Course: ECON 613

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Project: Reading Notes2

Date: 2/23/2022

Reading Notes of **"**Paying on the Margin for Medical Care: Evidence from Breast Cancer Treatments*"*

The paper shows that "top-up" health insurance policy increases the welfare by $700–2,500 per patient relative to other two policies ("full coverage" policy and "non top-up" policy) in breast cancer treatments. "top-up" health insurance policy requires patients to pay extra costs for more expensive treatment options. First, the author presents a simple graphical framework that reviews the welfare consequences of alternative insurance designs for reimbursement of different treatment choices. Next, the author estimates a demand curve that quantifies the resultant welfare effects of alternative policy designs in the specific context of treatment choices among breast cancer patients.

Standard "full coverage" policy in US means the patients hardly pay any increment cost for the more expensive option, and non top-up policy in UK means that the insurance only covers the cost-effective option, and the patient needs to pay all the cost if the more expensive plan is chosen. There are two major surgery options in curing breast cancer: mastectomy and lumpectomy, and they share similar mortality rates. Mastectomy is cheaper, and it is mainly due to the add-on costs of the radiation therapy brings by lumpectomies. Also, the time cost of traveling to receive post-surgery radiation therapy associated with lumpectomy. A standard course of radiation therapy requires 25 treatments spread over 5 weeks.

The empirical analysis uses the datasets of patients' medical records from CCR and datasets on radiation treatment facility locations from IMV. The sample covers 323,612 breast cancer patients and they chose either mastectomy or lumpectomy as their initial treatment, with every patient matched to the nearest radiation facility. First, the willingness to pay for lumpectomy is represented by vi ≡ vi,l − vi,m, where M stands for choosing mastectomy and L represents lumpectomy. Then the cumulative distribution function f(vi) is drawn. US-style "full coverage" policy loses welfare of amount triangle CDE and "no top-up" has losses of triangle ABE. Furthermore, the empirical strategy is focused on estimating this demand curve. To explore these tradeoffs quantitatively, the demand curve is derived from vi, individuals' incremental willingness to pay for L. ui ≡αi−βi(θidi+p), where αi and βi are the (potentially patient-specific) preference parameters, di is the distance of patient i to the nearest radiation facility, and p is the incremental price she would need to pay for lumpectomy (relative to mastectomy). the parameter θ_i captures the opportunity cost of time. In Table 3—Treatment Choice by Travel Time, the author applies Logit model to estimate the relationship between breast cancer treatment choice of lumpectomy. Column 1 assumes that both α_i and β_i are unaffected by patient variables. Columns 2, 3, and 4 maintain the assumption for β_i but increasingly add covariates that shift α_i. In column 5, the author allows these observables to change β_i by adding interaction terms between the covariates and distance. In the end, Column 6 reports results from a specification that allows random coefficients on distance: it assumes that β_i follows a lognormal distribution, thus relaxing the assumption of $\xi_i = 0$ that is assumed in all other specifications. The result is that having the radiation facility of driving distance of ten minutes further from the patient's residence makes the patient less likely to choose lumpectomy by about 0.7 to 1.1 percentage.

Then the demand curve for lumpectomy enables the author to do quantitative exercises of the impact of alternative insurance designs. The model now becomes $u_i \equiv \alpha_i - \beta'_i d_i$, where $\alpha_i = \mathbf{x}'_i \gamma^{\alpha}{}_i + \varepsilon_i$ and that $\beta_i = \mathbf{x}'_i \gamma^{\beta}{}_i + \xi_i$. US-style "full coverage" policy raises the lumpectomy rate by only about 10 percentage points relative to the efficient level of 48 percent, with a resultant welfare cost of about $710 per patient. UK-style "no top-up" policy (given by point A) reduces the lumpectomy rate from about 21 percent under the efficient top-up policy to nearly zero, and reduces welfare by about $1,400 per patient, relative to the efficient outcome. In Figure 3's model, on the other hand, the lumpectomy rates fall by only 4.5 percentage from the efficient level of 48 percent, with a welfare cost of around $800 per patient. The individual ex ante utility is given by π_i, the solution to: $w(x - \pi_i) = (1 - \varrho)w(x) + \varrho w(x - \min(p, v_i))$, and $\pi = \log[\varrho \cdot \exp(r \cdot \min(v;p)) + 1 - \varrho)]$.

Overall, the paper talks about the "top-up" health insurance policy and its social welfare benefits. The analysis focused on the efficiency of treatment choices, with the overall level of risk exposure fixed. Also, the paper evaluated the welfare consequences of those three insurance designs by the willingness to pay curve for the more expensive treatment option lumpectomy. Although the empirical analysis assumes that social planners focus on breast cancer more expensive treatment will not bring additional benefits, this type of analysis can be applied when an alternative treatment for a disease society is incremental value judgment for less than the incremental cost, even if the incremental value is positive. The restriction for this paper is that other than survival benefits, other benefits such as "body integrity" or aesthetic factors should be considered and the monetized value should be included in the model.