Subsidy Design in Singapore's Healthcare

Christopher Saw

January 2023

Background

- Healthcare in Singapore is provided through a multi-payer, mixed financing system
- Progressive government subsidies are one of the unique features of this system
  - All citizens can receive healthcare subsidies; lower-income receive more
  - 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 lower amenity, subsidized healthcare when subsidy rates increase?

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?
   - How does a progressive schedule of subsidies compare with a flat subsidy rate?

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%

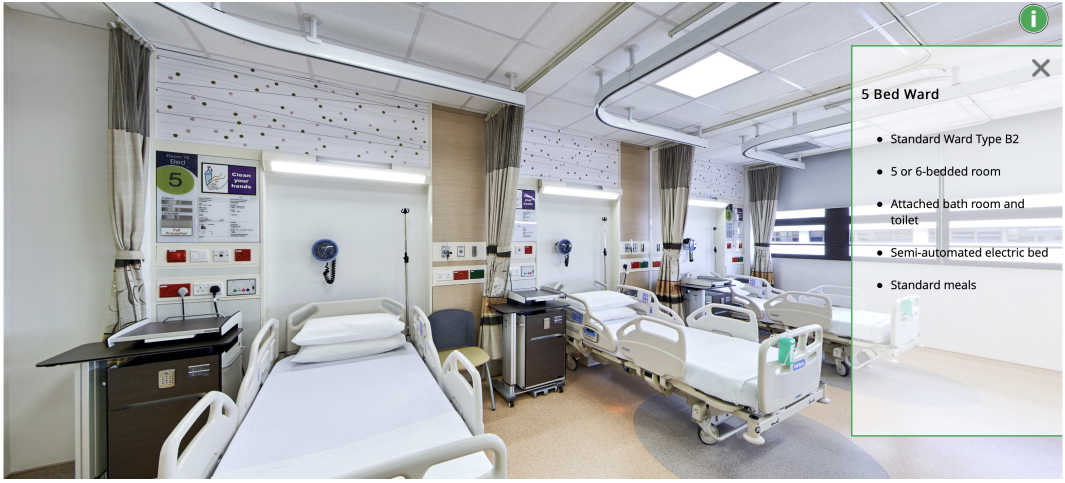
Higher-type wards provide more comfort but are not subsidized

Ward Type & Description	Rates*
Standard Ward Type C • Up to 8 beds in a room	From **S$35** per day
Standard Ward Type B2 • Up to 6 beds in a room • semi-automated electric bed	From **S$79** per day
Standard Ward Type B1 • 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 • 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)



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

Model

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

$$U_{ihj} = \left(\sum_{g=0}^{G} (\alpha_g + \sigma_g \eta_{i(g)}) \cdot \mathbb{1}\{y_i \in \mathcal{R}_j(g)\} \right) p_{hj} + X'_{hj}\beta_i + \xi_{hj} + \varepsilon_{ihj}$$

- p_{hj} denotes the *post-subsidy* price of type j in hospital h
- y_i denotes the income of patient i
- α_g captures the effect of subsidy rate $r_j(g)$ for each group g, normalize no-subsidy group to $g = 0$
- $\eta_{i(g)}$ is a $N(0,1)$ i.i.d. taste shock and σ_g captures the heterogeneity in willingness to pay across consumers within each income group

Model (continued)

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

$$\beta_{ik} = \mu_k + \beta_k^{age} \cdot age_i + \beta_k^{gen} \cdot gender_i + \beta_k^{inc} \cdot \log y_i + \sigma_k \nu_i$$

where $\mu_k, \beta_k^{age}, \beta_k^{gen}, \beta_k^{inc}, \sigma_k$ 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

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

    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)