Reading Notes 2

Zihao Zhang

Rising medical expenditures in the U.S. have always been at the center of the U.S. public and experts' attention. Examining this issue from the demand side by focusing on breast cancer treatments, this paper investigates how different insurance policies affect patients' overall welfare. The paper can be divided into three major sections. In the first section, the authors propose a conceptual framework that demonstrates how breast cancer patients' treatment choices statistically relates to their respective distances from radiation facilities . Then, the authors estimate patients' demand lumpectomy and with the estimated demand curve quantify how welfare changes under alternative insurance designs. At last, after measuring the efficiencies of the different insurance policies, the authors consider ex ante welfare (impacts on risk exposure) and find that "full coverage" policies top the others in terms of risk reduction.

The paper's base sample covers 323,612 female breast cancer patients diagnosed between 1997 and 2009, the data concerns with 1) patients' choice between mastectomy and lumpectomy as initial treatment and 2) patients' respective physical distances from their nearest radiation facility. From the data, the authors first find that travel time to radiation facilities is statistically correlated with patients' choices for lumpectomy – an operation that requires further radiation treatments. In addition, the authors consider several covariates such as age and race in their data analyses and find that they do not change the relationship between treatment choice and travel time. These two findings are important premises to authors' estimation of the the demand curve for lumpectomy.

Before estimating the demand curve, the author first introduces the conceptual framework. The framework illustrates the efficiency consequences of alternative insurance designs and corresponding welfare loss. The framework allows us to intuitively understand how no top-up and full coverage policies lead to welfare loss. Specifically, the full coverage policy means that patients can choose between baseline and more expensive treatments without an incremental cost. However, as lumpectomy is more expensive but not more effective a treatment, this policy design leads to inefficient treatment decisions. On the other hand, no top-up policies which only cover the cheaper baseline treatment option lead to welfare loss as most patients are driven to mastectomy as they would have to pay the whole price of lumpectomy. The "top-up" policy covers the baseline treatment and asks patients to pay incremental costs if they choose they more expensive treatment option.

The authors then proceed to estimate patients' demand curve for lumpectomy by first conducting logit regressions to quantify the treatment-distance relationship. The regression results show that having the nearest radiation facility ten minutes further from the patients' residence makes her 0.7-1.1% less likely to choose lumpectomy. Based on this conclusion, the author will use this distance measure as a shifter in the effective relative price women face for cancer treatment when estimating the demand curve.

Combining previous findings and conceptual framework, the authors then proceed to examine welfare under different policy designs. They define patient i's willingness to pay for a lumpectomy as $v_i = \frac{\alpha_i}{\beta_i} - \theta_i d_i$ and denote the estimated demand by the distribution $F(v_i)$. The joint distributions of α_i and β_i have been estimated in previous regression and d_i can be observed. Then the authors assume θ_i as \$1150, which represents the opportunity cost of time, and this number is calculated by multiplying the average hourly wage by the number of patients' round trips to radiation facilities. Then, with an estimate of $F(v_i)$ and given price, the paper defines the demand: it represents the share of choosing lumpectomy with $(1 - F(p))$ and consumer surplus with $(1 - F(p)\,E(v_i | v_i > p))$. Hence, we can easily reach that the total incremental cost is $(1 - F(p)\,c$. Using homogeneous and random coefficient logit models, the authors estimate exactly how lumpectomy rates change as patients' share in the treatment varies under different policies.

The paper thus far has focused on the ex-post efficiency of treatment choice. For completeness, the authors then briefly measure ex-ante utility - the policies' impact on risk exposure. In this process, the authors assume that the utility is CARA utility and that individual will face a financial loss or against will $(\min(p, v_i))$. The solution of the utility function measures the impact of the possible financial loss on patients' utility in different insurance policies. At last, the authors find that top-up policies do expose individuals to ex-ante risk. With stylized calibration exercises, they conclude that full coverage policies comparatively have higher social efficiency with high level of risk aversion.

Briefly, this paper presents a framework that illustrates breast cancer patients' welfare gains under different insurance policies by estimating the demand curve for the treatment lumpectomy. After examining efficiency, the paper estimates ex-ante welfare in different levels of risk aversion to improve the completeness of its research. Although the research specifically focuses on two treatments that differ in cost but not effectiveness, the authors propose suggestions for how further work can be conducted to examine more general situations. The possible limitation of the article is that when estimating the demand curve, the calculation of the opportunity cost may be too simple, which may cause deviation. All in all, this article is very informative for researchers and policymakers in related fields.