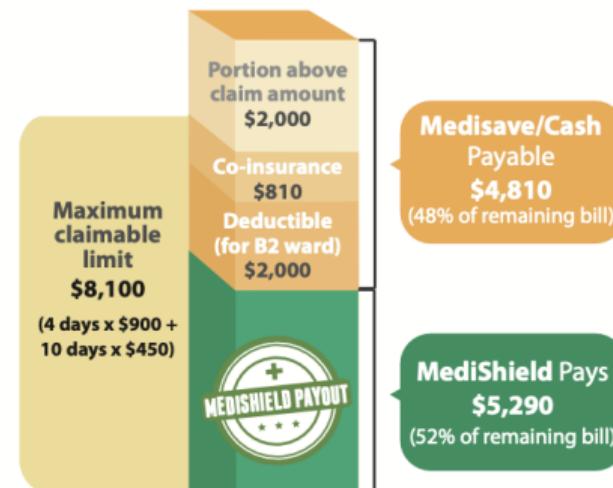
- Subsidies cover up to 80% of the total bill in public hospitals
- Smaller hospital bills can be paid through Medisave or private insurance
- Premiums charged for MediShield Life are set by prices for subsidised treatment in public hospitals
- Subsidies not only (i) ↓ the final out-of-pocket bill, but also (ii) ↑ the affordability of basic health insurance

Person X suffered from an accident with internal bleeding in the brain, and was hospitalized for 4 days in ICU and 10 days in a Type-B2 ward.

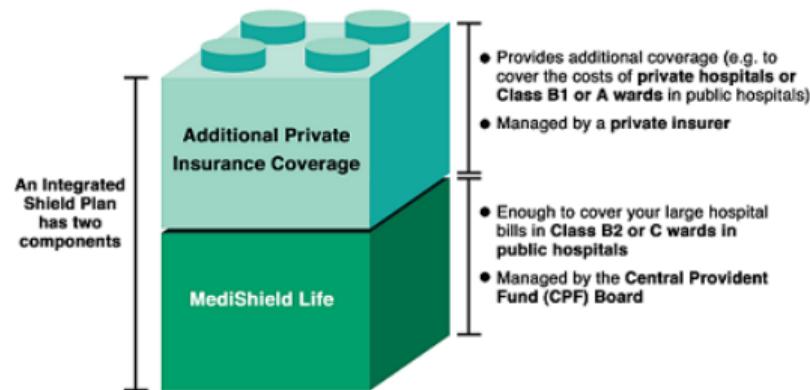
State subsidies covered about two-thirds of the hospital bill.

Bill Breakdown

Total bill before Government subsidy	\$30,200
Government subsidies	\$20,100
Bill after Government subsidy	\$10,100



Integrated Shield Plans provide additional coverage beyond MediShield Life



- Premiums for MediShield Life are fully payable by Medisave
- Additional premiums for a (privately provided) Integrated Shield Plan are also payable by Medisave, but up to a limit
- Large range of private plans; some may still result in out-of-pocket costs for patient

Progressive subsidies are provided for lower-type wards

Current Acute Inpatient Subsidy Levels (Singapore Citizen)		
Individual Monthly Income	C Ward Subsidy	B2 Ward Subsidy
\$3,200 and below	80%	65%
\$3,201 - \$3,350	79%	64%
\$3,351 - \$3,500	78%	63%
\$3,501 - \$3,650	77%	62%
\$3,651 - \$3,800	76%	61%
\$3,801 - \$3,950	75%	60%
\$3,951 - \$4,100	74%	59%
\$4,101 - \$4,250	73%	58%
\$4,251 - \$4,400	72%	57%
\$4,401 - \$4,550	71%	56%
\$4,551 - \$4,700	70%	55%
\$4,701 - \$4,850	69%	54%
\$4,851 - \$5,000	68%	53%
\$5,001 - \$5,100	67%	52%
\$5,101 - \$5,200	66%	51%
\$5,201 and above	65%	50%

Higher-type wards provide more comfort but are not subsidized

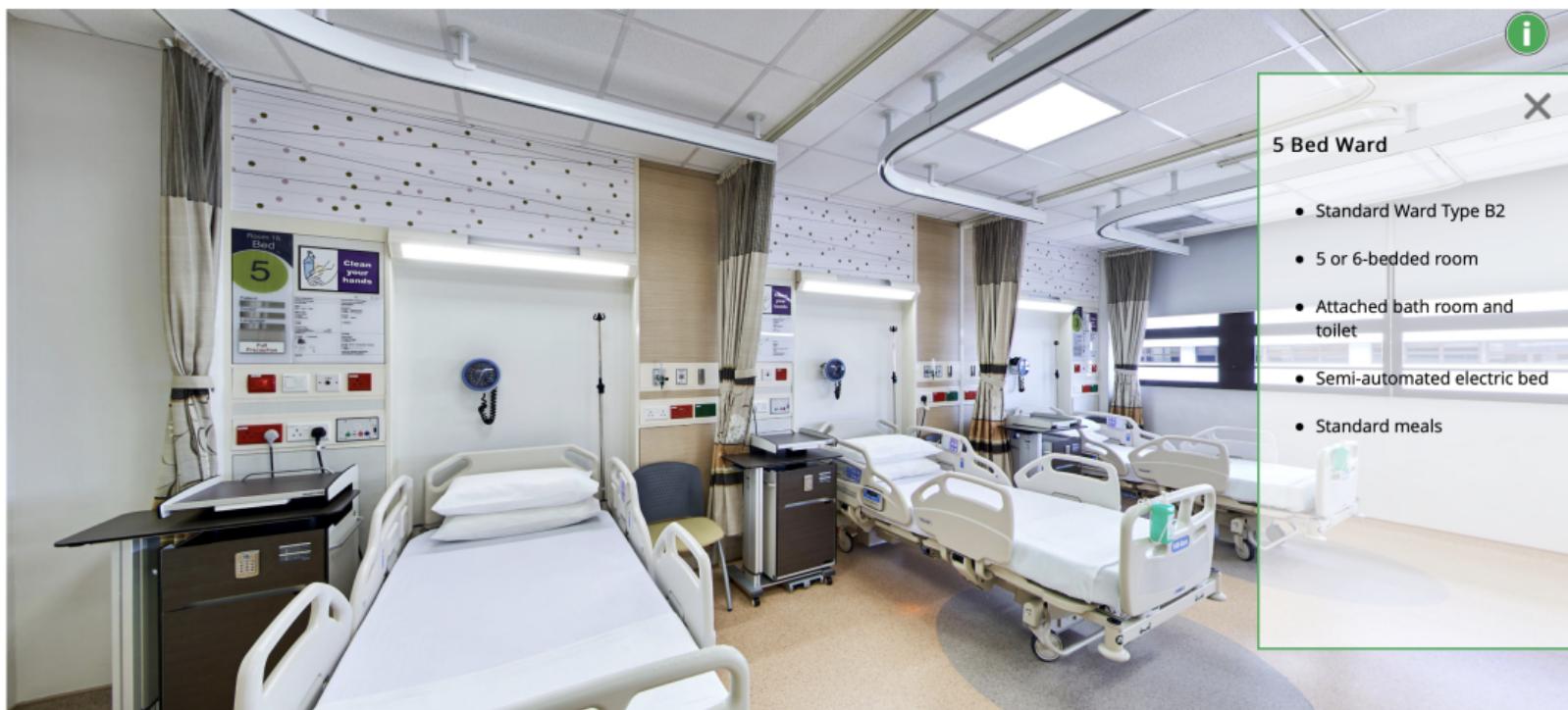
Ward Type & Description	Rates*
Standard Ward Type C <ul style="list-style-type: none">• Up to 8 beds in a room	From S\$35 per day
Standard Ward Type B2 <ul style="list-style-type: none">• Up to 6 beds in a room• semi-automated electric bed	From S\$79 per day
Standard Ward Type B1 <ul style="list-style-type: none">• 4 beds in a room• attached bath room and toilet• television• semi-automated electric bed• choice of meals.	From S\$251.45 per day
Standard Ward Type A <ul style="list-style-type: none">• Single room• attached bath room and toilet• toiletries• television• telephone• fully automated electric bed• choice of meals• sleeper unit for accompanying adult at additional charge	From S\$508.46 per day

*NOTE: Updated as of 1 July 2021

Ward Type A (0% subsidy)



Ward Type B2 (65% subsidy)



Recap

- Public hospitals offer 4 types of hospital wards (C, B2, B1, A) that vary in terms of prices, subsidies, and amenities
- Patients' choices will depend on subsidy level, Medisave balances, insurance (MediShield Life + Integrated Shield Plan), and healthcare episode
- Patients who have private insurance (for Type A/B1) may still choose Type B2/C wards due to the difference in out-of-pocket costs

Objectives

1. Develop a structural model of healthcare demand that incorporates differentiated hospital options and heterogeneous preferences across patients
 - Need to take into account the key features of healthcare financing in Singapore (subsidies, insurance, healthcare savings)
 - Want to isolate demand for hospital ward-types from non-treatment factors, but a patient's choice will depend on their health episode and treatment plan
2. Counterfactual analysis: welfare effects from changes to subsidy rates

Approach

- Focus on cataract surgeries (a day surgery procedure)
 - Cataract patients suffer from cloudy vision
 - Condition deteriorates over time and if untreated will make them effectively blind
 - Not life-threatening, but medically necessary
- Due to its non-urgent nature, the surgery is typically scheduled weeks in advance
 - Patients have sufficient time to consider their choice between 4 types of wards
 - Costs of surgery can be covered by Medisave and private insurance
- Depending on data, may consider other similar day surgery procedures or pool across multiple procedures
- Preferences for hospital-type may be different for day surgeries vs. more complicated procedures; may want to study treatments such as CABG surgeries (min. 7-day hospital stay)

Model

- Let $\mathcal{S}_j(g)$ denote the set of incomes that receive subsidy $s_j(g)$
- The (indirect) utility of patient i in hospital h and type j is

$$U_{ihj} = \left(\alpha_i^{ISP} \cdot \mathbb{1}\{ISP_i > 0\} + \alpha_i^{MSW} \cdot \mathbb{1}\{MSW_i > 0\} + \sum_{g=0}^G \alpha_g \cdot \mathbb{1}\{y_i \in \mathcal{S}_j(g)\} \right) \times [1 - s_j(g)] p_{hj} + X'_{hj} \beta_i + \xi_{hj} + \varepsilon_{ihj}$$

- p_{hj} denotes the *pre-subsidy* price of type j in hospital h
- y_i denotes the income of patient i
- α_i^{ISP} and α_i^{MSW} capture the effects of paying with an integrated shield plan and Medisave withdrawals
- α_g captures the effect of subsidy rate $s_j(g)$ for each group g , normalize no-subsidy group to $g = 0$

Model (continued)

- Let X_{hj} denote a $k \times 1$ vector of product characteristics in hospital h and type j (and with abuse of notation)

$$X_{hj} = (1, \#beds, bedtype, bathroom, TV, AC, meal, others)'$$

- And let β_i denote a $k \times 1$ vector with k^{th} element

$$\beta_{ik} = \mu_k + \beta_k^{\text{age}} \cdot \text{age}_i + \beta_k^{\text{gen}} \cdot \text{gender}_i + \beta_k^{\text{inc}} \cdot \log y_i + \sigma_k \nu_i$$

where $\mu_k, \beta_k^{\text{age}}, \beta_k^{\text{gen}}, \beta_k^{\text{inc}}, \sigma_k$ are parameters to be estimated and ν_i is a $N(0,1)$ i.i.d. taste shock

- ξ_{hj} denotes the unobserved characteristics of hospital h and type j
- ε_{ihj} is a Type 1 EV i.i.d. idiosyncratic shock

Instruments

- Usual concern that $\text{Corr}(p_{hj}, \xi_{hj}) \neq 0$
- Identification requires instruments Z_{hj} such that $\mathbb{E}[\xi_{hj} Z_{hj}] = 0$
 - One potential instrument could be

$$Z_{hj} = \bar{p}_{h'j} \quad \forall h' \neq h$$

which is the average price of type j in other hospitals h' ; but this is likely to be a weak instrument due to the bunching of prices across the public hospital system

- May need data on hospital manpower and related costs (e.g. no. of doctors, no. of nurses, staff wages) + variation over time (thus far we have omitted time subscripts for brevity)

Data

This project will need:

1. Relevant hospital data on admissions and payments in the cataract surgery segment from Singapore
2. Patients' demographics, by their (i) age, (ii) gender, (iii) income or income group
3. Additional data on hospital manpower and/or related costs to construct instruments

Two potential sources of data to begin this project:

1. Due to detailed record-keeping, the public hospital system should capture all the required data fields
2. Approach an insurance provider and obtain data on the relevant insurance claims (in this case will need to find instruments)

Food for thought

1. Given its complexity, are there information frictions in the healthcare system?
2. What is the role of competition in the private insurance market? How do patients choose their plan/provider?

End of presentation — Thank you!