Reading Notes 2

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In the paper *Paying on the Margin for Medical Care: Evidence from Breast Cancer Treatments*, Liran Einav, Amy Finkelstein, and Heidi Willians investigated the welfare consequences of a "top-up" health insurance policy for breast cancer treatments, and showed that welfare gains from the "top-up" policy by internalizing patients to marginal treatment cost.

The "top-up" design is a middle ground health insurance design between the US "full coverage" and the UK "no top-up" regimes. In the context of breast cancer treatments, lumpectomy (L) with radiation therapy is more costly than mastectomy (M) (Polsky et al., 2003), but has similar health outcomes (Fisher et al., 1985). Based on this fact, under the UK "no top-up" policy, patients who prefer L have to pay the full cost of it, which forces some of them to choose M. The US "full coverage" policy, from the other extreme, drives almost all patients to choose L. The two alternatives suffer from consumer welfare loss and insurer profit loss correspondingly. In contrast, the "top-up" policy allows patients to pay only the incremental cost, and insurance companies would cover the remaining baseline part with value equivalent to the cost of M. It more accurately reveals the numerical relations among patients' relative valuation of L (v_i), incremental cost (c), and full cost of L (TC), and could possibly reach the social efficiency.

(ex post)	$v_i < c$	$c \leq v_i \leq TC$	Compare with "top-up" policy	price needed to pay out of pocket for L (p)
"Full coverage"	L	L	has insurer profits loss	p=0
"Top-up"	M	L	--	p=c
"No top-up"	M	M	has consumer welfare loss	p=TC

To identify the demand curve, this paper relied on two datasets collected in California, one is from CCR research database containing the measures of patient demographics and clinical characteristics between 1997 and 2009; the other one is from IMV with distance measures. Monetized distance between patients' residence and the nearest radiation clinic was used to add variation on relative price for L. Given that breast cancer patients face a binary treatment choice, the authors applied standard logit and random-coefficient logit model to estimate the share of patients choosing L (L share).

Before formally drawing the demand curve, the authors first checked the relationship between distance and L share. They found that the effect of distance on L share is indeed

statistically significant and remains robust when all controls and random coefficients are included simultaneously. More importantly, the relation curve is downward sloping like a demand curve. These results suggest that monetized distance and L share could generate demand functions. To guarantee the reliability and authenticity of the demand curve, the authors decided monetizing factor (θ) for distance, c and TC with caution, and finally chose to set θ=\$1,150, c=\$10,000, TC=\$50,000.

The authors presented results for six logit models corresponding to six specifications from simple to complex. They further plotted implied demand systems for two typical specifications: the simplest one with no controls and the richest one. In addition to the demand curve, three benchmark (horizontal) lines were drawn according to the value p under three insurance designs (p=\$0, \$10,000 or \$50,000). Intersecting lines with demand curve generated three points. Compared the relative locations of these three points, changes in L customer surplus and changes in insurer profits were obtained. Take the efficient "top-up" as benchmark design, the "full coverage" design decreases the overall welfare by \$1,964 per patient (in the simplest specification), while the "no top-up" design decreases the overall welfare by \$1,427. Generally speaking, the "top-up" design has ex post efficiency.

Things could be different from an ex ante perspective. Instead of taking patient's risk exposure as given, the authors had to estimate ex ante risk ($-\pi_i$) using expected value. An individual will face a financial risk when she gets cancer subsequently with probability ρ. Assuming that individuals have CARA utility and ρ=0.48 for a 60-year-old female, the authors found that only individuals with the lowest risk aversion benefit from the "top-up" policy, for those with higher level of risk aversion, however, "full coverage" policy seems to be better. Considering that the "first best" policy can theoretically reach ex an and ex post efficiency, the "first best" alike (e.g., partial "top-up" coverage) might be practical and keeping similar welfare consequences at the same time.

In conclusion, this paper presented a graphical framework of the demand curve for three health insurance designs and verified it empirically. The welfare consequences for the "top-up" design were quantified for policy making. In future studies, the adverse selection problem arising in the ex ante perspective needs to be properly solved and more dimensions of benefits should also be accounted for.