

Uncertainty and Investment Option Games in Emission Permit Market

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Abstract

This paper analyzes the investment effects of tradable permit programs when the abatement cost is uncertain and the pollution abatement investment is competitively determined within a game-theoretic framework. As well known in the real option literature, uncertainty provides negative impacts on environmental investment. A real option model is developed to allow strategic investment behavior of each firm depending on other firms through permit market participation. In a strategic environment, the value of investment is endogenously determined and the optimal investment threshold cannot be derived in isolation. Thus, the strategy for each firm is evaluated within a game-theoretic framework. This paper aims to provide a tractable solution for deriving the equilibrium investment strategies of firms being regulated by a TPP. A symmetric Cournot-Nash equilibrium that is identified conditional on its competitors is determined when each firm simultaneously decides its equilibrium investment strategy. More interestingly the model analyzes the effect of competing firms on each firm's investment decision rule. The result shows that the effect of investment on abatement cost and allowance price acts in an opposite way through firms' preemptive incentive in the permit market.

References

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