Strategic Technology Adoption and Market Dynamics as Option Games.

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Abstract

Aim of this paper is to analyse the equilibrium strategies of two firms investing in a new technology, when the probability of successful implementation is uncertain and market shares are asymmetric. In particular, we are able to consider three key feature of a new technology adoption. First, it is, at least partially, irreversible. Second, once realized, there is uncertainty about the probability of a successful implementation. Third, the profit flow generated by such an investment is subject to uncertainty according to the evolution of demand function. The first firm to enter the market sustains the investment cost earlier, but can benefit of a higher market share with respect to the competitor. The follower have just to decide if and when realize the investment. He benefits from the resolution of uncertainty, but he suffers of a reduction in his market share.

Using the method of option pricing theory, we address this issue at two levels. First, we model the investment decision of a non-cooperative firm as a dynamic stochastic game. Then, we solve for the sequential monopolist as a benchmark case. We find the interaction of pre-emption and uncertainty can actually hasten, rather than delay, investment, contrary to the usual presumption, and identify the regions of parameters for which this situation might occur.

Keyword. Real Options; Stopping Timing Game, Asymmetric Demand.

Jel-Classification: C73, G13

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