UNIFORM REGULATORY COSTS: ANALYSIS OF WELFARE IMPLICATIONS IN THE INSURANCE INDUSTRY

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I Introduction

In this paper, the implication of having a uniform regulatory cost imposed by the regulator on insurance companies is analyzed. In several cases, regulators impose a uniform or constant regulatory cost on all insurers. For instance, in India, the regulator requires that a private insurance company should have an initial minimum paid-up capital of Rs. 100 crores irrespective of the amount of business or the nature of the risks that are covered. In more sophisticated regulatory environments where the regulatory costs are related to risk, the risk based capital requirement is calculated mostly on the basis of the risk of the asset side of the balance sheet of the insurance company.

This paper analyzes the implications of this approach to regulation within the framework of the standard von Neuman-Morgenstern utility function with risk averse buyers of insurance. With a constant regulatory cost, c, imposed on the insurance companies it is found that the break-even insurance premium increases by a factor of c. We then look at the implication of this on the insurance purchase decision of a risk averse decision maker who has an initial wealth and faces the possibility of a loss with some probability. This paper is organized as follows: Section II presents the basic insurance model. Section III incorporates a uniform or constant regulatory cost and analyzes the implications on the insurance purchase decision and welfare. Section IV concludes.

II The Model

We consider a strictly risk-averse decision maker who has an initial wealth W dollars but who runs a risk of a loss of L dollars. The probability of the loss is p. It is possible, however, for the decision maker to buy insurance. One unit of insurance costs q dollars and pays 1 dollar if the loss occurs. Thus, if α units of insurance is bought, the wealth of the individual will be $W-\alpha q$ if there is no loss and $W-\alpha q-L+\alpha$ if the loss occurs. The decision maker's expected wealth is then $W-p.L+\alpha(p-q)$. The decision maker's problem is to choose the optimal level of α. His utility maximization problem is therefore:

$$\underset{\alpha \geq 0}{Max} \ (1-p)U\ (W-\alpha.q)+pU\ (W-\alpha.q-L+\alpha)$$

At the optimum level of insurance consumption, α^*, must satisfy the first order condition:

$$-q(1-p).U'(W-\alpha^*q)+p.(1-q).\ U'(W-L+\alpha^*(1-p)) \leq 0$$

and with equality

If the price of insurance is the actuarially fair price of insurance, q = p, then since U' > 0, U" < 0, and U'(W-D) > U'(W) we must have that $\alpha^* > 0$.

Therefore,

$$U'(W-\alpha^*p)=U'(W-L+\alpha^*(1-p))$$
$$\Rightarrow (W-\alpha^*p)=U'(W-L+\alpha^*(1-p))$$
$$\Rightarrow \alpha^*=L.$$

Thus if insurance is actuarially fair, the decision makers insure completely. The individual's wealth is W-pL, regardless of the occurrence of the loss.

III Uniform and Constant Regulatory Cost

Let us now consider the case where the regulator imposes a uniform and constant regulatory cost, c, on all insurers. Then the insurer's payoffs are:

$(-\alpha+\alpha q-c)$ with probability p, and
$(\alpha q-c)$ with probability (1-p).

The break-even insurance premium, q, is that at which the following condition holds:

$$p.(-\alpha+\alpha q-c)+(1-p)(\alpha q-c)=0$$
$$\Rightarrow q=p+(c/\alpha)$$

It can be seen from Figure 1 below that the maximum insurance premium that this person would pay for insurance coverage is equal to the risk premium which is the difference between EP and CE. As long as the regulatory cost, c, is less than the risk premium, full insurance would be bought.

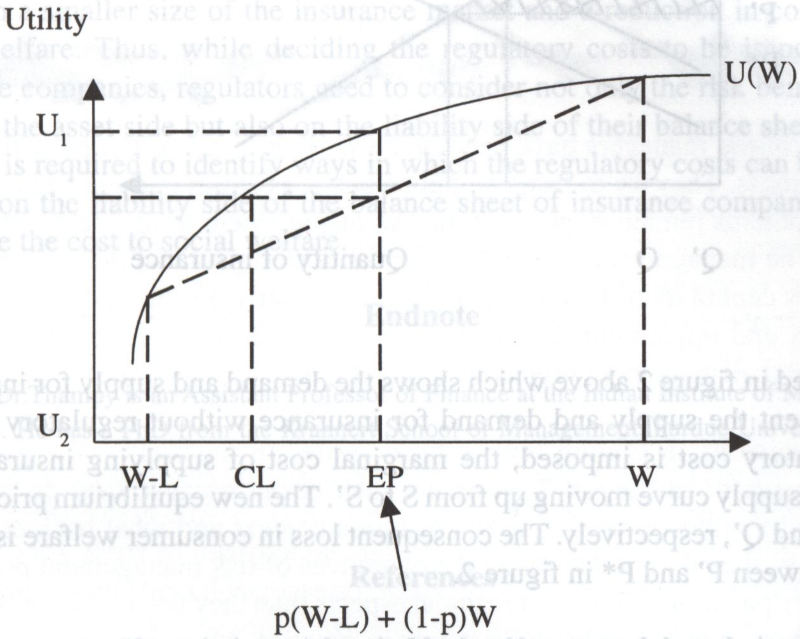
The risk premium that a buyer of insurance is willing to pay would decrease as:

(i) the degree of risk aversion decreases, i.e., as the utility function becomes less convex.

(ii) the probability of the bad event occuring decreases to very low levels, i.e., as EP moves close to W.

(iii) the probability of the bad event occuring increases to very high levels, i.e., as EP moves close to W-L.

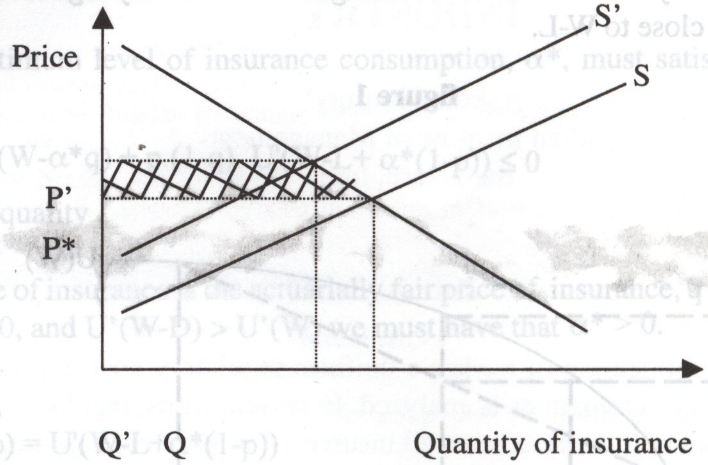
figure 1



$U_1 = U[p(W\text{-}L) + (1\text{-}p)W]$
$U_2 = pU(W\text{-}L) + (1\text{-}p)U(W)$
CE = Certainty Equivalent
EP = Expected Payoff

It can be seen from Figure 1 that the difference between the expected payoff and the certainty equivalence would be decreasing for all the three factors mentioned above. For that reason, a constant regulatory cost, c, which does not take into account the risk aversion and/or the risk that is insured would result in under-insurance and consequent welfare loss. This means that the regulatory costs imposed on insurance companies should be decided taking into account the risk on the liability side also.

Figure 2



This is illustrated in figure 2 above which shows the demand and supply for insurance. Lines S and D represent the supply and demand for insurance without regulatory costs, c. As a constant regulatory cost is imposed, the marginal cost of supplying insurance increases resulting in the supply curve moving up from S to S'. The new equilibrium price and quantity is given by P' and Q', respectively. The consequent loss in consumer welfare is shown by the hashed area between P' and P* in figure 2.

The risk-based capital model proposed by the National Association of Insurance Commisioners (NAIC) has identified four risks faced by the insurer:

- C1: Asset risk
- C2: Insurance risk
- C3: Interest rate risk
- C4: Business risk

These risk weights are taken into consideration in the calculation of the risk based capital.

The NAIC model takes the risk on the liability side into account in C2. C2 however is a measure of the risk of adverse changes in mortality and morbidity risk and not the mortality and morbidity risk that is covered. From the above analysis, it is necessary for welfare considerations to take the risk that is covered into account in deciding the regulatory costs imposed and not just the risk of change in the risk that is covered. Not taking into consideration the kind of risk that is insured (that is low and high risk, say) would lead to a flat or constant regulatory cost resulting in under-insurance.

IV Conclusion

The analysis in this paper has shown that imposing a uniform regulatory cost on all insurance companies irrespective of the nature of the risk that is covered would lead to an increase in the cost of insurance. The increased cost of insurance could thus result in potential buyers with low risk premiums from not buying insurance. This results in a smaller size of the insurance market and a reduction in consumer and social welfare. Thus, while deciding the regulatory costs to be imposed on the insurance companies, regulators need to consider not only the risk being borne by them on the asset side but also on the liability side of their balance sheets. Further research is required to identify ways in which the regulatory costs can be linked to the risk on the liability side of the balance sheet of insurance companies so as to minimize the cost to social welfare.

Endnote

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