



Friend or foe: Customer-supplier relationships and innovation



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ABSTRACT

This study provides an empirical investigation of the impact of customer-supplier relationships on firm innovation in an interorganizational framework encompassing transaction cost economics, resource dependence theory, and the theory of incomplete contracts. Using a sample of U.S. firms for the period from 1980 to 2005, this study explores how customer concentration and customer bargaining power affect a supplier's process innovation and product innovation measured with R & D-to-assets ratio and patents (also citations), respectively. The findings imply that a concentrated customer base, which reflects a strong customer-supplier relationship as well as high switching costs, motivates suppliers to invest more in R & D and become more innovative. However, the evidence also suggests that strong customer bargaining power creates hold-up problems and forces suppliers to invest less in R & D and innovation. The results are robust to sophisticated econometric techniques that control for endogeneity and suggest heterogeneous effects of business partnerships on firm innovation.

1. Introduction

The literature examines various aspects of the influence of customer-supplier relationships, including financing policies and capital structure (Banerjee, Dasgupta, & Kim, 2008; Chu, 2012; Cunat, 2007; Garcia-Appendini & Montoriol-Garriga, 2013; Kale & Shahrur, 2007; Petersen & Rajan, 1997; Titman & Wessels, 1988; Wang, 2012; Wilner, 2000), earnings management (Raman & Shahrur, 2008), accounting conservatism (Hui, Klasa, & Yeung, 2012), mergers and acquisitions (Ahern, 2012; Ahern & Harford, 2014; Bhattacharyya & Nain, 2011; Fee & Thomas, 2004; Shahrur, 2005), return predictability (Cohen & Frazzini, 2008), information spillover (Boone & Ivanov, 2012; Hertzfel, Li, Officer, & Rodgers, 2008), and cost of capital (Dhaliwal, Judd, Serfling, & Shaikh, 2016). Although these studies have recognized the importance of business relationships along the supply chain, few document how customer-supplier relationships can shape a firm's research and development (R & D) strategies and innovation outcome, the key drivers of corporate development and economic growth. This study attempts to address this question by exploring different dimensions of customer-supplier relationship dynamics, including customer concentration and bargaining power.

Relationships with customers have always been very important for firms in the competitive business world. Reliable relationships with customers help suppliers achieve improved inventory management (Kalwani & Narayandas, 1995), greater operational efficiency

(Patatoukas, 2012), and new product success (Gruner & Homburg, 2000), all of which enable suppliers to allocate more resources to develop differentiated products, reduce marginal costs of production, and cater to the needs of their customers. If customers are seeking sustainable growth opportunities, they are also willing to support and collaborate with their suppliers during the value-creation process, which can potentially increase both parties' competitive advantage in the product market.

Using a sample of customer and supplier pairs identified from Compustat Segment following Cohen and Frazzini (2008), the study finds that suppliers with higher customer concentration spend more on R & D and process innovation, supporting the *customer concentration hypothesis*. The implications are twofold. First, strong customer-supplier relationships encourage suppliers to increase their relationship-specific and R & D investments, consistent with predictions in the transaction cost economics (TCE) theory developed by Williamson (1979). Second, the finding might imply that because of potentially high customer switching costs driven by relationship-specific investments, suppliers are more actively engaged in research and product development as a defensive strategy to maintain their competitive position in the product market.

The resource dependence theory (RDT) proposed by Pfeffer and Salancik (1978) suggests the existence of a power imbalance among business partners in a resource-dependence relationship. Under the theory of incomplete contracts, hold-up problems arise when coordina-

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tion becomes an issue (Grossman & Hart, 1986; Grout, 1984; Hart & Moore, 1990). Strong bargaining power from customers can induce hold-up problems, sabotage suppliers' business strategies, and result in underinvestment. Accordingly, this study examines the impact of customer bargaining power on firms' R & D expenditures. The results show that suppliers significantly reduce R & D expenditures when their customers have strong bargaining power. This finding is consistent with the *customer bargaining power hypothesis* and implies that frictions along the supply chain can impede process innovation and the development of innovative products.

Next, this study analyzes the impact of customer-supplier relationships on product innovation that is largely fueled by R & D expenditures. In general, the test shows a positive relation between customer concentration and supplier innovation. Furthermore, innovation importance and innovation efficiency are also significantly higher for suppliers with a more concentrated customer base. However, the test shows that innovation intensity, importance, and efficiency are all significantly lower for suppliers facing strong customer bargaining power.

In addition, this study finds that R & D investments and innovation are higher for suppliers whose customer relations are of longer duration. The tests show that the degree of competition in a supplier's industry measured using the Herfindahl-Hirschman index is negatively related to innovation. Because a customer's relative bargaining power increases with the competitiveness of its supplier's product market, this showing is consistent with the *customer bargaining power hypothesis*. The results hold after controlling for a set of common determinants of innovation such as firm size, age, growth opportunities, profitability, leverage, time-fixed effects, and industry-fixed effects. In further tests to establish causality, this study applies an instrumental variable approach to address potential endogeneity problems and the propensity score matching method to address concerns about bias driven by observable covariates in the estimation. The results remain robust.

This study further explores the mechanisms through which the impact of customer-supplier relationships on innovation becomes essential and finds that the positive impact of customer concentration on firm innovation is more pronounced both when suppliers are in industries with low barriers to entry and when stakeholders are more likely to be involved in relationship-specific investments. However, the adverse effect of customer bargaining power on supplier innovation is stronger when suppliers are in industries with high barriers to entry and when stakeholders are involved in lower relationship-specific investments, consistent with Fee and Thomas (2004) and Hui et al. (2012). Finally, financially constrained suppliers benefit more from the synergy achieved with a concentrated customer base, whereas unconstrained suppliers suffer more from stronger customer bargaining power.

This study makes the following contributions. First, despite the emerging literature on corporate innovation (Atanassov, 2013; Bouncken & Kraus, 2013; Cornaggia, Mao, Tian, & Wolfe, 2015; He & Tian, 2013; Tian & Wang, 2011) and the extensive literature on customer-supplier relationships (Ahern & Harford, 2014; Fee & Thomas, 2004; Kale & Shahrur, 2007; Walter, 2003), empirical documentation of how economic links along the supply chain can systemically influence a supplier's R & D strategy and innovation productivity is limited, except the following two studies. Chen (2014) attempts to explain the impact of buyer power on supplier innovation in a theoretical framework. Chu, Tian, and Wang (2015) focus on technology spillovers between customers and suppliers using the distance between customers and suppliers as a proxy for customer-supplier relationships. This study expands this area and provides empirical evidence that customer concentration and customer bargaining power have a strong impact on the supplier's process innovation and product innovation.

Second, this paper extends studies on relationship-specific investment, supply chain management, and hold-up problems (Acemoglu, Johnson, & Mitton, 2009; Banerjee et al., 2008; Chu, 2012; Dass, Kale, & Nanda, 2014; Walter, 2003). Specifically, this study shows that

suppliers with a more concentrated customer base innovate more. This result is consistent with Chang, Hall, and Paz (2015), who show that suppliers with high customer concentration are more likely to pursue mutual dependence and cooperation with their customers. The findings in this paper suggest that collaborations can create efficiency gains during the production process; consequently, suppliers engage more in relationship-specific investments. However, the real threats to supplier innovation could come from customers who have strong bargaining power and intend to control suppliers' profit margin.

2. Literature background and hypotheses

2.1. Theoretical framework

The theoretical framework underlying the conceptual model in this study primarily follows these theories of interorganizational relationships: *transaction cost economics* (TCE), *resource dependence theory* (RDT) and the *theory of incomplete contracts*. Williamson's (1979) TCE theory argues that the key driver of managerial decisions in interorganizational relations is the desire to minimize exchange costs and maximize transaction efficiencies. This theory implies that strong coordination and high integration between customers and suppliers can help achieve efficiency gains through relationship-specific investments. The TCE theory predicts that collaboration along the supply chain encourages a supplier's R & D investments and innovation. However, relationship-specific investments make the supplier less valuable to outside parties, leading to high switching costs if the supplier needs to find new customers. Thus, this theory also predicts that the supplier chooses to invest more in R & D and remains innovative as a defensive strategy.

The RDT proposed by Pfeffer and Salancik (1978) suggests that power imbalance exists among business partners in a resource-dependence relationship, and the supplier has less freedom in choosing the most profitable contract design when its customer has strong incentives to bargain and maintains alternative suppliers. Customers with strong bargaining power can influence prices by withholding demand information, potentially reducing suppliers' profitability and thus the resources allocated to R & D investments and innovations.

However, based on the theory of incomplete contracts, hold-up problems arise when one party is concerned about the other party's increasing power and refrains from making ex-ante investments (Grossman & Hart, 1986; Grout, 1984; Hart & Moore, 1990). This theory predicts that when facing strong customer bargaining power and expecting lower accrued profits, suppliers will be less willing to engage in relationship-specific investments and will reduce their R & D efforts ex-ante.

2.2. Related literature

This study primarily relates to two strands of literature. First, building on the above theories, many studies attempt to address how supply-chain collaboration affects corporate financial policies and capital structure (Banerjee et al., 2008; Chu, 2012; Cunat, 2007; Kale & Shahrur, 2007; Titman, 1984; Titman & Wessels, 1988). Titman (1984) and Titman and Wessels (1988) provide empirical support for the proposition that a customer experiences high switching costs when its supplier is liquidated. Chu (2012) provides both theoretical explanations and empirical evidence that firm leverage decreases with supplier competition and thus, substitution among suppliers is elastic. Some recent studies examine the impact of customer-supplier relationships on corporate governance-related decisions such as merger and acquisitions. For example, Fee and Thomas (2004) is probably the earliest study to examine the effects of horizontal mergers on customers and suppliers. Ahern (2012) uses industry inputs and outputs data and shows that customer-supplier relationships can explain divisions of total merger gains.

Second, this paper echoes the growing literature on corporate

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