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Econ 613 Reading Notes #2
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Paying on the Margin for Medical Care: Evidence from Breast Cancer Treatments

Health care spending in the United States is becoming increasingly costly, making it imperative that strategies be developed to carefully manage the issue. Einav et al (2016) attempts to address this issue through estimating a relative treatment demand curve which can quantify the resultant welfare effects of these several health insurance policy solutions. The article also offers a graphical framework designed to visualize these disparate welfare effects and to show the importance of using relative demand curves to assess policy alternatives. Through their analysis, the authors find and illustrate potential welfare gains that could be achieved through a "top-up" policy design, as compared to welfare achieved through current popular alternatives.

For addressing the issue of increasingly costly health care costs, several popular alternatives have come into practice. The first is the standard "full coverage" insurance design that is commonplace in the United States. Insurance companies cover the full cost so that consumers face little to no incremental costs from choosing more expensive treatments. Others, particularly the United Kingdom and European countries, have instead implemented "no top-up" designs where the "cost-effective" treatments are fully covered, and other less cost-effective treatments are not covered. In assessing resultant welfare effects for different health insurance policy designs, Einav et al (2016) also offers a third option: a "top-up" policy which covers more expensive treatments but requires individuals to pay out of pocket the incremental cost, relative to the fully covered baseline treatment. The authors explain that such "top-up" approaches have been taken and studied in other contexts, including public subsidies for education and other public health insurance subsidies. This literature guides the article's theoretical framework.

Patients diagnosed with breast cancer generally receive surgery as their initial course of treatment. There are two key types of surgery to choose: mastectomy or lumpectomy followed by radiation therapy. Randomized clinical trials indicate that there is no average difference in survival between the two types of surgery; however, mastectomy tends to be the significantly cheaper option. To estimate the disparate welfare consequences of the three policy alternatives, the authors estimate the relative willingness-to-pay curve for the lumpectomy, the more expensive treatment. The authors make a revealed preference assumption and use the relative lumpectomy demand curve for their welfare analysis. The demand curve is estimated using variation across patients in the distance required to travel to the nearest radiation clinic. This is achieved through assuming travel times can be monetized and preferences for travel time reductions are analogous to preferences for any other equivalent price difference. The article also assumes that there are not omitted patient characteristics correlated with clinic distance and lumpectomy demand. Thus, the authors can formulate a relationship between treatment choice (measured in probability to choose lumpectomy) and travel times. This demand curve is then used to illustrate welfare effects of the three policy alternatives.

The article uses two main datasets for their empirical analysis. Both are from the state of California. The first is patient-level cancer data drawn from the California Cancer Registry. It records every cancer diagnosis made in California from 1988 on. Cancer data is collected directly from medical records at the time of diagnosis alongside other demographic covariates, including the exact address of residence at the time of diagnosis. This allows for the calculation of precise clinic travel times/distances. The second is data on radiation clinic locations from the private firm IMV. Data was collected through a telephone survey. The full sampling frame of California sites was provided for all available survey years (1996 to 2011) (even non-responses), including the exact street addresses for each clinic. After combining the two datasets, the authors used Google Maps (as of the summer of 2012) to calculate a variety of distance metrics between each patient and their nearest radiation clinic. Overall, the sample covers 323,612 breast cancer patients diagnosed between 1997 and 2009 who chose either mastectomy or lumpectomy with radiation as their initial treatment, and each patient is matched to their nearest radiation clinic.

Einav et al (2016) employs a simple empirical strategy. To estimate the relative demand curve for lumpectomy, the authors use variation across patients in the distance to the nearest radiation clinic as their independent variable. The dependent variable is determined through the binary choice between lumpectomy and mastectomy. The patient chooses lumpectomy if and only if the dependent variable is greater than zero. The probability of lumpectomy is thus the probability that the dependent variable is greater than zero. The authors complete a standard logistic (logit) regression when patient characteristics are homogeneous and a random-coefficient logit regression otherwise. A logit regression models the probability of a certain event occurring, in this case, a patient choosing lumpectomy over mastectomy. It achieves this through using a logistic function to model the binary dependent variable. Einav et al (2016) conducts numerous logit regressions of both types in exploring the relationship between clinic distance and probability of choosing lumpectomy over mastectomy. This relationship is used to construct the demand curve that will be used to compare welfare effects of the three policy alternatives.

The authors understand that, to interpret the results of a logit regression, the marginal effects must be calculated. Through the calculated marginal effects, Einav et al (2016) find that having the nearest radiation clinic ten minutes further from the patient's residence makes them about 0.7-1.1% less likely to choose lumpectomy. Demographic covariates do not appear to have an important effect. The "full coverage" policy raises the lumpectomy rate by ~37 percentage points from the "top-up" policy's efficient level of 21% or 10 percentage points from the "top-up" policy's efficient level of 48%. This leads to resultant welfare costs of ~$710-2,000 per patient. The "no top-up" policy lowers the lumpectomy rate by ~21 percentage points (to zero) from the "top-up" policy's efficient level of 21% or 4.5 percentage points from the "top-up" policy's efficient level of 48%. This leads to resultant welfare costs of ~$800-1,400 per patient.

Health care expenditures are becoming increasingly costly, and political and academic actors are both interested in addressing this. Einav et al (2016) offers a graphical framework to visualize and quantify disparate welfare effects between the "full coverage", "no top-up", and "top-up" policy alternatives. The article shows the importance of using relative demand curves to assess policy alternatives. Compared to the other two policies, the proposed "top-up" policy is found to increase social welfare by $700-2,500 per patient. This represents a significant welfare gain that might be achieved. In terms of limitations, the article's relative demand curve hinges on clinic travel time/distance variation being monetizable and reliable in determining lumpectomy's relative demand. Additionally, the paper examines the binary choice between two surgery types that have disparate costs but the same average survival rates and only accounts for survival benefits, not other benefits such as "body integrity". These issues could be addressed in future extensions of the model, however. The article also examines only cancer diagnoses and treatment decisions in California, United States. Thus, the external validity of the paper's findings might be limited to the United States rather than other countries where the "no top-up" policy has been implemented. This too may be further explored in future research.