**Introduction**:

This paper studies the effect of “top-up” health insurance policy on social welfare in comparison with other types of health insurance policies: the United States’ style full coverage policy and the UK-style “no top-up” policy. To do so, researchers estimated the relative demand curve for lumpectomy and introduced a key demand determinant: the distance between the patient’s residence and the nearest radiation treatment facility. The author conducted welfare analysis and quantified the impact of alternative insurance designs on overall welfare. They found that “top-up” health insurance policy provides more social welfare than the other two alternatives. However, if consumers have a high enough ex ante risk-aversion level, the full coverage insurance policy could produce a higher social welfare level.

**Data**:

The empirical analysis is based on two datasets on patients and radiation treatment facilities’ location, respectively. The dataset on 323612 breast cancer patients diagnosed between 1997 and 2009. The dataset on facilities is collected by IMV. For ease of presentation, patients chosen neither treatment were omitted.

**Theoretical Foundation, Empirical Strategy and Findings:**

The empirical analysis focused on the treatment choice between mastectomy and lumpectomy faced by breast cancer patients. Both treatments produce similar survival outcomes. However, lumpectomy is much more expensive.

Under the proposed “top-up” policy scheme, lumpectomy customers only bear the portion of lumpectomy’s cost higher than the baseline treatment mastectomy cost. Patients internalize the social marginal cost; hence this allocation is efficient. Under the “full coverage” policy, patients incur no additional cost for the more expensive treatment. Under “no top up” policy, patients bear full cost if they choose the more expensive treatment. Since patients’ cost in both situations fails to reflect their willingness to pay, they both yield inefficient treatment decisions which results in relative welfare loss.

Researchers generated the demand curve for lumpectomy by inversing the cumulative distribution function where represents the relative willingness to pay for lumpectomy. The author then estimated the impact of distance on lumpectomy treatment choice by using the standard logit regression model and random-coefficient logit model: Specifically, represents the covariates among the patient’s utility level, the distance to a radiation treatment facility and the incremental cost he or she bears (. represents the coefficient of distance and the intersection variables containing distance. Researchers introduced different covariates such as demographics, and clinical characteristics and different intersection variables containing distance into the regression to test whether distance’s sensitivity to changes in and .

Across regression models with different covariates and intersection variables, the distance variable remains statistically significant. It suggests a relatively robust relationship between the patient’s treatment choice and the distance to the treatment facility. From standard logit regressions only, scholar concluded that a ten minutes increase in distance would decrease the predicted probability of a lumpectomy choice by 0.77 percent.

Since the out-of-pocket price patients face for both treatments are effectively zero, the relative demand can be rewrite as The new equation showed that relative to the efficient allocation, “full coverage” policies raise the lumpectomy rate. It indicates a corresponding raise in consumer surplus and reduction in insurer profits that results in less social welfare. Similarly, the “no top-up” policies reduce the lumpectomy rate, which reduces consumer surplus and increases insurer profits and results in less overall social welfare.

Researchers incorporated risk exposure in the last section. Patients’ insurance decision is made in advance of knowing what diseases they may catch. To evaluate ex ante utility function, the author assumed CARA utility with homogenous absolute risk aversion and annual probability of illness. Using the previous estimation of relative willingness to pay for lumpectomy’s distribution, the author analyzed three alternative insurance designs for three fixed different risk aversion level. The efficiency ranking of different insurance designs changes as the value of risk aversion. Specifically, when the level of risk aversion is low (0.000026), the top-up policy remains the most efficient design. When the level of risk aversion is higher (0.0027), the US-style full coverage policy becomes more efficient since the top-up policy incurs 74664 more welfare loss compared to the full-coverage policy.

**Conclusion**:

By comparing the relative demand for lumpectomy relative to mastectomy, a cheaper alternative breast cancer treatment under different types of insurance policies, the “top-up” policy yields the maximum social welfare among three kinds of policies considered. However, after introducing risk exposure, alternative policies, such as the full coverage policy yield higher social welfare than the “top-up” policy when the risk aversion level is sufficiently high. However, this paper does not consider the doctor’s influence on their patient’s treatment choice in their empirical model. Patients may choose their treatment solely on their doctors’ recommendation, which suggests it can be a key determinate for lumpectomy’s relative demand. More information and analysis is needed to determine the exact relationship between doctor’s recommendation and their patients’ treatment choice. However, readers should be cautious about the effect of this potentially unincorporated covariate while interpreting this paper’s findings.