



# Industry growth and the knowledge spillover regime: Does outsourcing harm innovativeness but help profit?<sup>☆</sup>



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## ABSTRACT

The outsourcing of innovation activities, geographic clustering of firms, and mobility of labor each allow knowledge to circulate within industries. This study investigates knowledge spillover mechanisms' effects on industry innovativeness and profit, and how these effects change with the level of industry growth. Generally, the set of hypotheses presented suggests enhanced performance effects from knowledge spillover mechanisms under growth; the pace of developments in growth industries increases the importance of access to knowledge. Analysis of an industry-level data set assembled from five secondary sources consists of both regression and fuzzy set qualitative comparative analysis (fsQCA). While regression detects the discrete effects of each mechanism, fsQCA identifies specific configurations of these mechanisms associated with the outcome, emphasizing causal complexity. In general, outsourcing negatively affects innovativeness (though one identified configuration represents a unique case within which outsourcing can aid innovativeness), but benefits profitability. All three elements of the knowledge spillover regime examined here have performance implications contingent on growth.

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## 1. Introduction

Each industry has a different knowledge spillover regime, impacting firms' efforts to innovate. To varying degrees, knowledge passes from one firm to another—aided by geographic clustering, mobility of employees as well as the use of contracting. This knowledge spillover regime has implications for innovativeness and financial performance, and while previous research posits that the level of growth within an industry impacts the effectiveness of geographic clustering (Audretsch & Feldman, 1996; Neffke, Henning, Boschma, Lundquist, & Olander, 2011), the logic behind these agglomeration-growth advantages may also hold true for the outsourcing of innovation activities, which has thus far gone unexamined. Here, hypotheses propose that the performance effects of the three knowledge spillover mechanisms are contingent on the level of industry growth; enabling knowledge spillovers becomes more valuable in high growth industries since the rapid pace

of new developments makes innovation increasingly difficult for firms isolated from these spillovers.

Scholars note the increased outsourcing of innovation activities across a wide swath of industries (Howells, 1999; Hsuan & Mahnke, 2011), but they pay little attention to the effect an industry's outsourcing of innovation activities can have on its performance and how this effect may change across levels of industry growth. This research sets out to examine the relationships between characteristics of the knowledge spillover regime (innovation outsourcing, clustering and labor mobility), the level of industry growth, and industry performance. Specifically, analysis includes two dimensions of performance: innovativeness and profit. This research project uses two distinct, complementary analytic techniques: Regression analysis represents a direct test of the hypotheses presented. An emerging technique, fuzzy set qualitative comparative analysis (fsQCA) (cf. Fiss, 2011; Mendel & Korjani, 2012) supplements the regression analysis; fsQCA focuses on the configurations of conditions that give rise to an outcome, rather than the discrete effect of each condition. While much of the existing literature pertaining to knowledge spillovers draws on cases focused on individual clusters, this research uses secondary data compiled from five sources to allow for comparison across industries and more generalizable results.

This study is novel and necessary for two reasons. First, scant research exists examining the performance implications of outsourcing innovation activities (Hsuan & Mahnke, 2011), particularly alongside other spillover mechanisms. The lack of research regarding the performance implications of the innovation outsourcing decision stands in relative contrast to other knowledge spillover mechanisms, where

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both international business (e.g., Liu, Lu, Filatotchev, Buck, & Wright, 2010) and strategy (e.g., Chatterji, 2009) researchers more thoroughly examine performance questions. This manuscript argues that the outsourcing of innovation activities is distinct from other knowledge spillover mechanisms. Although this type of outsourcing is an increasingly common enabler of knowledge spillover (cf. Carson, 2007), scholars have not yet explored potential theoretical and empirical performance distinctions between this outsourcing and other enablers of knowledge spillover. This study addresses the relatively uncertain outcomes of innovation outsourcing at the industry level. Second, by examining the effects of these knowledge spillover mechanisms across levels of sector growth, developing an understanding of how industry expansion dramatically changes the performance implications of these knowledge spillover mechanisms is possible.

## 2. Conceptual background and hypotheses

*Knowledge spillover* is the involuntary leakage or voluntary exchange of technological knowledge within an industry (De Bondt, 1997). The three enabling mechanisms of these spillovers examined here are innovation outsourcing, clustering and labor mobility. Each of these mechanisms fosters the circulation of ideas between firms, though this circulation may not always be beneficial to the industry (e.g., if individual firms have less incentive to innovate).

The theory of knowledge spillover informs the hypotheses in this study. The origins of this theory date to Marshall (1890), who argues that agglomeration advantages accrue through three localization advantages: 1) availability of specialized inputs and services, 2) pooled labor market, and 3) transfer of technological knowledge. While originally conceived as purely locational, the underlying logic of the theory of knowledge spillover extends to each of the three knowledge spillover elements conceptualized here. First, just as clustering impacts the availability of specialized inputs and services, so do labor mobility (Angel, 2000) and the propensity to outsource innovation activities (Manning, Massini, & Lewin, 2008). While clustering impacts the size of an available labor market, mobility reflects the labor pool's accessibility, and outsourcing represents an alternative to using internal labor resources. Finally, all three knowledge spillover mechanisms relate closely to the transfer of technological knowledge (Breschi & Lissoni, 2001). Thus, the set of mechanisms selected is logically consistent with the theory of knowledge spillover.

Typically, research related to the theory of knowledge spillover presents the enablers of these spillovers as having positive performance implications. Here, while considering the outsourcing of innovation activities as an enabling mechanism of knowledge spillover, hypotheses distinguish outsourcing from other knowledge spillover mechanisms. The outsourcing of innovation activities promotes knowledge spillover, but this knowledge tends to be commoditized (Fey & Birkinshaw, 2005). Contractor firms often propagate similar knowledge across an industry since many client firms access largely equivalent technology (Pavitt, 1984). This is as opposed to Marshall's (1890) vision of knowledge transfer spurred by firms developing a range of solutions to similar problems based on differing perceptions and spheres of competence. Thus, this study considers the outsourcing of innovation activities to be theoretically distinct from the other elements of the knowledge spillover regime considered here. Accordingly, the hypotheses in this manuscript concern divergent relationships between innovation outsourcing and the two dimensions of performance (innovativeness and profit), while for the other two knowledge spillover mechanisms (clustering and labor mobility) hypotheses concern only performance, which comprises both innovativeness and profit.

### 2.1. Effects of innovation outsourcing

*Innovation outsourcing* is research or development activity contracted to external organizations. The research literature pertaining to the

management of innovation boundaries is in its early stages, with many opportunities for further contributions (Hauser, Tellis, & Griffin, 2006; Kang, Wu, Hong, & Park, 2012). Studies exist in which scholars investigate the key drivers of this outsourcing, including transaction cost factors such as asset specificity and various forms of uncertainty (e.g., Audretsch, Menkveld, & Thurik, 1996) as well as drivers stemming from the resource base view of the firm, such as the ability to develop competitive advantage (Steensma & Corley, 2001). Researchers know less about the performance implications of this outsourcing. While case based research suggests that outsourcing lowers costs and increases speed-to-market, research incorporating statistical methods contradicts these findings (Stanko & Calantone, 2011).

H1A and H1B hypothesize differing effects of innovation outsourcing on innovativeness and profit, while hypotheses concerning other knowledge spillover elements' performance effects concern only overall performance (which encompasses both innovativeness and profit). Innovation is an iterative process initiated by the perception of a new market and/or service opportunity that leads to development, production and marketing tasks striving for the commercial success of the invention (Garcia & Calantone, 2002). Innovativeness is a closely related concept, which refers to a given industry's propensity for innovation (O'Connor & Veryzer, 2001).

With respect to innovativeness, several recent findings support the notion that outsourcing innovation efforts leads to more incremental (or less innovative) outcomes. For instance, both Huang, Chung, and Lin (2009) and Beneito (2006) show that outsourcing is more appropriate for incremental innovations. Ideas purchased from contractors tend to be highly commoditized and similar to existing competing offerings. Firms tend to outsource activities they no longer view as a core competence to be invested in and protected (Howells, 1999). Relying on external contractors can lead to the decay of internal innovative capacity as knowledge increasingly resides outside the firm (Henard & McFadyen, 2006). Contractors (typically working with numerous clients) act as a conduit for knowledge flow within an industry, promoting commoditization as the technologies of competing firms become less distinctive (Fey & Birkinshaw, 2005).

Conversely, for several reasons, the profit effects of innovation outsourcing may be decidedly more positive. First, outsourcing allows firms to speed a greater number of products through the development cycle, quickly growing their product portfolio (Quinn, 2000). At the same time, cost savings will be generated through the use of contractors (Al Zu'bi & Tsinopoulos, 2012; Chatterji, 1996). Since market forces will act to keep costs in check, sectors utilizing outsourcing will not be subject to cost overruns due to the inefficiencies of internal bureaucracy (Rindfleisch & Heide, 1997).

**H1A.** Innovation outsourcing relates negatively to innovativeness.

**H1B.** Innovation outsourcing relates positively to profit.

When an industry sector is in the midst of rapid expansion, opportunities for quick returns multiply and a gold rush era with many short-term business opportunities begins (Murtha, Lenway, & Hart, 2001). In this environment, the nimbleness and adaptability of contracting outperform free-standing individual firms in exploring, developing and deploying new technologies (Christensen & Raynor, 2003).

Once products begin to proliferate, disconnected firms struggle to recognize and understand the significance of market and technological changes (Saxenian, 1990). Through active collaboration with specialist contractors, firms become aware of competitors' offerings, technological shifts and market realities. To meet the needs of new market segments, relying on contractors and partners becomes a necessity (Saxenian, 1994). As customer segments emerge, the accelerating pace of new product development forces existing firms to rely more heavily on outsourced innovation activities in order to get numerous products to market quickly. Aside from speed to market,

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