Reading Introduction

Medical Provider Agency and Pharmaceutical Demand with Universal Coverage: Evidence from Taiwan

a. What is the question (of the paper)?

This paper deals with the supplier's agency problem of the profit-oriented choice of drugs in medical markets based on the data of anti-diabetes drugs in Taiwan, attaching importance to structural estimation and counterfactual analysis.

b. Why should we care about it?

A leaked intrinsic document for the medical agendas claims that the drug selection criteria are related to the largest gap between refund and acquiring prices, the adoption of academic medical centers, and relatively high profits, which was surprisingly focused on by the media. Apart from this, this paper pays attention to the assumption of no perfect agency of medical suppliers supported by the data of NHIRD, and incorporates welfare analysis considering consumer characteristics, which has not been discussed before. Additionally, the results of the empirical analysis proffers some meaningful indication of the mentioned agency problem along with advisable policy for the medical regulation in Taiwan and over the world.

Real Word Example:

Intuitively, a private pharmaceutical owner cares more about his/her own profits than the employees or a government medical institution. For instance, a physician-owner, John, is willing to maximize his utility, i.e. profits, when facing the patients coming to his clinic. Due to some knowledge, he knows the reimbursement and insurance coverage of the patients, resulting in providing them with sub-optimal treatments instead of the best medical services in order to pursue his own gains, where the patients' demand is taken priority over while they may not realize it. In this case, some medical regulation departments ought to implement certain measures to control the moral risk of such private medical institution owners by reducing their probability of prescribing the sub-optimal treatments for higher profits, which will benefit both the patients and the governmental or other insurance institutions.

c. What is your (or the author's) answer?

(1) The logit estimation reveals that private medical institutions tend to prescribe generic and costly drugs with a higher probability than government medical suppliers, especially when it is claimed with a higher refund value or greater insurance coverage of a patient .
(2) Counterfactual analysis illustrates the estimation on the size of the agency effects in accord with the assumption of the medical institutions' ownership.
(3) Regression controlling endogenous product characteristics displays the downward slope and price elasticity of the pharmaceutical demand curve while the cross-price elasticity estimates medical suppliers' potential substitution patterns considering adjusted future price.

d. How did you (or the author) get there?

To begin with, the author defines an empirical model of the agency problem as the medical supplier's own utility regarding their treatment selection. Then, the author shows some indispensable institutional details concerning the data from NHIRD that are used in the empirical analysis, with empirical proxy to represent the physician ownership of the providers.When it comes to the exogenous identification with market competition, the two-stage least squares estimation is employed in the second stage, followed by welfare analysis including the agency problem, the policy of triple equivalence, as well as moral hazard.

Notations

NHI: National Health Insurance.
OHA: oral hypoglycemic agent.

Eq(1): $U_{ijt}(\pi,u,x)=\sum_k x^1_{jkt}\alpha_{ikt}+\sum_k x^2_{jkt}\beta_{ikt}+\xi_{jt}+\varepsilon_{ijt}.$

$U_{ijt}(\pi,u)$: provider *i*'s utility gained from prescribing an OHA *j* to its patient in month *t*, where π is the provider's utility and *u* is the patient's utility from receiving this treatment.

x^1_{ijt} : observed product characteristics including the drug price and whether the drug is generic.

x^2_{ijt} : other observed product characteristics including vintage, import, and whether the manufacturer lists their company on the stock market in Taiwan.

ε_{ijt} : an addictive error term.

D_j : Dummy variables such that $x^2_{ijt}=(D_j,x^{2'}_{ijt})$ and D_j equals 1 if the *j*th drug was prescribed in a treatment.

(z^1_{irt},z^2_{irt}) : empirical proxies, where *r* is an index, z^1_{irt} includes the dummy variables indicating physician and government ownership, and z^2_{irt} includes the provider's other characteristics.

Eq(2): $\alpha_{ikt}=\bar{\alpha}_{kt}+\sum_r z^1_{irt}\alpha_{krt}$

Eq(3): $\beta_{ikt}=\bar{\beta}_{kt}+\sum_r z^2_{irt}\beta_{krt}$

$\bar{\alpha}_{kt},\bar{\beta}_{kt}$: the common preference to the providers to the product characteristic *k*, while the other α's and β's capture the heterogeneous effect of individual characteristics.

Eq(4): $U_{ijt}=\delta_{jt}+\sum_{kr} x^1_{jkt}z^1_{irt}\alpha_{krt}+\sum_{kr} D_j z^2_{irt}\beta_{krt}+\varepsilon_{ijt}$

Eq(5): $\delta_{jt}=\sum_k x^1_{jkt}\bar{\alpha}_{kt}+\sum_k x^2_{jkt}\bar{\beta}_{kt}+\xi_{jt}$

δ_{jt} : a product-specific constant term common among providers.

Eq(6): $Pr_{it}(j\mid z^1_i,z^2_i,x^1_j,x^2_j;\alpha,\beta,\delta)=\frac{exp(\delta_j+\sum_{kr}x^1_{jk}z^1_{ir}\alpha_{kr}+\sum_{kr}D_j z^2_{ir}\beta_{kr})}{1+\sum_{q=1}^{J_t}exp(\delta_q+\sum_{kr}x^1_{qk}z^1_{ir}\alpha_{kr}+\sum_{kr}D_q z^2_{ir}\beta_{kr})}$

a conditional logit model to identify (α,β,δ).

Eq(7): $\epsilon_{ijt}=\frac{\partial Pr_{it}(j)}{\partial p_{jt}}\frac{p_{jt}}{Pr_{it}(j)}=\frac{\partial U_{ijt}}{\partial p_{jt}}p_{jt}(1-Pr_{it}(j))$

individual price elasticity of the *j*th OHA.

Eq(8): $\epsilon_{ijkt}=\frac{\partial Pr_{it}(j)}{\partial p_{kt}}\frac{p_{kt}}{Pr_{it}(j)}=-\frac{\partial U_{ikt}}{\partial p_{kt}}p_{kt}Pr_{it}(k)$

cross-price elasticity between the OHAs *j* and *k*.

Eq(9): $U_{ijt}=\delta_{jt}+\sum_{kr}x^1_{jkt}z^1_{irt}\alpha^o_{krt}+\sum_k x^1_{jkt}\nu_{ikt}\alpha^u_{kt}+\sum_{kr}x^2_{jkt}z^2_{irt}\beta^o_{krt}+\varepsilon_{ijt}$

a nested model of the utility function.

Eq(10): $\Delta E(CS)=\frac{1}{-\alpha_{price}}[\ln(1+\sum_{j=1}^{n}e^{U_{after}})-\ln(1+\sum_{j=1}^{n}e^{U_{before}})]$

the welfare change.