TECHNOLOGY INVESTMENT DECISION-MAKING UNDER UNCERTAINTY IN MOBILE PAYMENT SYSTEMS

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Abstract

Innovations in the mobile payments industry provide potentially profitable investment opportunities for banks. Nonetheless, significant uncertainties are associated with decision-making for this IT investment context, regarding future market conditions, technology standards, and consumer and merchant responses, especially their willingness to adopt. As a result, traditional capital budgeting approach and experienced intuition have not been effective. We develop a model to support a bank’s mobile payment systems adoption decision-making at the firm level when it faces endogenous technological risks and exogenous market conditions. This study applies theory and modeling from financial economics for decision-making under uncertainty to investments in m-payment systems technology. We assess the projected benefits and costs of investment as a continuous-time stochastic process to determine the optimal investment timing. We find that: (1) the value of waiting to adopt jumps when the related business environment experiences relevant shocks; (2) when the rate of benefits flows, the time horizon for decision-making and the time value of money change, the recommended investment timing and optimal investment will change too; and (3) when value jumps occur at different stages and in different directions, the optimal timing and maximal payoffs may exhibit unexpected changes. We illustrate how to use simulation-based financial option valuation approach to value the investment. We further discuss the application of our approach for systems that are subject to network effects, rational expectations and strategic interactions among different banks.

Keywords: Decision-making under uncertainty, electronic payments, financial economics, financial services, IT investments, jump diffusion, mobile payments, network effects.