## Review on Einav et. al. 2016

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What private health insurance policy can generate more social warfare? How can we design a more efficient health insurance market? Currently, there are mainly two types of insurance policy in the market: the "fully-covered US model" or the "no top-up" design that is widely used in the UK. In this paper, the authors propose a "top-up" policy that covers the cost-effective treatment but allows the insured to pay the price difference for a more expensive alternative. Using data on breast cancer treatment decisions and patients' distance to the facility, the authors estimate the demand curve for lumpectomy, the more expensive treatment. Finally, they use the results to analyze how could "top-up," "no top-up," and "full coverage" system change social welfare, and their results show that the top-up design generates more social welfare.

First, why a "top-up" system should be more efficient? Suppose there are two treatments with similar outcomes but different costs. The full coverage model could prompt people to choose the more expensive treatment without them internalizing any costs (the insurers will pay for the extra fees). On the other hand, the "no top-up" model would force most patients to choose the cheaper one despite that some initially want to pay extra for the more expensive treatment. Hence, a "top-up" model would be the ideal middle ground for the benefit of insurers and patients.

To empirically test this policy recommendation, the authors need to estimate the demand for the treatments. Luckily, their data allows them to approximate the demand. They use data on breast-cancer treatment decisions in California with patients' characteristics from California Cancer Registry (CCR). The data contains patients' addresses allowing the authors to capture the "price" for lumpectomy by using "distance to the radiation facility." This strategy is essential since patients are generally fully insured and do not pay for either treatment. Studying breast cancer treatment comes with an additional benefit: There are two dominant treatments with similar outcomes but different prices, so treatment effectiveness will not complicate the analysis. In terms of empirical technique, the authors estimate the distance effect (the independent variable) on lumpectomy treatment (binary dependent variable) with standard logit models and a random coefficient logit model. The standard logit models show that a 10-minute increase in travel time is associated with a decrease in the demand for lumpectomy by 0.7 to 1.1 percent. The coefficient is even more

negative (2.5% decrease) when using the random coefficient method.

With the estimated coefficients and a monetized transformation for distance, the authors can derive the demand curve for lumpectomy and estimate welfare losses of the US and UK systems. The US system dramatically increases the share of people choosing lumpectomy compared to the efficient "top-up" design, reducing the insurer's welfare. On the contrary, the UK system should force the share of this expensive treatment to nearly zero, resulting in a lower consumer surplus. Compared to the suggested policy, both US and UK systems create social welfare losses.

However, since the "top-up" policy requires the insured to make a top-up decision in advance, it is essential to incorporate risk in the analysis. The basic argument is that individuals who value lumpectomy more than mastectomy risk spending extra with top-up if they are healthy. On the other hand, they risk paying a substantial amount for their preferred treatment if they have the illness but no top-up. The authors approach these risks by assuming CARA utility with homogeneous absolute risk aversion. Furthermore, by using the previous estimation of lumpectomy's value distribution and treating probability of illness and risk aversion as constants, the authors can conduct the welfare analysis with consumer's risk evaluation. Overall, they find that under the lowest value of risk aversion (r = 0.0000026), the top-up system returns the highest social welfare. This result, however, will change if the risk aversion is higher. For r = 0.0027, the top-up system inflicts a 74664 welfare loss compared to the full coverage system. That is, the ideal insurance policy depends on people's sensitivity to risk.

Overall, the authors make a strong case for the top-up policy by showcasing the potential welfare gain from it. Despite that the top-up system is clearly more efficient, the authors concede that the full coverage system may be more beneficial to society under high risk aversion.

Speaking of the paper's limitation, I argue that using community-level control for individual characteristics assumes homogeneous communities. Although I understand it is the best the authors can do, I expect new evidence to verify their findings further. Perhaps the more critical problem is their simple analysis only considers patients and insurers. What if doctors with financial ties with medical companies and insurance companies can mislead the patients to top up the more expensive treatment? With probability of deception, there could be more consumer loss in the top-up system than the US or UK system. Since

American doctors' links to medical companies are well documented, I expect some doctors to suggest the patients pay extra for the more expensive treatment option.

Additionally, the policymakers may have other priorities than maximizing the combination of patient's and insurer's utility. For example, the governor may prioritize less medical waste or less time waste on getting treatment for the patients. In that case, a UK system makes more sense, and the gain from adopting a top-up approach may not be that substantial. Moreover, should we use a top-up system when the add-on treatment is statistically more effective? If we change from the full coverage US system to the top-up system, ill-informed poorer citizens may dominantly choose the basic package, which will lead to health inequality among the rich and the poor. Nevertheless, the paper brilliantly links empirical results back to classic microeconomic welfare analysis, offering a careful and thorough investigation.