Effect of Medical Savings Accounts on Inpatient Demand

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February 2023

What are Medical Savings Accounts (MSAs)?

- Individuals make monthly contributions into a savings account that is set aside for future healthcare expenses
- Advocated as a demand-side measure to control individual healthcare spending and reduce moral hazard with 3rd party insurance
- However, restrictions on how MSA monies can be used imply that individuals value 1 dollar in their MSA less than 1 cash dollar
- Singapore is the only country in the world to have a mandatory, large-scale MSA scheme known as Medisave

Research Objectives

Question:
To what extent do Singaporeans value Medisave dollars less than cash dollars?

Approach:
Use hospital payments data from Singapore to estimate MSA and cash elasticities from a conditional logit model

Why is this interesting?
If Medisave dollars are valued at 0, then there is no effective demand-side measure, and full private insurance is better because it allows for risk-pooling

Model

- Each individual maximizes utility over two periods ($t = 1,2$):

$$U = u_1(c_1, h_1 - \theta_1) + \beta u_2(c_2, h_2 - \theta_2)$$

- Subject to Medisave and Income constraints:

$$M = p_1^m + \frac{p_2^m}{1+r}$$
$$Y = c_1 + \frac{c_2}{1+r} + p_1^c + \frac{p_2^c}{1+r}$$

where c_t denotes a consumption good (numeraire), $h_t = p_t^m + p_t^c$ denotes healthcare spending from Medisave and Cash, and θ is a health shock

Unconstrained solution

- Optimal choices equate marginal utilities of consumption and health in the same period, and expenditures across time periods are adjusted by $\beta(1+r)$

$$
\begin{aligned}
u_c(c_1^*, p_1^{m*} + p_1^{c*} - \theta_1) &= u_h(c_1^*, p_1^{m*} + p_1^{c*} - \theta_1) \\
u_c(c_2^*, p_2^{m*} + p_2^{c*} - \theta_2) &= u_h(c_2^*, p_2^{m*} + p_2^{c*} - \theta_2) \\
u_c(c_1^*, p_1^{m*} + p_1^{c*} - \theta_1) &= \beta(1+r) \cdot u_c(c_2^*, p_2^{m*} + p_2^{c*} - \theta_2) \\
u_h(c_1^*, p_1^{m*} + p_1^{c*} - \theta_1) &= \beta(1+r) \cdot u_h(c_2^*, p_2^{m*} + p_2^{c*} - \theta_2)
\end{aligned}
$$

- We also get $\frac{\lambda_M}{\lambda_Y} = 1$, which implies cash and Medisave are valued equally in the problem with no borrowing constraint

Model with borrowing constraint

- Individuals now choose $(c_1, p_1^m, p_1^c, c_2, p_2^m, p_2^c)$ subject to per-period income constraints, the Medisave constraint, and a non-negative constraint on p_1^c

- Non-satiation implies that individuals in spend all their period 1 income on consumption and only use Medisave for healthcare spending, so $\mu_{p_1^c} > 0$

- Straightforward to show that $\lambda_M = \lambda_{Y_1} - \mu_{p_1^c} \implies \lambda_M < \lambda_{Y_1}$

- Other cases where $\lambda_M > \lambda_Y$ can be derived by changing assumptions on M, Y, r, θ

Data

- Individual-level inpatient hospital data at Singapore hospitals from Jan 2001 to June 2001
- Central Claims Processing System (CCPS) captures clinical data such as specialty, procedure type, diagnosis, length of stay, outcome of treatment; financial data such as hospital charges, subsidies and Medisave used; as well as patient characteristics such as age and sex
- An age-representative sample of the CCPS data was taken and linked with household income, household Medisave balance and household size
- Empirical section estimates $\frac{\lambda_M}{\lambda_Y}$ from a conditional logit model of hospital-ward choices, using MLE

Conditional Logit (MLE) Estimates

Table 5.8: Ratio of Medisave to Cash Price Elasticity

Severity	Baseline		Median Income		Males		Elderly		Pregnancy	
(Percentile)	Est	s.e.	Est	s.e.	Est	s.e.	Est	s.e.	Est	s.e.
0th to 25th	0.42***	(0.05)	0.33***	(0.05)	0.45***	(0.05)	0.51***	(0.05)	0.24***	(0.08)
26th to 50th	0.61***	(0.06)	0.49***	(0.06)	0.67***	(0.06)	0.71***	(0.05)	0.34***	(0.1)
51st to 70th	0.81**	(0.07)	0.69***	(0.08)	0.91	(0.07)	0.91*	(0.06)	0.47***	(0.12)
71st to 80th	0.84**	(0.07)	0.71***	(0.09)	0.96	(0.08)	0.94	(0.06)	0.45***	(0.14)
81st to 90th	0.92	(0.08)	0.78**	(0.09)	1.06	(0.09)	1.01	(0.06)	0.47***	(0.17)
91st to 95th	0.96	(0.09)	0.82*	(0.1)	1.13	(0.11)	1.04	(0.07)	0.46***	(0.18)
96th to 99th	0.97	(0.11)	0.81	(0.12)	1.15	(0.13)	1.05	(0.08)	0.41**	(0.21)
above 99th	0.76*	(0.12)	0.5***	(0.16)	0.92	(0.14)	0.91	(0.08)	0.14	(0.3)

Notes: Each cell reports the ratio of the coefficient for p_m (including the effect of interacted terms) over p_c.The standard errors shown in parentheses are obtained using a bootstrap with 2000 replications. *** denotes significance at the 1% level and ** denotes significance at the 5% level.

Figure 1: Empirical estimates of $\frac{\lambda_M}{\lambda_Y}$ from Singapore CCPS data

Results

- Empirical evidence bears out the theoretical predictions that one Medisave dollar is worth less than a cash dollar only for low health shocks and very high health shocks

- Comparing a pure cash system versus Medisave in Singapore, the additional expenditure as a result of Medisave does not appear to be large; likely due to the restrictions on Medisave use (only for inpatient and selected outpatient treatment), and limits on Medisave contributions and balances