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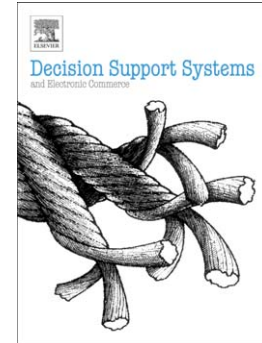
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Invention or incremental improvement? Simulation modeling and empirical testing of firm patenting behavior under performance aspiration

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Abstract

This paper explores how firms determine their patenting strategy when faced with different performance situations. Patenting strategy in this study is defined in terms of either engaging more in inventions with more risk and higher profit or in more incremental improvements with less risk and lower profit. We develop two game-theoretical models to analyze how different kinds of performance discrepancies encountered by a firm influence the evolution of the firm's propensity toward a patenting strategy. Then, an empirical analysis of 1,921 listed companies in China is conducted to test the propositions derived from the two game-theoretical models. The results reveal the decision-making pattern of a firm's patenting strategy. Specifically, a firm with performance higher than its aspiration will prefer to engage more in invention-type patents, while a firm with lower performance than its aspiration will invest more in incremental improvement patents. Additionally, all else being equal, the patenting strategy more likely to succeed will be more appealing to firms, no matter what kinds of performance gaps they have. *Keywords:* Invention; Incremental improvement; Patenting strategy; Performance aspiration; Performance discrepancy

1. Introduction

From the strategic decision-making perspective, firms tend to use patents to create intellectual property assets for various strategic motives. Potential motives include self-defense (protecting an invention from being imitated), obtaining information, blocking competitors (Blind et al., 2006) and seeking profits (earning royalty income by patent licensing) (Kim et al., 2016). Generally, patents can be divided into two types: inventions and incremental improvements (or non-inventions) (Howell, 2015). Compared with non-invention patents, invention patents are

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