Early Default Risk and Surrender Risk: Impacts on Participating Life Insurance Policies

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Abstract

We study the fair valuation of participating life insurance policies with surrender guarantees when there is a regulatory intervention rule which forces an insurance company to be liquidated once a solvency threshold is reached before maturity. The early default regulatory framework not only affects the contract value directly but also indirectly via influencing policyholders' surrender behaviors. In this paper we endogenize surrender risk by assuming a representative policyholder's surrender intensity bounded from below and from above, due to the existence of exogenous surrender reasons and the policyholder's limited surrendering competence respectively. We derive a PDE to characterize the price of a participating policy and solve it with the finite difference method.

Many implications can be drawn from our numerical analysis. First, if policyholders are able to surrender their participating policies optimally, it is not necessary for the regulator to set a regulatory rule to monitor the insurance company. The insurance company is actually monitored by the policyholders themselves. However, since policyholders are mostly not completely rational to make financially optimal decisions, an early default regulation protects these policyholders so long as the regulation is not too strict. Over-regulation is also disadvantageous to irrational policyholders. Second, although regulation has a negative effect on the value of the surrender guarantee and makes the surrender guarantee ineffective in many cases, its overall effect on the contract value could be positive. In particular, we observe that the early default regulation protects the whole contract value when the insurance company adopts a more risky investment strategy, even though the surrender option value decreases due to increase in the riskiness of the investment strategy. Third, without the introduction of the regulatory framework, we are not clear about the effect of the investment strategy on contract value. We find that the equity holder prefers to adopt a less risky investment strategy if the policyholders are able to surrender the contracts optimally. Since the equity holder knows that policyholders are most of the time not financially rational enough and there are always exogenous reasons for them to surrender the contracts prematurely, he actually tends to invest more riskily. However, when the early default barrier is settled, an increase in the riskiness of the investment strategy will generally have a positive effect on the contract value from the perspective of the policyholders. The equity holder will then have the incentive to reduce the riskiness of their investment, which is independent of the rationality level of the policyholders. This result is consistent with the goal of the regulator.

Keywords: participating life insurance contracts, early default risk, surrender risk, limited rationality

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