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# Assessing the Impact of Customer Concentration on Initial Public Offering and Balance Sheet–Based Outcomes

Using the notion of customer concentration, the authors argue that firms should evenly spread their revenues across their customers, rather than focusing on a few major customer relationships. Prior literature suggests that major customers improve efficiency and provide access to resources, thereby producing positive performance outcomes. However, building on industrial organizational literature and modern portfolio theory, the authors argue that concentration of revenues reduces the supplier firm's bargaining power relative to its customers and hurts the ability of the supplier firm to appropriate value, which, in turn, hurts profits. Using a sample of 1,023 initial public offerings (IPOs) and robust econometric methods, they find that customer concentration reduces investor uncertainty and positively impacts IPO outcomes, but significantly hurts balance sheet–based outcomes (e.g., profitability). The results suggest that a 10% increase in customer concentration reduces profitability by 3.35% (or about \$7 million) in the subsequent year, or 9.4% cumulatively over the next four years (or about \$20.32 million). Further, the authors find that the negative effects of customer concentration decrease with increase in organizational (marketing, technological, and operational) capabilities and increase with low customer credit quality.

**Keywords:** customer concentration, customer relationship management, organizational capabilities, customer credit quality

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**A**cquiring and managing customers is one of a firm's most important tasks. Firms spend significant resources on managing customer relationships to create strong bonds with their customers. Such efforts are based on the premise that relationships with customers translate into improved customer loyalty and, in turn, superior organizational outcomes

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(Kumar, Luo, and Chintagunta 2011). Scholars have highlighted several benefits of having strong relationships with customers, such as reduced transaction costs and increased productivity. For example, Kalwani and Narayandas (1995) suggest that relationships with major customers improve firm performance by reducing discretionary expenses such as advertising and selling, general, and administrative expenses (SG&A) and by reducing costs through better inventory management. Similarly, such collaborative relationships can reduce transaction costs by developing interfirm norms and managing opportunism (Heide and John 1988). These benefits of customer relationships are especially important for young firms, which typically have limited resources and rely on such relationships to acquire external resources and exploit them for competitive advantage through new product creation, enhanced technological distinctiveness, and reduced sales costs (Yli-Renko, Autio, and Sapienza 2001). Customer relationships serve as valuable signals for the underlying quality of firms going public, who otherwise face significant information asymmetry due to their limited performance histories (Saboo and Grewal 2013).

However, firms typically have relationships that can provide such benefits with only a small fraction of their customers because building relationships requires investment of scarce organizational resources. Thus, it is not surprising that firms spend disproportionate resources managing relationships with their key customers, often at the expense of other customers.

Indeed, research across both B2B (e.g., Luo and Kumar 2013) and B2C (e.g., Zeithaml, Rust, and Lemon 2001) domains has documented the “80/20” principle, where 20% of customers account for about 80% of revenues and, in turn, organizational efforts. In other words, firms tend to spend significant resources and build the strongest relationships with a small fraction of customers who spend the most with the firm (i.e., large purchase size), in the hopes of accruing all the benefits of selling to few large (in purchase size) customers. However, both anecdotal and academic research suggest that this small fraction of large customers can yield significant pressure on the supplier firm and bargain away all the joint value created (e.g., Heide and John 1988). Thus, organizational efforts to court large customers contrast with the negative consequences experienced by firms that have such customers. For example, although most firms strive to have Walmart as a key customer, these same firms complain about Walmart’s relentless pressure to squeeze profit-killing concessions and its effects on the entire operation from factory to financial statement (Fishman 2003). This is in line with Snyder (1996), who claims that large buyers have significant pricing power and can extract price concessions from suppliers and negatively affect their profitability. The vast literature on customer relationship management has argued for the benefits of allocating customer management resources according to the 80/20 principle (Luo and Kumar 2013; Zeithaml, Rust, and Lemon 2001) and has largely overlooked the negative consequences of building strong customer relationships with only a small fraction of customers, an area to which we seek to contribute through this research. We propose that customer concentration that relates to the distribution of revenue over the firm’s customer base can provide some resolution to this conflict. Specifically, “high concentration” refers to a scenario wherein revenues are concentrated across a small group of customers or a few customers account for a large proportion of revenues, whereas “low concentration” refers to a scenario wherein revenues are distributed across customers and even large groups of customers contribute only a small proportion of revenues.

Building on the industrial organizational literature, we argue that an increase in customer concentration, which reduces the supplier firm’s bargaining power relative to its customers, hurts the ability of the supplier firm to capture value and enables large customers to bargain away all the joint value created due to their superior bargaining position (Heide and John 1988; Porter 1980). Further, building on the seminal portfolio selection theory proposed by Markowitz (1952), we argue that the concentration of revenues among a handful of customers can increase the overall risk for the firm and hurt firm value. Having a small number of large customers (i.e., high customer concentration) exposes the firm to the idiosyncratic risks of individual customers and, in line with the portfolio theory, makes a firm inherently more vulnerable than a firm that derives revenues from a large number of customers (i.e., low customer concentration). In sum, we argue that customer concentration creates value, but it hurts the ability of the supplier firm to appropriate the joint value created.

Our primary objective in this research is to conceptualize and empirically demonstrate the importance of customer concentration as a variable that explains the conflicting consequences

of having strong customer relationships.<sup>1</sup> Prior studies have acknowledged the importance of customer concentration but have largely limited its use to characterizing the balance of power between the firm and its customers (e.g., Boyd, Chandy, and Cunha 2010; Nath and Mahajan 2011; Saboo, Chakravarty, and Grewal 2016). Our use of customer concentration as a measure of risks associated with the entire customer portfolio is most closely aligned with recent accounting studies by Patatoukas (2012) and Irvine, Park, and Yildizhan (2016), who use a similar measure to examine the relationship between customer concentration, firm performance, and supplier risk. Our research is different from previous work on both conceptual and empirical grounds. Unlike prior studies, we investigate firms from the beginning of their life cycles and, thus, account for the initial conditions (or those at the time of inception) and examine both initial public offering (IPO)–based and balance sheet–based outcomes of customer concentration. Assessing these two related but fundamentally distinct outcomes allows us to examine the effect of customer concentration on both a stock market–based outcome that should be of interest to pre-IPO investors and an objective balance sheet–based accounting outcome that should be of interest to most of the stakeholders. Specifically, as we detail subsequently, we use market capitalization on the first trading day to measure IPO outcome; we use profitability to measure balance-sheet outcomes because profitability includes both costs and benefits of customer concentration. Our study also resolves the apparent conflict between Patatoukas (2012), who documents a positive effect of customer concentration, and Irvine, Park, and Yildizhan (2016), who document a negative effect. Unlike prior studies, our study highlights and provides evidence of the underlying mechanism (asymmetry in bargaining power between suppliers and major customers and the ability of the supplier firm to appropriate value) that drive the impact of customer concentration. Further, we highlight important boundary conditions for the effects of customer concentration. Finally, unlike prior research, we account for both potential endogeneity of concentration and unobserved heterogeneity in our estimation.

In terms of boundary conditions for the consequences of customer concentration, we incorporate two sets of moderators that reflect the ability of the supplier firm to appropriate value from its customer relationships and the inherent quality of the supplier firm’s customer base to create such value. First, consistent with the relational view of competitive advantage that highlights learning as an important avenue for maximizing returns from interfirm relationships (Dyer and Singh 1998), we argue that firms can mitigate the deleterious consequences of concentration through their capabilities to learn from their major customers and use the learning to enhance existing customer relationships or acquire new customers; that is, organizational capabilities should moderate the relationship between customer

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<sup>1</sup>We use the label “strong” to refer to the strength of the relationship between the supplier and its customers. Because resource constraints limit the number of relationships firms can develop with their customers, firms often allocate their customer management resources according to the 80/20 principle (Luo and Kumar 2013; Zeithaml, Rust, and Lemon 2001), resulting in stronger relationships with a small group of customers.

concentration and firm performance. Further, in line with several studies (e.g., Dutta, Narasimhan, and Rajiv 1999; Gerybadze and Reger 1999; Krasnikov and Jayachandran 2008; Van den Bulte and Moenaert 1998) that define marketing, R&D, and operations as the core functions that endow firms with demand and/or supply-side advantages, we argue that organizational marketing, technological, and operations capabilities should moderate the effect of customer concentration on firm value. Second, in line with the view that the value that a firm derives from its customers is a function of the underlying quality of its customer base, we include the credit quality of the supplier firm's customer base. Low credit quality is an indicator of low-quality borrowers who may not possess the desired information about business processes, product characteristics, and marketplace challenges that the supplier firm desires. In general, these borrowers are unlikely to share this information with the supplier firm in order to conceal their true quality (Mishkin and White 2002). We borrow from the accounting and finance literature in suggesting that doubtful receivables, which relate to the ability of customers to repay debts, are a valid proxy of the credit quality of a firm's customer base and include this quality as additional moderator.

We test our conceptual framework using a unique data set compiled from multiple sources for firms that went public during 2000–2011. Using IPO firms allows us to track customer concentration from the beginning of a firm's (public) life cycle and examine the influence of concentration on both IPO-based and balance sheet–based outcomes. Recognizing that customer concentration can vary across industries and can be endogenous for a variety of reasons that we discuss subsequently, we use a random effects model that accounts for industry-specific effects and the control function approach to account for the potential endogeneity of customer concentration. We find that customer concentration benefits IPO outcomes but adversely affects supplier firms' profitability. Furthermore, this negative effect of customer concentration is contingent upon both organizational core capabilities and quality of the supplier's customer base. Specifically, organizational marketing, technological, and operational capabilities positively moderate the negative effects of customer concentration, whereas the negative effects of customer concentration increase with the decrease in customer credit quality.

Our research contributes to the literature on customer relationship management (CRM) and dynamic capabilities. To the CRM literature, we introduce the idea of customer concentration as a resolution for the apparent conflict and consequences of having large customers. Our results suggest that although strong relationships with few customers can improve IPO outcomes, relying on a few major customers for revenues negatively impacts firm profitability. We also contribute to the literature on dynamic capabilities by demonstrating that organizational marketing, technological, and operational capabilities can mitigate the adverse effects of customer concentration (e.g., Teece, Pisano, and Shuen 1997). To the literature on customer profitability (Zeithaml, Rust, and Lemon 2001), we highlight that customers with low credit quality exacerbate the negative effects of customer concentration. Our research also contributes to the literature on the role of marketing in the context of IPOs (Luo 2008), in which investors view a concentrated customer base as a credible signal for firms' survival and growth given the newness of young firms and uncertainty of their growth when they go public.

The rest of the article is organized as follows: First, we present an overview of the literature on customer concentration and develop our conceptual model, along with the contingency effects of organizational capabilities and customer credit quality, before proposing our hypotheses. Next, we present the methodology used to estimate the proposed effects and discuss our results and our robustness checks. Finally, we conclude with theoretical and practical implications of our research.

## Conceptual Framework

### *Customer Concentration*

Customers are probably the most important organizational assets, and firms spend significant resources on acquiring and managing their customers. This is in line with research on building strong relationships that emphasizes the need to maintain profitable long-term relationships with customers (Reinartz and Kumar 2000). To economize on relationship management efforts, firms tend to allocate resources to their most promising customers. Such efforts are consistent with the CRM literature that advocates targeting efforts toward a small fraction of customers who spend the most with the firm and have strong relationships (Kumar, Luo, and Chintagunta 2011). However, the effects on firm performance of having strong relationships with a small fraction of customers are mixed. For example, Luo and Kumar (2013) and Zeithaml, Rust, and Lemon (2001) argue that strong customer relationships encourage information exchange and collaboration, improving profitability, whereas Christensen and Bower (1996) suggest that such relationships narrow the focus of these firms on the needs of their major customers and hurt firm performance. In this research, we argue that although having strong relationships with a small set of customers can have temporary benefits, such as when the firm is going public, relying on a few large customers or having strong relationships with only a few customers significantly hurts firm performance overall. Concentration of revenues in the hands of a few customers (1) lowers the bargaining power of the supplier firm relative to its customers and hurts the supplier firm's ability to appropriate the joint value created in the supplier–customer relationship, and (2) increases the risk of customer churn, hurting overall firm performance. Thus, we propose customer concentration as a construct that measures the extent to which organizational revenues are distributed across customers as a potential explanation for the conflicting effects of strong customer relationships. We refer to firms with revenues evenly distributed across their customers as having low concentration and those that rely on a few customers for the bulk of their revenues as having high customer concentration.

### *Customer Concentration and IPO Outcomes*

Firms with high customer concentration have fewer relationships to manage versus those with low concentration and, thus, can invest resources in these relationships to develop mutual trust and commitment, driving additional qualitative benefits such as lower conflict, uncertainty, and propensity to leave (Morgan and Hunt 1994). Strong customer relationships facilitate sharing of information and reduce costs through improved resource utilization and lower discretionary expenses such as SG&A and overheads (Kalwani and Narayandas 1995). Similarly, major customers



can help firms increase operational efficiency by streamlining order processing and inventory management (Parvatiyar and Sheth 2001). Major customers can also help firms expand their current customer base by spreading positive word of mouth (Reichheld and Teal 2001). Finally, customers can provide product ideas and be actively involved in codeveloping products (Gulati and Kletter 2005; Lusch, Vargo, and O'Brien 2007). Thus, customer concentration creates value by increasing purchase volume, positive word of mouth, coproduction, and, in general, reduced transaction costs. For IPO firms that lack performance history and face significant uncertainty about their viability and prospects, these benefits associated with high customer concentration can alleviate investor concerns in three ways. First, high concentration and the associated supplier–customer relationships can give investors a perception of stable cash flows that is typically lacking in young firms. Consistent with the literature on market-based assets (e.g., Srivastava, Shervani, and Fahey 1998) and customer equity of firms (Rust et al. 2004), strong relationships with customers and the corresponding benefits, such as reduced cost of marketing and access to valuable information and capabilities associated with such relations, should alleviate investor uncertainty. Second, these relationships with major customers serve as third-party endorsements and can signal the underlying quality of the IPO firm (Leland and Pyle 1977; Ritter 2011). Finally, these relationships serve as reservoirs of resources that the IPO firms can access to compensate for their lack of internal resources (Gulati and Higgins 2003). In sum, customer concentration can mitigate the liability of newness faced by IPO firms and reduce investor uncertainty (Bruderl and Schussler 1990), thereby improving IPO performance. Thus:

H<sub>1</sub>: Increase in customer concentration is associated with increase in suppliers' IPO performance.

### ***Customer Concentration and Firm Profitability***

Although having major customers reduces the liability of newness at the time of going public, we argue that having a concentrated customer base hurts the supplier firm's ability to appropriate the value created to generate economic profits. The industrial organization literature suggests that organizational ability to capture value is influenced by its bargaining strength (Porter 1980). Thus, increase in customer concentration, which, by definition, reduces the supplier firm's bargaining power relative to its customers (e.g., Boyd, Chandy, and Cunha 2010; Wang, Saboo, and Grewal 2015), should then hurt the ability of the supplier firm to appropriate value. Further, in line with literature on power dependence that suggests that dependence in an exchange relationship makes the dependent party susceptible to the power and influence of the other party (Heide and John 1988), we argue that large customers can force the supplier firms to change their business practices and bargain away all the value created by demanding lower prices, frequent deliveries of small quantities, product customizations, and extended technical and marketing support (Galbraith 1952). Anderson and Weitz (1989) provide evidence that trust decreases with increasing interdependence asymmetry. Finally, major customers may hinder the growth of the supplier firm outside such relationships. Indeed, Christensen and Bower (1996) find that large customers demand significant resources toward their specific needs, making it difficult for the

supplier firm to cater to the broader marketplace. In fact, Martin (1995, p. 121) strongly suggests that innovative firms must "ignore their customers."

Moreover, increase in customer concentration implies increased reliance on a few customers for revenues, meaning loss of a few customers or even a single customer can significantly hurt firm performance. Forecast errors (or the difference between company projections and actual demand) tend to be higher when a small number of customers make large purchases (vs. many customers making small purchases) and result in excess inventories or lost sales (Chopra and Sodhi 2004). This is consistent with portfolio theory, which suggests that relying on a few customers for revenues significantly increases cash flow volatility and vulnerability and therefore increases the cost of capital or the discount rate (Srivastava, Shervani, and Fahey 1998). Furthermore, supplier firms are forced to offer cheap trade credits to large customers who exploit their monopsony power and threaten to switch suppliers (e.g., Brechling and Lipsey 1963) or willingly offer attractive trade credits to signal supplier commitment and financial health (e.g., Petersen and Rajan 1994), thereby increasing the cost of servicing such customers and the default risks. Indeed, Mian and Smith (1992) find evidence that customer concentration is significantly associated with accounts receivable.

In sum, we argue that the costs associated with the increase in customer concentration are largely borne by the supplier, whereas major customers bargain away all the benefits (due to lack of bargaining power of the supplier). Thus, the costs of concentration outweigh its benefits, and this trade-off should be reflected in the objective balance sheet–based performance of the supplier firm. Thus:

H<sub>2</sub>: Increase in customer concentration is associated with lower supplier firm profitability.

### ***Moderating Effects of Organizational Capabilities***

The preceding hypothesis suggests that costs associated with customer concentration, combined with the inability of the supplier firm to extract value from these customer relationships, hurts supplier performance. Thus, factors that influence organizational ability to appropriate value from such resources (customer relationship, in our context) should influence the effects of customer concentration. We draw on the dynamic capabilities view of the firm that argues for the importance of organizational capabilities to "integrate, build, and reconfigure" internal and external resources to create sustainable competitive advantage (Teece, Pisano, and Shuen 1997, p. 516). Organizational capabilities are "complex bundles of skills and accumulated knowledge that enables firms to coordinate activities and make use of their assets" that is, they increase the productivity of other resources (Day 1994, p. 38). Accordingly, we suggest that capabilities should influence the outcomes of organizational resources; that is, capabilities should moderate the influence of customer concentration.

Further, although each firm develops its own configuration of capabilities according to its competitive situation, we focus on three capabilities—marketing, technological, and operational—that have been documented as primary sources of organizational advantage (e.g., Dutta, Narasimhan, and Rajiv 1999; Gerybadze and Reger 1999; Krasnikov and Jayachandran 2008; Van den Bulte and Moenaert 1998). These three capabilities are the "core

functional capabilities that contribute the most to firms' ability to deliver value to customers and thereby create sustainable competitive advantage" (Feng, Morgan, and Rego 2016, p. 4). Our choice of these three capabilities is also consistent with the classification of outside-in, inside-out, and spanning capabilities proposed by Day (1994). Specifically, marketing capability connects organizational processes to the external environment and enables firms to compete by anticipating market requirements and creating durable relationships with external stakeholders, (i.e., outside-in); operational capability emphasizes inside-out processes that include manufacturing and other transformation activities, such as logistics and cost management, that enable firms to transform inputs into output; and technological capability emphasizes spanning processes that integrate both inside-out and outside-in processes and includes activities like product development, strategy development, and so on. We discuss the moderating effects of each of these capabilities next.<sup>2</sup>

### **Marketing Capability**

Marketing capability refers to a firm's ability to carry out both market sensing and customer linking activities that relate to understanding and anticipating customer requirements and linking the firm to its customers (Krasnikov and Jayachandran 2008). It is based on a broad understanding of changes in market conditions, customer preferences, and the ability of the firm to respond to these changes; it enables firms to efficiently combine organizational resources to achieve marketing objectives. Marketing capability that involves tacit understanding of processes and relationships with customers is difficult to imitate and gives a competitive advantage to firms. Overall, increase in marketing capability enhances firm performance through improved market sensing and strong customer relationships (Day 1994).

We argue that an increase in organizational marketing capability increases the ability of the supplier firm to extract value from its customer relationships in three ways. First, marketing capability enables firms to increase efficiency of their marketing investments by increasing customer loyalty and reducing customer management costs (Krasnikov and Jayachandran 2008). Moreover, increase in marketing capability allows supplier firms to establish stronger relationships with their customers, reducing the risk of customer churn. Since major customers provide a large

portion of organizational revenues, the presence of such customers and close collaboration with them reduces marketing and advertising spending and aids knowledge acquisition, helping suppliers reduce retention costs and acquire new customers at lower costs. Thus, marketing capability directly reduces costs of customer acquisition and retention and enhances the profitability of existing marketing relationships. Second, by anticipating customer needs and developing products that meet (or exceed) their requirements, firms can increase customers' dependence on the supplier firm. Such reduction in customer power can reduce the power imbalance between the two firms and allow the supplier firm to extract value from the relationship (e.g., LaBahn and Krapfel 2000). Finally, marketing capability allows firms to learn from their customers and cocreate knowledge that can be deployed broadly. For example, firms can integrate their customer-based insights in their new product development process to develop solutions that can be used by other customers, allowing the supplier to generate additional rents. In sum, marketing capability reduces the negative effects of customer concentration by increasing the ability of supplier firms to extract value from existing relationships and reducing the risks of customer churn. Therefore, we hypothesize the following:

H<sub>3</sub>: Increase in marketing capability decreases the negative effects of customer concentration on suppliers' profitability.

### **Technological Capability**

Technological capability refers to a firm's ability to develop and use internal technological resources along with other organizational resources to improve existing products or develop new ones in response to changing marketing conditions (Moorman and Slotegraaf 1999). It helps firms to rapidly respond to changing customer preferences as well as cater to other customers with similar needs. A stock of knowledge and technological resources helps supplier firms to be irreplaceable to their major customers and improves existing technological capabilities.

This ability of the supplier firm to use technological resources to develop new products and improve existing ones to gain competitive advantage should influence the benefits that the supplier firm derives from its customer relationships in two ways. First, in line with the literature on absorptive capacity that suggests that a firm's ability to absorb new external knowledge largely depends on its existing knowledge bases (Cohen and Levinthal 1990; Saboo et al. 2017), the ability of the supplier firm to learn from its customers should increase with increasing organizational technological capability. Major customers, who are often actively involved in codeveloping products, provide access to technology, systems, and processes that can be leveraged by the supplier firm to enhance its knowledge bases (Gulati and Kletter 2005). For example, Toyota allows a group of suppliers to visit its plants for knowledge sharing and joint problem solving (Dyer and Nobeoka 2000). Such access to external technological resources can also reduce the need for internal R&D spending. In addition to utilization of joint capabilities for cocreation, suppliers also share risks with their major customers in case of new product failure, which generally has a high probability. Second, customers are vital sources of information on market trends, which is an essential ingredient

<sup>2</sup>We use two outcome measures to provide a nuanced understanding of the impact of customer concentration. Specifically, IPO outcomes (market capitalization and initial returns) measure the IPO investors' evaluations of customer concentration. However, given that pre-IPO investors often have short-term investment horizons (Cadman and Sunder 2014), they emphasize immediate IPO outcomes and overlook factors that may have longer-term negative consequences. This short-term emphasis of pre-IPO investors is consistent with Saboo, Chakravarty, and Grewal (2016), who document that IPO investors obsess over current earnings and overlook myopic marketing activities of IPO firms that may have significant long-term negative consequences. Given that the consequences of our moderators (organizational capabilities and customer credit quality) may not be immediately evident, we do not hypothesize the moderating effects of these variables on the effects of customer concentration on IPO outcomes. In a robustness check, we reestimate our IPO performance model with these interaction effects and do not find any significant moderating effects.

for fruitful deployment of technological capability. Major customers are motivated to be a part of the innovation process and are often willing to share future projections with their suppliers (Lilien et al. 2002). Technological capability enables firms to combine this information on customers and markets and exploit it for commercial advantage. Enhanced understanding of technology, markets, and customer preferences is likely to strengthen the supplier's ability to leverage other resources (e.g., Dutta, Narasimhan, and Rajiv 1999; Moorman and Slotegraaf 1999). Moreover, developing products that anticipate and fulfill the technological needs of their customers enables suppliers to increase customer reliance on them and reduce the asymmetry of bargaining power in the relationship, allowing the supplier firm to generate additional value from the relationship (e.g., LaBahn and Krapfel 2000). In sum, technological capability reduces the negative effects of customer concentration by allowing supplier firms to benefit from existing customer relationships through knowledge acquisition from customers and, in turn, increasing knowledge exploitation. Therefore, we hypothesize the following:

H<sub>4</sub>: Increase in technological capability decreases the negative effects of customer concentration on suppliers' profitability.

### ***Operational Capability***

Operational capability refers to the ability of firms to coordinate and execute the tasks along the entire value chain required to transform the inputs to outputs, for example, logistics, inventory management, forecasting, distribution, and manufacturing (Cepeda and Vera 2007). Operational capability entails value chain flexibility, which requires integration with both customers and vendors and flexible production programs to compensate for changes in customer demands and fluctuations in raw material supply (Gelhard and Von Delft 2016). Thus, customer management is at the heart of operational capability, and firms use variety of techniques (e.g., just-in-time production, total quality management) to maintain long-term relationships with customers and improve operational efficiency through proactive problem solving. Overall, operations capability enhances new product success through efficient manufacturing, supply chain, and customer integration.

We argue that operational capability mitigates the negative effects of customer concentration in three broad ways. First, operational capability (and the corresponding relationship with customers and vendors) enables firms to lower their manufacturing costs through accurate demand forecasting, better inventory management, and improved production processes (Tan, Kannan, and Narasimhan 2007). Supplier firms can pass on these benefits to their concentrated customer bases and still make profit from their customer relationships due to their low costs. Moreover, these lower-cost offerings increase the attractiveness of the supplier, increasing customer dependence and reducing churn. Second, the flexibility in the manufacturing process allows supplier firms to offer a wide variety of products to cater to different customers and diversify their customer bases (Worren, Moore, and Cardona 2002). Flexible manufacturing processes reduce reliance on existing customers and increase firms' ability to handle the wild demand fluctuations that can result from a concentrated customer base. Finally, operational

capabilities should help firms with high customer concentration (or those with few major customers) by lowering the costs of customizing products for their smaller customer bases. For example, integrating RFID technology in a firm's supply chain in response to Walmart's demands allows the firm to offer the same technology to existing smaller and new customers. In sum, operational capability reduces the negative effects of customer concentration by reducing production costs and increasing manufacturing flexibility. Therefore:

H<sub>5</sub>: Increase in operational capability decreases the negative effects of customer concentration on suppliers' profitability.

### ***Moderating Effect of Customer Credit Quality***

Building on the idea proposed by Kumar (2013) and Zeithaml, Rust, and Lemon (2001) that not all customers are equal and that some customers are more valuable to the firm, we introduce the concept of customer credit quality, which refers to the financial well-being of customers and the risk of default. Customer credit quality is related to customers' ability to pay back their suppliers and, in line with the general idea of credit quality (Petersen and Rajan 1997), is inherently linked to the underlying quality of the customer base. Low-quality customers are less likely to have the desired information about business processes, product characteristics, and marketplace challenges. Moreover, given that supplier firms extend trade credits according to their assessment of the quality and the future potential of their customers (Brennan, Miksimovic, and Zechner 1988), low-quality customers are unlikely to share their private information with supplier firms, to prevent the supplier firms from knowing their true quality (Mishkin and White 2002).

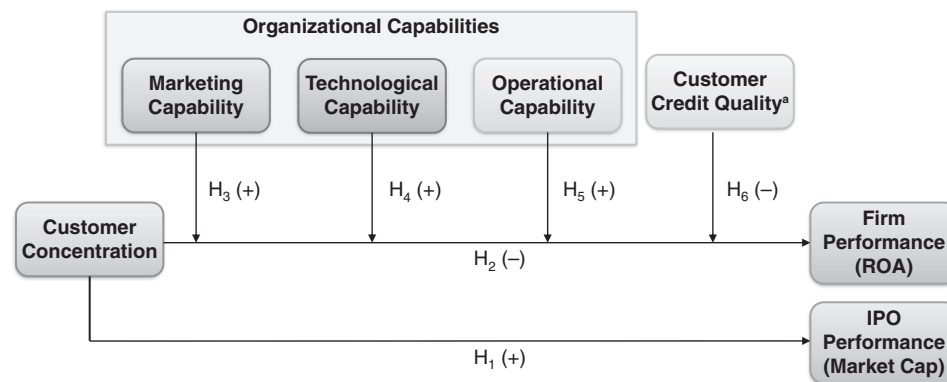
We argue that low customer credit quality exacerbates the negative effects of customer concentration in two ways. First, low customer credit quality directly amplifies the negative consequences of concentration as the risk of concentration is spread over a few low-quality customers. On average, low-quality customers have a high default risk and an increased likelihood of not being able to live up to their commitments, further increasing cash flow volatility and vulnerability and the overall cost of capital. Second, low credit quality indirectly hurts the supplier firm by locking in resources and preventing the supplier firm from pursuing other high-quality customers. Low-quality customers are fundamentally less equipped to learn from their environment and provide quality insights to the focal firm, making such relationships even less valuable (Dodgson 1993). In sum, low customer credit quality further deteriorates the negative relationship between customer concentration and firm performance. Therefore:

H<sub>6</sub>: As customer credit quality decreases, the negative effects of customer concentration on suppliers' profitability increase; that is, the negative effect increases in magnitude with a decrease in customer credit quality.

In sum, we expect a negative effect of customer concentration on firm profitability. Furthermore, we expect organizational capabilities to positively moderate and (low) customer credit quality to negatively moderate the relationship between customer concentration and profitability. We summarize our conceptual framework in Figure 1.



**FIGURE 1**  
**Conceptual Framework**



<sup>a</sup>Higher number indicates low customer credit quality.

Notes: We estimate the models of both the dependent variables, IPO and firm performance, separately, as presented in Equations 5 and 6, respectively. We do not hypothesize the moderating effects of our moderators (organizational capabilities and customer credit quality) on the relationship between customer concentration and IPO performance for two main reasons. First, we do not observe the data to estimate our moderating variables in the pre-IPO period. Second, IPO investors have short-term investment horizons, and the consequences of our moderators may not be immediately evident to influence IPO performance.

## Data and Sample

We test our framework using data from IPO firms, which provide an ideal context to test our framework because we can track them from the initial stages of their life cycle. Focusing on young IPO firms also allows us to observe the supplier firm from the initial phase of relationships with all its customers, account for the evolution of concentration in its customer base, and eliminate any bias due to suppliers' preexisting knowledge about its customers. Although we do not observe these relationships from inception, our use of firm age as a proxy of relationship age is consistent with Irvine, Park, and Yildizhan (2016, p. 893), who suggest that "young firms tend to have young relationships with their major customers" and that "firm age contains enough information on relationship duration" to be used instead of relationship age. More importantly, focusing on IPO firms allows us to evaluate both IPO-based and balance sheet-based outcomes and, thus, to examine the consequences of customer concentration from both stock market and accounting perspectives and provide a complete understanding of the influence of customer concentration. Accordingly, we collected information for all firms that went public between 2000 and 2011. The 12-year window is long enough to provide adequate variability in terms of periods of boom and bust, to make generalizable claims over a large sample, and to allow us to track the long-term (four years post-IPO) performance of these firms. We obtained the list of IPOs from the SDC Platinum New Issues Database. In line with prior literature (Luo 2008; Saboo, Chakravarty, and Grewal 2016), we excluded secondary offerings, spin-offs, leveraged buyouts, rights issues, closed-ended funds, and limited partnerships, to obtain our initial sample of 1,483 firms. After excluding 326 financial services firms (SIC 6000–6999), 79 very small issues (less than \$1.5 million in proceeds), and 55 IPOs with extensive missing information, we obtain our sample of 1,023 IPO firms across 54 industries (two-digit SIC codes). Combining the concentration

information with other financial controls from Compustat and patent information from the U.S. Patent and Trademark Office resulted in an unbalanced panel with 7,008 firm-year observations.

## Measures

### Independent Variables

**Customer concentration.** Customer concentration (CC) measures how a firm's revenues are distributed across its customers, which is analogous to the Herfindahl index that measures the concentration of industry revenues across firms. Accordingly, we measure customer concentration as the sum of square of revenue share from major customers. The Securities and Exchange Commission requires all publicly listed firms to disclose information through prefiling Statement of Financial Accounting Standards (SFAS) 14 (SFAS 131 after 1997) disclosures on customers that account for more than 10% of firm revenue contributions; these statements are available in the Compustat segments database.<sup>3</sup> However, Compustat customer information is only available for post-IPO years and often lacks

<sup>3</sup>This missing information of customers accounting for less than 10% does not materially bias our results for several reasons. First, due to our manual data collection efforts, for many firms, we could collect information for customers who accounted for revenues as low as 7%. Second, mathematically, given that we square the revenue shares, small revenue shares are unlikely to materially change our concentration measure. Third, conceptually, customers with a small revenue share are less likely to have the costs/benefits that we outline. The fact that even the Securities and Exchange Commission does not require firms to report information on these customers provides support to our claim. Fourth, we also replicate our analyses using quantile regression, which is less sensitive to measurement error, skewness, and outliers (Peel 2014) and obtain identical results. Finally, our endogeneity correction procedure should correct for any measurement error.

information. Therefore, we supplement the Compustat segment information with data on customer concentration that we manually collected from the IPO prospectus and 10-K filings. Specifically, we looked for phrases such as “key customers,” “significant customers,” and “major customers,” and we looked in the customer section of the filings to find the customer-level information. For firms that did not use any of these phrases, we manually searched the entire filings for the relevant information. IPO firms reveal their historical financial information in their IPO prospectuses, covering a period either since their inception or at least for the recent past, typically at least for 5 years prior to the offering. The manual data collection allows us to obtain concentration information for the firms since inception.

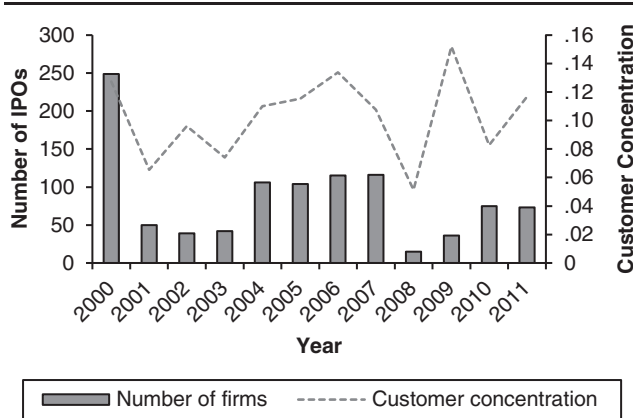
Next, in line with extant research (Irvine, Park, and Yildizhan 2016; Patatoukas 2012), we measure customer concentration  $CC_{it}$  for firm  $i$  having  $j = 1, 2, \dots, N$  customers in period  $t$  as

$$(1) \quad CC_{it} = \sum_{j=1}^N (\text{Share}_{ijt})^2 = \sum_{j=1}^N \left( \frac{\text{Sale}_{ijt}}{\text{Sale}_{it}} \right)^2.$$

Thus, customer concentration of a firm ranges from  $1/N$ , or 0 as  $N \rightarrow \infty$  (where revenues are evenly distributed across a very large number of customers), to 1 (where all the revenues are derived from a single customer). We provide a time trend series of customer concentration in Figure 2, showing adequate variation in both number of firms going public every year and the levels of customer concentration across years. Figure 3 provides the distribution of the number of major customers and highlights that firms typically have few major customers and that the number of major customers declines rapidly. Figure 4 provides the evolution of concentration over firm age and documents that customer concentration reduces as firms mature. These figures highlight the need for understanding of the dynamics of customer concentration.

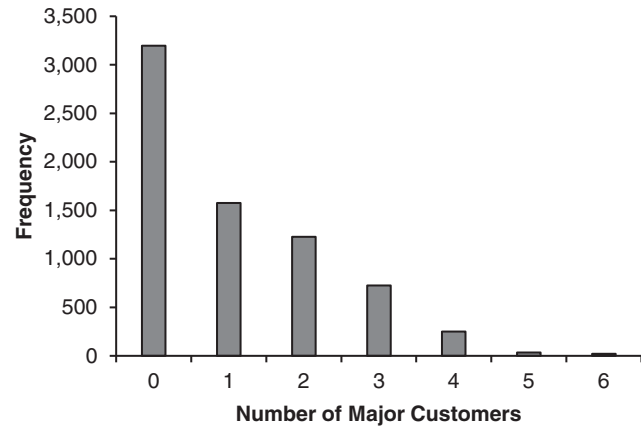
*Marketing capability.* We follow the extant literature and use an input–output stochastic frontier approach to measure

**FIGURE 2**  
Distribution of Firms and Time-Series Trend of Customer Concentration



Notes: The line chart shows the time-series trend of customer concentration over our sample window, and the bar chart shows the number of firms in our sample that went public in each year.

**FIGURE 3**  
Distribution of Number of Major Customers



marketing capability (Dutta, Narasimhan, and Rajiv 1999; Xiong and Bharadwaj 2013). The stochastic frontier analysis estimates the inefficiency scores based on the firm’s ability to transform inputs into outputs; it has been widely used to measure organizational capabilities (e.g., Feng, Morgan, and Rego 2015). To estimate marketing capability, we follow Dutta, Narasimhan, and Rajiv (1999) and Feng, Morgan, and Rego (2016) and include total sales as output and the following quantities as marketing-resource inputs: (1) SG&A expenditures, indicating the level of marketing-related investments; (2) receivables, relating to the resources dedicated toward maintaining customer relationships; and (3) previous-year sales, indicating an already installed customer base. We also add industry dummies to control for industry-level heterogeneity. Formally, we write the frontier model as follows:

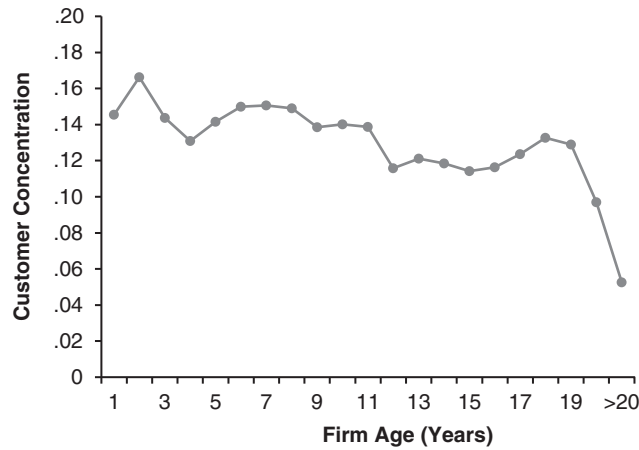
$$(2) \quad \ln(\text{Sale}_{it}) = \beta_0^M + \beta_1^M \ln(\text{SGA}_{it}) + \beta_2^M \ln(\text{Receiv}_{it}) + \beta_3^M \ln(\text{Sale}_{it-1}) + \sum \text{Ind}_i + \sum \text{Year}_t + \varepsilon_{it}^M - \eta_{it}^M,$$

where  $\text{Sale}_{it}$  is total sales;  $\text{SGA}_{it}$  is SG&As;  $\text{Receiv}_{it}$  is total accounts receivables of firm  $i$  in year  $t$ ;  $\text{Ind}_i$  and  $\text{Year}_t$  are industry and year dummies, respectively;  $\varepsilon_{it}^M \sim N(0, \sigma_{\varepsilon_M}^2)$  is idiosyncratic error; and  $\eta_{it}^M \sim \text{Exp}(\theta_M)$  is a marketing inefficiency error component, which is exponentially distributed with  $\theta_M > 0$ ,  $\eta_M \geq 0$ , and  $E[\varepsilon_{it}^M, \eta_{it}^M] = 0$ . We derive the measure of marketing capability from the maximum likelihood estimate of the inefficiency term  $\eta_{it}^M$  (such that higher inefficiency means lower marketing capability) and rescale the measure between 0 (lowest) and 100 (highest) for ease of interpretation.

*Technological capability.* Technological capability refers to organizational ability to convert technological resources into technological output. In line with the extant literature, we measure technological output of a firm using patent count, which has been widely established as a valid measure of organizational innovativeness (Feng, Morgan, and Rego 2016). However, to account for the extraneous factors (e.g., processing delays, legal challenges) and closely relate the patent output to firm’s R&D



**FIGURE 4**  
**Evolution of Customer Concentration with Firm Age**



Notes: Because there are only a few observations with age greater than 20 years and they are scattered across different age groups, we combine them in one group.

expenses, we use the filing date, rather than the patent issue date, to relate the R&D investments to patent output (e.g., Acharya and Subramanian 2009; Chava et al. 2013). Further, given that several technological resources have persistent (long-term) effects and that recent resource allocations are more valuable than those in the past (e.g., Xiong and Bharadwaj 2013), we use Koyck lag function for patent counts and R&D expenditure with higher weights on recent years. We follow Dutta, Narasimhan, and Rajiv (2005) in using Koyck lagged structure with associated weights of .4 for both variables. In additional analyses, we try different weights ranging from .4 to .7 and find qualitatively similar results.

We also control for industry-level heterogeneity among firms by adding industry dummies. Consistent with our estimation of marketing capability, we write the frontier model as follows:

$$(3) \ln(\text{Innov}_{it}) = \beta_0^T + \beta_1^T \ln(\text{R\&DStock}_{it}) + \beta_2^T \ln(\text{PatentStock}_{it}) + \sum \text{Ind}_i + \sum \text{Year}_t + \varepsilon_{it}^T - \eta_{it}^T,$$

where  $\text{Innov}_{it}$  is innovation output, or patent count, of firm  $i$  in year  $t$ ;  $\text{R\&DStock}_{it}$  is stock of R&D expenses;  $\text{PatentStock}_{it}$  is stock of patent output of firm  $i$  in year  $t$ ;  $\text{Ind}_i$  and  $\text{Year}_t$  are industry and year dummies, respectively;  $\varepsilon_{it}^T \sim N(0, \sigma_{\varepsilon_T}^2)$  is idiosyncratic error; and  $\eta_{it}^T \sim \text{Exp}(\theta_T)$  is a technological inefficiency error component, which is an exponential distribution with  $\theta_T > 0$ ,  $\eta_T \geq 0$ , and  $E[\varepsilon_{it}^T, \eta_{it}^T] = 0$ .

**Operational capability.** Operational capability relates to a firm's ability to transform raw material and other resource inputs into finished products or services in the most efficient manner (Cepeda and Vera 2007). To estimate operational capability, we minimize the output operational expenses, using the following as inputs: (1) current assets held by firms, indicating the level of cash available for operations; (2) number of employees scaled by total assets, indicating the level of work force; and (3) current property, plant, and equipment, indicating current expenses related to property

in operational activities. Formally, we write the frontier model as follows:

$$(4) \ln(\text{XOPR}_{it}) = \beta_0^O + \beta_1^O \ln(\text{Assets}_{it}) + \beta_2^O \ln(\text{PPEGT}_{it}) + \beta_3^O \ln(\text{Emp}_{it}) + \sum \text{Ind}_i + \sum \text{Year}_t + \varepsilon_{it}^O + \eta_{it}^O,$$

where  $\text{XOPR}_{it}$  is operational expenses;  $\text{Assets}_{it}$  is current assets;  $\text{PPEGT}_{it}$  is property, plant and equipment;  $\text{EMP}_{it}$  is number of employees;  $\text{IND}_i$  and  $\text{Year}_t$  are industry and year dummies, respectively;  $\varepsilon_{it}^O \sim N(0, \sigma_{\varepsilon_O}^2)$  is idiosyncratic error; and  $\eta_{it}^O \sim \text{Exp}(\theta_O)$  is an operational inefficiency error component, which is an exponential distribution with  $\theta_O > 0$  and  $\eta_{it}^O \geq 0$ . Unlike marketing and technological capabilities, for which we use production maximization, operational capability is estimated as a cost-minimization problem, and, thus, inefficiency  $\eta_{it}^O$  is added to the equation.

Further, given that these three organizational capabilities may be related to one another due to unobserved factors (e.g., overall capability of the firm), we estimate them jointly.<sup>4</sup> Specifically, we use a Bayesian estimation with a multivariate normal idiosyncratic error structure to allow for correlated errors. We run a Markov chain Monte Carlo of 50,000 iterations for the models to converge and obtain the capabilities estimates after 10,000 burn-ins, which we then use in our final model.

**Customer credit quality.** Customer credit quality refers to the financial health of the supplier's customer base. In line with the accounting and finance literature (e.g., Cunar 2007; Petersen and Rajan 1997; Sopranzetti 1998), we use doubtful receivables (i.e., a portion of account receivables that has a high probability of becoming a bad debt in the future) as measure of the credit quality of a supplier's customer base. Note that delays in payment alone (which are common for large customers) do not reflect low customer credit quality. For example, customers such as Walmart often pay their suppliers after some time (i.e., trade financing); however, there is very low probability of receivables from these customers turning into bad debt, and thus they are not considered doubtful receivables. We measure customer credit quality as the two-year average of the ratio of doubtful receivables to total account receivables, where a lower number represents superior credit quality of customer base (Sopranzetti 1998). We use the log-transformed variable to reduce the skewness (Danaher, Mullarkey, and Essegiaier 2006).

### Dependent Variable

In line with extant research in the IPO domain (e.g., Gulati and Higgins 2003; Megginson and Weiss 1991), to measure IPO outcome, we use market capitalization (MCap), measured as the total outstanding shares multiplied by the closing price obtained from CRSP, of the IPO firm at the end of the first trading day.

To evaluate the balance sheet-based consequences of customer concentration, consistent with our objective of investigating the influence of the risks and rewards of having a concentrated customer base, and in line with extant research on

<sup>4</sup>We thank an anonymous reviewer for the suggestion to allow the capabilities equations to be correlated. As a practical matter, we obtain qualitatively similar results using capabilities estimated independently.

customer concentration (e.g., Irvine, Park, and Yildizhan 2016; Patatoukas 2012), we use firm profitability as our dependent variable. Unlike other measures such as sales or cash flows, profitability reflects both the costs and benefits associated with customer concentration and, thus, is the most appropriate measure in our context. For example, profitability includes the benefits of customer concentration, such as lower marketing costs and learning from customers, as well as the risks of customer attrition or low margins due to the supplier firm's lack of bargaining power. Specifically, we use return on assets (ROA), measured as the ratio of net income to total assets obtained from Compustat.

### Control Variables

For our IPO outcome analysis, in line with the recent IPO literature (see recent reviews by Ljungqvist 2007; Ritter 2011, 2003; Ritter and Welch 2002; Yong 2007), we include IPO-related and firm-specific control variables to account for the range of factors that influence IPO performance. Specifically, we include price adjustment (i.e., the revision in the offer price from the midpoint of the original filed price range), which accounts for the private information gathered during the road show (Ritter 2011); and percentage width of offer range (ratio of offer width to lower offer price), which accounts for uncertainty in setting the price (i.e., wider offer range provides greater price flexibility; Hanley 1993). Further, we also control for underwriter reputation, which has been documented as a credible signal of the quality of IPO firm, and we use the scores provided by Loughran and Ritter (2004) and ownership dilution (operationalized as amount of equity stake that owner managers relinquish at the time of IPO), which provide insights into the managers' valuation of the IPO (Leland and Pyle 1977). Finally, we include dummy variables to account for whether the IPO was backed by venture capitalists and whether firm went public during the bubble period (Saboo and Grewal 2013). In addition to the IPO-specific controls, we also control for firm-specific variables, such as sales, ROA, firm age, number of major customers, number of business segments, and marketing intensity. Finally, we include both industry and year dummies to account for industry- and time-specific trends.

In addition to our focal variables, we control for a range of industry- and firm-level financial factors that may influence firm performance. Specifically, we control for firm size (sales and total assets) to account for the scale economies, and age (firm age) to account for the maturity of the firm (e.g., Saboo and Grewal 2013). We include sales growth to account for recent firm performance (Slater and Narver 1994). We also control for firms' marketing intensity (ratio of SG&A expenses to total assets) to account for firms' emphasis on building market-based assets, such as brand equity and customer equity, which affects firm performance (Rust et al. 2004). We use the log transformation of sales, age, and assets to reduce the skewness (Danaher, Mullarkey, and Essegai 2006). Firms also face risks from concentration of revenues across a few business segments, especially IPO firms that typically operate in few business segments. Accordingly, we include the number of business segments that the supplier firm operates in, obtained from the Compustat segments database. Our bargaining power

argument for the negative consequences of customer concentration relies on having a few dominant customers. However, given that our measure of concentration does not distinguish between the number of customers and the level of dependence (we disentangle the two in a subsequent robustness check), we include the number of customer relationships that the supplier firm has to maintain (breadth; see Figure 3).<sup>5</sup> Given that our sample comes from multiple industries, we control for the competitive intensity using the Herfindahl–Hirschman index (HHI), which measures industry concentration (sum of squared market shares for all firms in the industry) according to two-digit SIC codes (Feng, Morgan, and Rego 2015). Further, given that industries may offer differential growth opportunities, we also control for the industry growth rates (Russo and Fouts 1997). In addition to the aforementioned controls, we include both industry and year fixed effects to account for industry-level and time-specific unobserved heterogeneity. We provide a summary of our variable operationalization and data sources in the Web Appendix (Table W1).

### Model Specification

To test H<sub>1</sub> (influence of customer concentration on IPO outcomes), we regress IPO market capitalization at the end of the first trading day on pre-IPO customer concentration and a range of control variables discussed earlier:

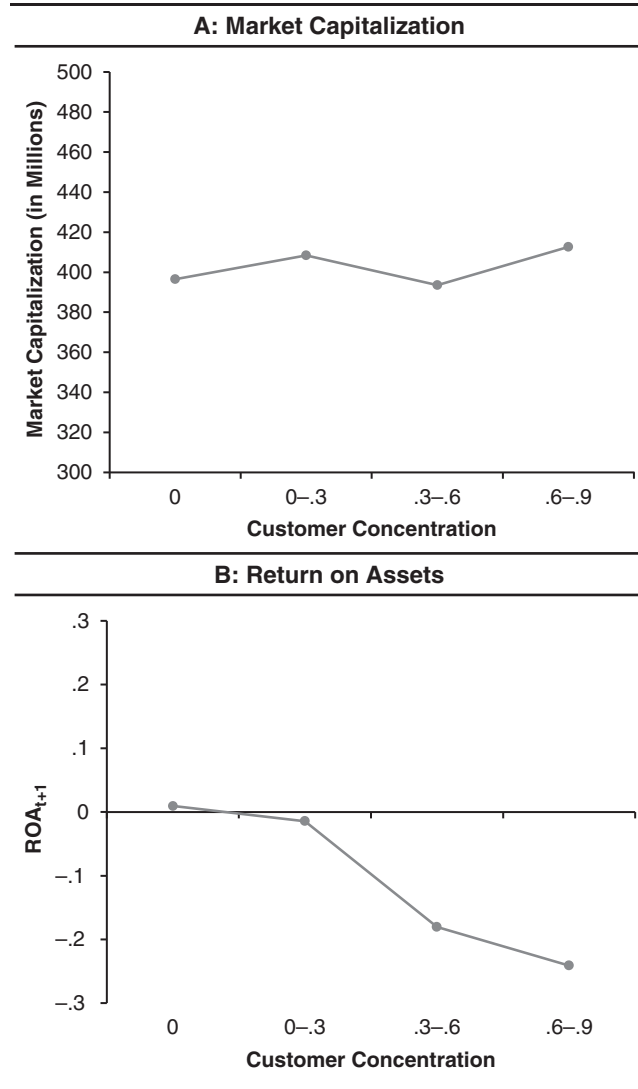
$$(5) \quad \text{MCap}_i = \beta_0 + \beta \text{CC}_i + \gamma \text{Z}_i + \sum \text{Ind}_i + \sum \text{Year}_t + \epsilon_i,$$

where MCap<sub>i</sub> is market capitalization of firm *i*, CC<sub>i</sub> is customer concentration, Z<sub>i</sub> is a matrix of IPO-related and firm-specific control variables for firm *i*, IND<sub>i</sub> and Year<sub>t</sub> are industry and year dummies, and the idiosyncratic error  $\epsilon_i$  is assumed to be identically and independently normally distributed. Figure 5, Panel A, provides the model-free evidence of the relationship between CC and MCap, providing additional evidence for our arguments that customer concentration positively influences IPO outcomes.

To test H<sub>2</sub>–H<sub>6</sub> (effect of customer concentration on firm profitability), we use an autoregressive panel data model that accounts for prior performance and augment it to address the potential endogeneity of customer concentration and unobserved heterogeneity. In line with prior literature (Feng, Morgan, and Rego 2015; Nath and Mahajan 2011), we use one-year leading measure of profitability (ROA<sub>it+1</sub>) to incorporate the effects of past organizational actions. Using an autoregressive model, that is, including the lagged measure of profitability, allows us to control for past levels of ROA and other factors, including inertia, persistence, and different initial conditions, that can predict future ROA (Saboo, Chakravarty, and Grewal 2016). In the additional analyses related to the robustness checks, we estimate the consequences of customer concentration on firm profitability up to year *t* + 4. To correct for the dynamic panel bias introduced by the presence of a lagged dependent variable, we use lagged differences in dependent variables as

<sup>5</sup>We thank an anonymous reviewer for this insight. Results without including the number of major customers are similar to those reported here.

**FIGURE 5**  
**Model-Free Evidence of the Relationship Between**  
**Customer Concentration and Market Capitalization**  
**(A) and Return on Assets (B)**



Notes: For ease of exposition, we divide concentration into three intervals: [0, .3], [.3, .6], and [.6, .9]. We plot the average of the median values (to avoid outliers) of market capitalization and ROA in each of those intervals.

instruments (Blundell and Bond 1998), where we first regress  $ROA_{i,t+1}$  on  $\Delta ROA_{i,t}$  and take the predicted values as an instrument to control for profitability in the last period. We include both the industry (two-digit SIC code) and year dummies to control for industry and year fixed effects on profitability. Finally, we use a random effects specification that also helps us to account for unobserved heterogeneity and use cluster of robust standard errors that account for serial correlation and heteroskedasticity.<sup>6</sup> Overall, our final model can be written as

<sup>6</sup>We obtain similar results using the Newey–West estimator, which accounts for both heteroskedasticity and higher-order serial correlation (Wooldridge 2010).

$$\begin{aligned}
 (6) \text{ RoA}_{it+1} = & \beta_0 + \beta_1 \text{CC}_{it} + \beta_2 \text{MktCap}_{it} + \beta_3 \text{TechCap}_{it} \\
 & + \beta_4 \text{OprCap}_{it} + \beta_5 \text{LogCredQual}_{it} \\
 & + \beta_6 (\text{CC}_{it} \times \text{MktCap}_{it}) + \beta_7 (\text{CC}_{it} \times \text{TechCap}_{it}) \\
 & + \beta_8 (\text{CC}_{it} \times \text{OprCap}_{it}) + \beta_9 (\text{CC}_{it} \times \text{LogCredQual}_{it}) \\
 & + \beta_{10} \text{SaleGrowth}_{it} + \beta_{11} \text{LogAge}_{it} + \beta_{12} \text{LogSale}_{it} \\
 & + \beta_{13} \text{HHI}_{it} + \beta_{14} \text{IndSaleGrowth}_{it} + \beta_{15} \text{MktInten}_{it} \\
 & + \beta_{16} \text{LogAssets}_{it} + \beta_{17} \text{BusSeg}_{it} + \beta_{18} \text{Breadth}_{it} \\
 & + \beta_{19} \Delta \widehat{\text{ROA}}_{it} + \sum \text{Ind}_i + \sum \text{Year}_{t+1} + \varepsilon_{it+1},
 \end{aligned}$$

where  $ROA_{it+1}$  is the return on assets of firm  $i$  at time  $t + 1$ ,  $CC$  is customer concentration,  $\text{MktCap}$  is marketing capability,  $\text{TechCap}$  is technological capability,  $\text{OprCap}$  is operations capability,  $\text{LogCredQual}$  is the natural logarithm of credit quality of the customer base,  $\text{breadth}$  is the number of major customer relationships,  $\text{BusSeg}$  is the number of business segments in which a firm operates, and the idiosyncratic error  $\varepsilon_{it+1}$  is normally and independently distributed. Figure 5, Panel B, provides the model-free evidence of the relationship between  $CC$  and  $ROA$ , and the significant negative correlation between  $CC$  and  $ROA$  ( $\rho = -.08$ ) provides preliminary evidence for our arguments that an increase in customer concentration hurts profitability.

### Endogeneity Correction

Given the importance of customers for firm performance, it is not surprising that managers spend significant resources on acquiring and managing their customers. Indeed, Kumar and Petersen (2005) suggest that firms should carefully choose customers that are most valuable to the organization, suggesting that firms may choose the level of customer concentration to improve their future performance and that customer concentration may be endogenous. To correct for endogeneity in our model, we use the control function approach widely used in marketing (Petrin and Train 2010). In the first step, we regress the potentially endogenous variable, customer concentration, on a set of exogenous variables. Specifically, we include capabilities and financial variables such as age, total assets, sales, sales growth, marketing expenses, number of major customers, number of business segments, and profitability.

In addition to the aforementioned variables, to fulfill the requirement of exclusion restrictions (Petrin and Train 2010), we also include average industry-level customer concentration and average customer concentration of firms with similar profitability. Given the inherent uncertainty about the right levels of customer concentration, in line with institutional isomorphism theory (DiMaggio and Powell 1983), we argue that firms often imitate their peers. Mimicking other firms is also consistent with other related theories of industry recipes (Spender 1989), industry mindset (Phillips 1994), and dominant logic (Bettis and Prahalad 1995). Moreover, average concentration in the same industry or across similar firms has little to do with the performance of the focal firm and is unlikely to serve its specific needs. Thus, average industry-level customer concentration ( $\text{IndCC}$ ) and average customer concentration of firms with similar profitability ( $\text{PeerCC}$ ) satisfy both criteria of relevance and exogeneity, to serve as valid instruments.



**TABLE 1**  
**Bivariate Correlation Coefficients and Descriptive Statistics**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. $ROA_{it+1}$	.27																
2. $ROA_{it}$	-.08	-.08															
3. Customer concentration (CC)	-.01	-.01	.32														
4. Number of major customers (Breadth)	-.07	-.06	.82	.67													
5. Total sales from major customers (Depth)	.17	.18	-.11	.04	-.08												
6. Marketing capability (MktCap)	.08	.07	-.04	-.05	-.05	.10											
7. Technological capability (TechCap)	-.23	.02	.02	-.06	-.02	-.31	.02										
8. Operational capability (OprCap)	-.16	-.22	.06	.00	.02	-.04	-.02	.01									
9. Customer credit quality (CredQual)	.00	.00	.01	-.01	.00	-.02	-.02	.00	.00								
10. Sales growth	.07	.08	-.14	-.16	-.19	.07	.05	.22	-.02	-.02							
11. Age	.02	.03	-.04	-.04	-.05	.19	.03	.00	-.01	-.01	.08						
12. Sale	.00	.02	-.14	-.13	-.17	.01	.00	.10	-.02	-.01	.15	.10					
13. Industry concentration (HHI)	.00	.00	-.01	-.01	-.01	.00	.00	-.01	.00	.00	-.01	.00	.01				
14. Industry sales growth	-.22	-.72	-.06	-.03	-.05	-.09	-.04	-.06	.20	.00	-.06	-.02	.05	.00			
15. Marketing intensity (MktInten)	.03	.04	-.06	-.06	-.07	.00	.04	.34	-.01	.00	.18	.17	-.01	.00	-.05		
16. Assets (TA)	-.02	-.01	-.02	-.05	-.03	-.02	.01	.07	.06	-.01	.08	.01	.03	.00	.01	.07	
17. Number of business segments	-.20	-.22	.11	1.05	.21	62.29	61.97	3.48	1.79	2.05	20.12	1,298.62	.20	.16	.40	920.28	1.21
M	1.28	1.39	.22	1.20	.29	20.50	26.44	2.72	47.69	55.69	23.60	7,712.69	.15	3.74	1.17	4,570.65	.62
SD																	

Note: Correlations above absolute value of .025 are significant at  $p < .05$ , two-tailed.

Because the dependent variable of our first-stage endogeneity correction model, customer concentration, is constrained between 0 and 1, and because both boundaries have a significant probability mass, we cannot use the regular regression techniques that rely on the normal functional form for estimation (Papke and Wooldridge 1996). Therefore, we use fractional response panel methods where  $E(y|X) = G(X\beta)$  such that  $G(\cdot)$  is a nonlinear function satisfying  $0 \leq G(\cdot) \leq 1$  (Papke and Wooldridge 2008; Ramalho, Ramalho, and Murteira 2011). Formally, the first stage model is

$$(7) \quad CC_{it} = \alpha_0 + \alpha_1 IndCC_{it} + \alpha_2 PeerCC_{it} + \sum_{i=2}^R \alpha_i Z_{it} + \vartheta_{it},$$

where  $Z$  is matrix of exogenous variables,  $IndCC$  is the average industry-level (two-digit SIC code) customer concentration, and  $PeerCC$  is the average concentration of firms with similar profitability. We use the residual,  $\hat{\vartheta}_{it}$ , from the first-stage model (Equation 7) as an additional independent variable to correct for potential endogeneity of customer concentration in both our models (Equations 5 and 6).

## Results

Table 1 contains descriptive statistics and bivariate correlations for all the variables used in the study. The condition number (i.e., ratio of the largest to the smallest eigenvalues of the correlation matrix) of 24.22 is lower than the recommended cutoff value of 30, suggesting that multicollinearity is unlikely to be a concern. The average customer concentration for our sample of firms is .11, which is similar to values in previous studies in this context (Irvine, Park, and Yildizhan 2016; Patatoukas 2012).

Results of our first-stage regression (Table 2) provide insights into organizational customer management practices. We present the correlations between variables used in the

**TABLE 2**  
First-Stage Endogeneity Correction Results

	Estimate	SE
Average CC of firms in the same industry (IndCC)	2.642***	.290
Average CC of firms with similar profitability (PeerCC)	1.288***	.335
Marketing capability (MktCap)	-.001	.002
Technological capability (TechCap)	-.0001	.001
Operational capability (OprCap)	.020*	.011
Log customer credit quality (LogCredQual)	.002	.006
Sales growth	-.155	.263
Log age (LogAge)	-.054*	.031
Log sales (LogSale)	.005	.013
Competitive intensity	-.621***	.181
Industry sales growth	-.001	.005
Marketing intensity (MktInten)	-.001***	.000
Log assets (LogAssets)	-.110	.182
Number of business segments	-.174***	.055
$\Delta ROA_{it}$	.015	.045
Intercept	-1.474***	.185

\* $p < .1$  (two-tailed).

\*\*\* $p < .01$  (two-tailed).

analyses of IPO outcomes (Equation 5) in the Web Appendix (Table W2). In line with our intuition, we find that a focal firm's customer concentration is positively related to the average customer concentration of firms in the same industry ( $\beta = 2.642$ ,  $p < .001$ ) and those with similar levels of profitability ( $\beta = 1.288$ ,  $p < .001$ ), suggesting that firms mimic other (similar) firms to determine their levels of customer concentration. Further, customer concentration decreases with firm age ( $\beta = -.054$ ,  $p < .1$ ), indicating that firms increase their customer base as they mature and no longer depend on a few customers for their revenues. Moreover, organizational marketing investments are negatively related to customer concentration ( $\beta = -.001$ ,  $p < .001$ ), suggesting that marketing investments enable firms to acquire new customers and increase revenues from their customers to lower their concentration. Similarly, customer concentration decreases with an increase in the number of business segments that the firm operates in ( $\beta = -.174$ ,  $p < .01$ ).

We present the results of IPO performance analysis (Equation 5) in Table 3. In line with  $H_1$ , we find that customer concentration is positively related to the market capitalization of the IPO firm ( $\beta = .814$ ,  $p < .05$ ), indicating that IPO investors reward firms that have large stable customer relationships. We also replicated our analysis with initial returns (i.e., percentage difference between the offer price of the stock and the price of the stock at the end of the first trading day), another popular measure for assessing IPO and find qualitatively similar results ( $\beta = .126$ ,  $p < .05$ ). We hasten to highlight that this positive effect should not be treated as IPO investors ignoring the costs associated with customer concentration. Given the information asymmetry and the uncertainty associated with the prospects of a firm going public, IPO investors are primarily concerned about the survival of the firm, and they value signals that reduce the risks associated with the firm's prospects (e.g., Saboo, Chakravarty, and Grewal 2016). In such a context, having a steady stream of revenue that

**TABLE 3**  
Parameter Estimates for the IPO Performance Model

	Estimate	SE
Customer concentration (CC)	.805**	.389
Partial adjustment	1.712***	.319
Offer range width	-.908***	.267
Underwriter reputation	.037***	.011
Bubble	.082	.104
Venture capital funded	-.062	.043
Ownership dilution	-.642***	.131
Log age (LogAge)	-.052**	.024
Log sales (LogSale)	.01	.006
Marketing intensity (MktInten)	.250***	.081
Log assets (LogAssets)	.001***	.000
Number of business segments	-.127***	.035
Number of major customers	-.051	.035
ROA	.021	.073
Endogeneity correction term ( $\hat{\vartheta}_{it}$ )	-.468	.340
Intercept	-.281	.196
Industry fixed effects	Yes	
Year fixed effects	Yes	

\*\* $p < .05$  (two-tailed).

\*\*\* $p < .01$  (two-tailed).

is associated with high concentration reduces investors' uncertainty. The coefficients of the control variable are along expected directions (Luo 2008; Saboo and Grewal 2013). For example, IPO valuations increase with increases in price adjustment ( $\beta = 1.742, p < .001$ ), underwriter reputation ( $\beta = .041, p < .01$ ), marketing intensity ( $\beta = .284, p < .01$ ), and total assets ( $\beta = .001, p < .01$ ); valuations decrease with an increase in the offer range ( $\beta = -.828, p < .01$ ).

In Table 4, we report the results of our analyses of the consequences of customer concentration on firm profitability that control for endogeneity and unobserved heterogeneity. As expected, we find that the estimate of our correction (residuals from the first-stage model) term is significant ( $\beta = 2.625, p < .01$ ), suggesting that firms do strategically choose the desired level of customer concentration. As hypothesized in  $H_2$ , we find that customer concentration hurts firm performance ( $\beta = -6.258, p < .001$ ), suggesting that the costs associated with having major customers easily outweigh their benefits. We perform a robustness check with contemporaneous variables (both ROA and CC in the same period) and obtain qualitatively similar results ( $\beta = -8.527, p < .05$ ). Our results are consistent with Irvine, Park, and Yildizhan (2016), who also document a negative relationship between customer concentration and firm performance.

Our results provide strong support for the moderating effects of organizational capabilities (see Figure 6). Specifically, in line with  $H_3$ – $H_5$ , we find that marketing ( $\beta = .025, p < .001$ ), technological ( $\beta = .010, p < .01$ ), and operational capabilities ( $\beta = .311, p < .01$ ) mitigate the deleterious consequences of

customer concentration. In line with  $H_6$ , we find that poor customer credit quality further deteriorates performance of supplier firms ( $\beta = -.032, p < .01$ ). Although all three organizational capabilities are important in mitigating the negative effects of customer concentration, we evaluate their relative importance by comparing the magnitudes of the standardized interaction coefficients. The results show that operations capability ( $\beta^{STD} = .141, p < .01$ ) is more important than marketing ( $\beta^{STD} = .086, p < .001$ ) and technological ( $\beta^{STD} = .043, p < .01$ ) capabilities in reducing the negative effects of customer concentration. The Wald test confirms that operations capability is significantly superior in mitigating the negative effect of customer concentration than technological capability ( $\chi^2(1) = 4.08, p < .05$ ), but the other comparative effects are not statistically significant.

The effect of other control variables is in line with expectations and aligned with prior literature. In line with our intuition, marketing ( $\beta = .003, p < .001$ ) and operational ( $\beta = .032, p < .05$ ) capabilities positively affect firm performance, whereas firm performance decreases with poor customer credit quality ( $\beta = -.007, p < .01$ ). Finally, we find that sales growth is positively related to firm performance ( $\beta = -.110, p < .001$ ), whereas marketing intensity ( $\beta = -.621, p < .001$ ) negatively affects firm performance. Results using a three-stage least squares procedure are qualitatively similar to those presented in Table 4.

### Disentangling the Effect of Customer Concentration

Our measure of customer concentration combines two dimensions of the customer base: its breadth, which represents the number of key customers, and its depth (ratio of sales from all the major customers to total sales), which represents the extent to which the focal firm relies on its key customers for revenues. To disentangle the effects of these two dimensions of customer concentration, we replicate our analysis using the breadth and depth of customer concentration on firm performance. To deal with the potential endogeneity of breadth and depth of the customer base, we use the control function approach (as detailed earlier) with industry averages of customer breadth and customer depth, respectively. We find that the depth of customer relationships has a negative effect on firm performance ( $\beta = -2.563, p < .001$ ), whereas customer breadth has no effect ( $\beta = .019, p > .80$ ). Further, we also find that that marketing ( $\beta = .019, p < .001$ ), technological ( $\beta = .008, p < .01$ ), and operational capabilities ( $\beta = .202, p < .01$ ) reduce the adverse effects of depth of customer concentration on profitability. We do not find significant interaction effects for customer credit quality ( $\beta = .006, p > .3$ ).

These results suggest that the negative effects of customer concentration are driven entirely by the depth of customer relationships, and they provide evidence for the mechanism discussed in our hypotheses, in which we argue that major customers bargain away the benefits that they create and leave the supplier firm exposed to all the risks associated with the concentrated customer base. An increase in the depth of customer relationships increases the bargaining power of the customers, enabling them to command an increased share of the value created; breadth of customer concentration alone, however, should not influence bargaining power.

**TABLE 4**  
**Parameter Estimates for the Firm Profitability (ROA) Model**

	Estimate	SE
Customer concentration (CC)	-6.258***	1.490
Marketing capability (MktCap)	.003***	.001
Technological capability (TechCap)	.0001	.001
Operational capability (OprCap)	.032**	.015
Customer credit quality (LogCredQual)	-.005	.003
CC $\times$ MktCap	.025***	.006
CC $\times$ TechCap	.010***	.004
CC $\times$ OprCap	.311***	.107
CC $\times$ LogCredQual	-.032***	.012
Sales growth	.114***	.022
Log age (LogAge)	-.025	.030
Log sales (LogSale)	.003	.008
Competitive intensity	-.081	.143
Industry sales growth	-.001***	.000
Marketing intensity (MktInten)	-.616***	.066
Log assets (LogAssets)	-.093*	.054
Number of business segments	-.003	.014
Number of major customers	-.002	.025
$\Delta ROA_{it}$	.115	.493
Intercept	-1.654*	.926
Endogeneity correction term ( $\hat{\vartheta}_{it}$ )	2.625***	.932
Industry fixed effects	Yes	
Year fixed effects	Yes	

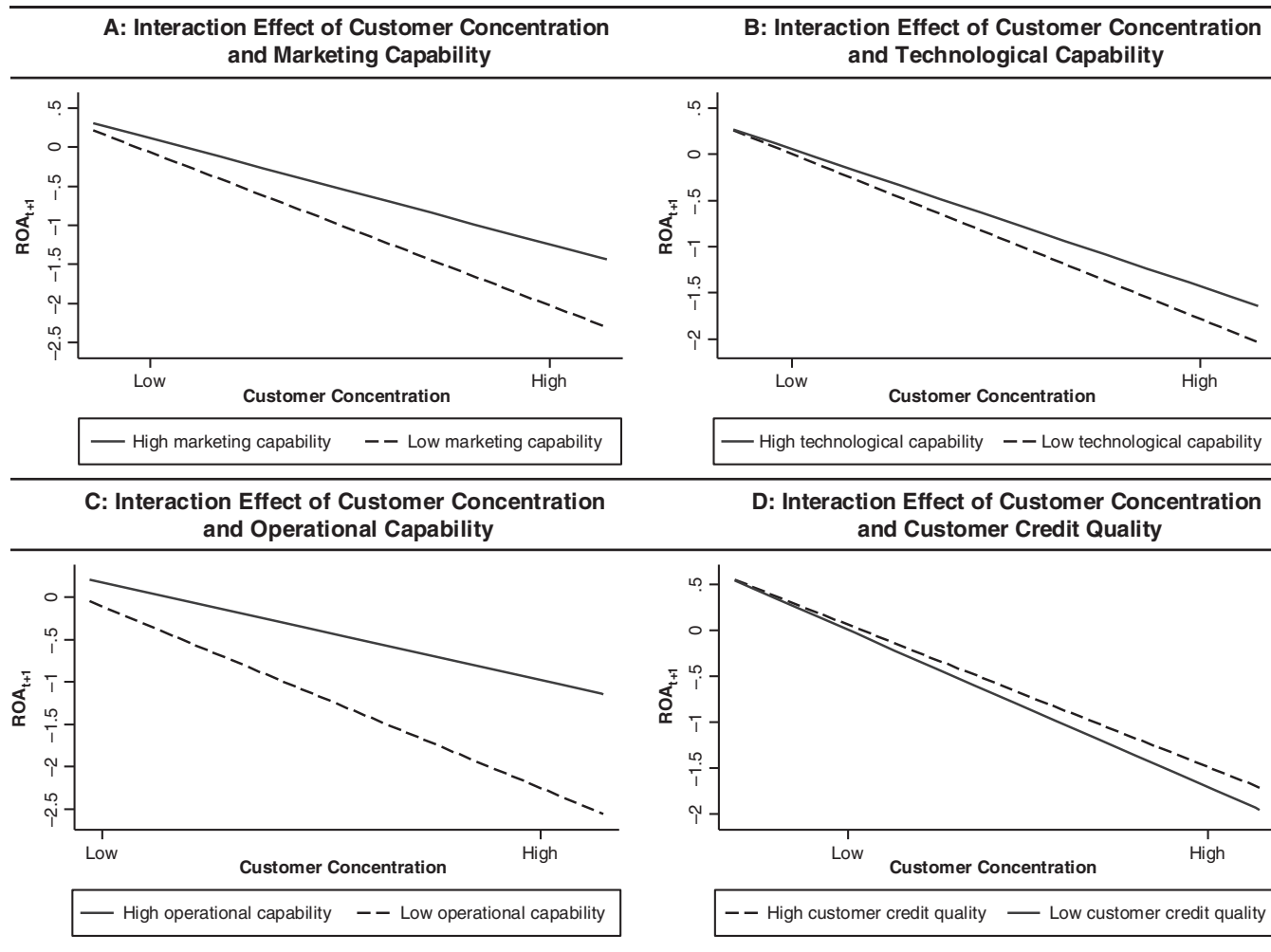
\* $p < .1$  (two-tailed).

\*\* $p < .05$  (two-tailed).

\*\*\* $p < .01$  (two-tailed).



**FIGURE 6**  
Plots for the Moderating Effects



### Robustness Tests

We carried out several additional analyses to ensure the robustness of our results.

*How long does the negative effect persist?* Our results indicate that the effect of customer concentration negatively affects firm performance in the subsequent period, while organizational capabilities mitigate these negative effects. Given the importance of long-term profitability of organizational strategies and decisions, we are interested in finding out how long the negative consequences of customer concentration persist. To answer this question, we estimate the model in Equation 6 with additional future profitability measures:  $ROA_{it+2}$ ,  $ROA_{it+3}$ , and  $ROA_{it+4}$ . In all the models, we also account for the dynamic panel bias by using appropriate instruments for each period as discussed earlier. We find that the effect of customer concentration is negative for period  $t+2$  ( $\beta = -6.975, p < .001$ ) and period  $t+3$  ( $\beta = -3.475, p < .001$ ), and this effect persists until period  $t+4$  ( $\beta = -3.256, p < .001$ ). Results of the interaction effects are also along expected lines in all the cases.

*Stock market-based buy-and-hold abnormal returns (BHAR).* Our two measures, market capitalization and

profitability, examine the consequences of customer concentration from both stock market and accounting perspectives and provide a better understanding of the influence of customer concentration. Specifically, our results suggest that pre-IPO investors care about IPO outcomes, whereas other investors care about general well-being of the firm and therefore value balance sheet-based performance outcomes. However, one could argue that IPO outcome is a forward-looking stock market-based measure, whereas ROA is a backward-looking accounting metric. To document the robustness of our results, we replicate our balance sheet-based results using BHAR as the dependent variable. We compute buy-and-hold abnormal returns between two events as the difference between the buy-and-hold return of the stock and the buy-and-hold return of the benchmark, that is,

$$BHAR_{i(\tau_1, \tau_2)} = \prod_{t=\tau_1}^{\tau_2} (1 + R_{i,t}) - \prod_{t=\tau_1}^{\tau_2} (1 + E[R_{i,t} | \Omega_{i,t}]).$$

Similar to our ROA analyses, we compute BHAR for each of the four years post-IPO (depending on the data availability; for many firms, we compute BHAR beyond four years) and re-estimate the model in Equation 6 with BHAR. This variable measures the abnormal return from holding the stock for an

extended period and is a widely used measure of long-term outcomes (Srinivasan and Hanssens 2009). Unlike ROA, which is available for pre-IPO years, a stock market-based measure is available only after the stock starts trading, resulting in a loss of 2,796 observations; thus, we do not use BHAR as our primary dependent variable. Consistent with our results, we find that customer concentration negatively influences long-term BHAR ( $\beta = -.811, p < .05$ ), providing confidence in our results.

*Alternate model specifications.* We estimated and compared our model with several other benchmark models. Specifically, the proposed model (Akaike information criterion [AIC] = 1,2971.4) is superior to alternate specifications such as models with only control variables (AIC = 13,333.9), only endogeneity correction and no correction for heterogeneity (AIC = 13,116.6), and only correction for unobserved heterogeneity and no endogeneity correction (AIC = 13,116.7). We also explored the nonmonotonic effects of customer concentration and reestimated both our models (Equations 5 and 6) to test for the quadratic effects of customer concentration. We obtain results qualitatively similar to those reported earlier and find no evidence of quadratic effect of customer concentration on market capitalization ( $\beta = -.191, p > .6$ ) or ROA ( $\beta = .184, p > .4$ ). Finally, using the estimated residual in our second stage can induce measurement error.<sup>7</sup> To account for this, we replicated our second-stage model with bootstrapped standard errors; we obtain results qualitatively similar to those reported earlier.

*Alternate variable operationalization.* We check the robustness of our results by using alternate specifications for our measures of organizational capabilities. Specifically, we use different variables to specify our input-output stochastic frontier. For marketing capability, for instance, we add lags of variables and use advertising expenditures (SG&A – R&D) as inputs, and we obtain identical results to those reported here. We also try using different lagged variables for estimating operations and technological capabilities and confirm the robustness of our results.

## Discussion

Customer management is one of the most important tasks that firms face, and managers spend significant resources developing strong relationships with their customers in an effort to increase purchases. However, our research highlights the downsides associated with strengthening relationships with only a small group of customers. We introduce the idea of customer concentration, which relates to the distribution of revenues across customers, to argue that instead of focusing on maximizing revenues from individual customers, managers must optimize their revenues across the entire customer base. Despite the convenience and potential benefits of managing fewer relationships (per  $H_1$ ), we highlight that having a concentrated customer base wherein the revenues are derived from a small group of customers has a significant negative effect on firm profitability. Large customers, who are aware of their strong

bargaining position relative to the supplier firm, can extract all the joint value created and leave the supplier firm exposed to all the idiosyncratic risk associated with a concentrated customer base, hurting supplier profitability. We acknowledge the fact that firms (especially young firms, such as those in our sample) may not have much flexibility or choice in terms of level of customer concentration; however, the objective of our research is to sensitize managers about the deleterious consequences of relying on a few customers for their revenues. Further, our results suggest that the negative effects of customer concentration increase with a decrease in the credit quality of the supplier's customer base and decrease with an increase in suppliers' marketing, technological, and operational capabilities.

## Theoretical and Empirical Contributions

Customer acquisition and management has been a topic of significant research in marketing, yet this stream of research has largely focused on the strength of the individual supplier-customer relationship (Palmatier et al. 2006; Reinartz, Krafft, and Hoyer 2004; Reinartz and Kumar 2000; Ryals 2005). Our research contributes to CRM research in multiple ways. First, we highlight the importance of focusing on the entire customer base as allocating resources to maximize individual relationships with a small fraction of customers may lead to suboptimal outcomes. Our research should not be viewed as contradicting the volumes of research in the CRM domain; instead, we seek to highlight the risks of narrowly focusing on a few individual customer relationships, and we encourage both theory and practice to look at the entire portfolio of customers. Second, we introduce the notion of customer concentration, which should allow scholars to better quantify the relationship between the firm and its customer base. Instead of dummy variables that prior research has used, such as customer power, CMO power, or customer dependence (e.g., Boyd, Chandy, and Cunha 2010; Christensen and Bower 1996; Wang, Saboo, and Grewal 2015), we hope that scholars use the customer concentration measure, which provides a nuanced understanding of the dynamics between firms and their customers. Third, we provide a resolution to the conflicting evidence provided by scholars on the consequences of having a concentrated customer base. For example, Patatoukas (2012) finds a positive effect of concentration on supplier performance, whereas Irvine, Park, and Yildizhan (2016) find that the effect is negative in the initial phases of buyer-supplier relationships and becomes positive as the relationship matures. Using a large sample of 1,023 IPO firms wherein we observe customer concentration from the beginning of their life cycles and therefore reduce any bias due to prior experience in customer management, our results highlight that the relationship is not so straightforward and that although customer concentration is viewed positively by pre-IPO investors and helps IPO outcomes, it hurts the overall financial well-being of the firm by hurting profitability over multiple periods. In other words, whereas Irvine, Park, and Yildizhan (2016) show a positive effect on profitability in the long-run, we observe the opposite. Our negative main effect of customer concentration supports the argument made by Slater and Narver (1998) that firm strategy should not be customer-led and is consistent with the literature

<sup>7</sup>We thank an anonymous reviewer for this insight.

on power dependence (e.g., Heide and John 1988), which suggests that ability to appropriate value in an exchange relationship is a function of the relative bargaining power of the firm, and financial portfolio theory (Markowitz 1952), which argues for diversifying the customer base to reduce idiosyncratic customer risk. Furthermore, our negative moderating effect of customer credit quality provides additional justification for managing the overall portfolio of customer and even firing “bad customers” (Zeithaml, Rust, and Lemon 2001). Low-quality customers may not only directly hurt the firm value through reduced profitability, but they also consume precious organizational resources and prevent the supplier firm from pursuing high-quality customers.

To the emerging literature on the role of marketing during IPOs (e.g., Luo 2008; Saboo and Grewal 2013), we highlight another marketing construct that influences IPO outcomes. Having a set of core customers significantly reduces the liability of newness associated with young firms and increases investor confidence in the IPO firm. Thus, customer concentration serves as a credible signal of IPO firm quality and affects market capitalization positively.

Finally, to the resource-based view literature, we highlight the indirect benefits of organizational capabilities and their relative importance (Amit and Schoemaker 1993). First, we highlight the value of organizational capabilities in enabling firms to amplify the benefits and diminish the costs associated with organizational actions. In line with prior studies that highlight the moderating effects of organizational capabilities (e.g., Grewal and Tansuhaj 2001), we find that the effects of a concentrated customer base are contingent upon organizational capabilities. Specifically, we find that marketing, technological and operational capabilities mitigate the negative effects of customer concentration on firm performance. Second, we document the relative importance of operational capability over technological and marketing capabilities in terms of mitigating the deleterious effects of customer concentration. Specifically, our results suggest that firms that emphasize operational capability are better equipped to mitigate the risks of customer concentration than those that emphasize marketing and technological capabilities.

### **Managerial Implications**

Our results are also managerially relevant. First, to managers who spend significant resources on increasing customer purchases, our results highlight the negative consequences of such efforts. Although customer concentration can serve as a credible signal of quality for firms going public, we hope to sensitize managers against relying on a small group of customers for their revenues. Given the average market capitalization of \$633.6 million among our sample firms, our results for the effects of concentration on IPO outcomes suggest that a 10% increase<sup>8</sup> in customer concentration (which, for a firm having two customers each contributing 40% of the revenues, can result from a mere 2% increase in contributions from each of two customers)

<sup>8</sup>Because we use standardized estimates for these calculations in this subsection, percentage values refer to the percentage of the standard deviation of that variable. So, in this case, 10% refers to 10% of one standard deviation of concentration.

results in an increase in market valuation of supplier firms by \$8.21 million. However, these IPO benefits are easily overshadowed by the significant negative consequences of customer concentration on firm profitability. For example, using the standardized estimates, our results suggest that a 10% increase in customer concentration reduces profitability by 3.35% in the subsequent year (and that these consequences persist for more than four years, resulting in a cumulative loss of more than 9.4% over the four years). For an average firm in our sample, this translates to an additional loss of about \$7 million in the subsequent year, or about \$20.32 million over the next four years. Thus, our results suggest that managers must be wary of deleterious consequences of having a concentrated customer base. Further, our results highlight that managers who are exposed to customer concentration may be able to reduce the deleterious consequences of their concentrated customer base by investing in their internal capabilities or going after high-quality customers. For instance, the same supplier firms with a 10% increase in concentration can trim their losses by 2.02% (i.e., losses decrease by 2.02%, from 3.35% to 1.33%) by increasing all their core organizational capabilities by 10%. On the other hand, the same supplier can further increase its losses by .21% (i.e., a total of 3.56%) if it lowers the credit quality of its customers by 10%. Further, to document the trade-off between our moderators, we estimate the percentage increase in capabilities and customer credit quality required to offset the negative effects of a 1% increase in customer concentration. We find that losses due to a 1% increase in customer concentration can be compensated by an increase of 3.23% in operations capability, 5.14% in marketing capability, or 17.87% in technological capability alone. On the other hand, the losses can also be evened out by an increase in 16.05% of customer credit quality. Thus, our results provide actionable guidance to managers in terms of alleviating the deleterious consequences of customer concentration. Finally, our research will help investors pick winners and improve corporate governance by highlighting the downsides of organizational customer management efforts. We acknowledge that not every firm may be able to change its customer mix in the short run; however our objective is to encourage firms to move in the right direction based on their specific situations.<sup>9</sup>

### **Limitations and Future Research**

Our research highlights the negative consequences of customer concentration and cautions managers against relying on a small group of customers for their revenues. However, our study is not without its limitations, which provide several avenues for future research that we outline here. First, as discussed earlier, SFAS 131 requires all firms to disclose revenues from all customers who contribute at least 10% of total revenue. Although this 10% limit covers the significant customers and is consistent with the

<sup>9</sup>In an unreported analysis, we explored additional industry type and firm characteristics that can influence the effect of customer concentration; find that the negative effects of concentration decrease with firm size (both sales and total assets) and in the manufacturing industry, whereas they increase with firm age. We hope future scholars explore additional variables to help firms make these decisions.



objectives of our study, having revenue data of all customers could provide additional insights. Second, given that most firms do not disclose the names of their customers, we are not able to include any individual customer characteristics (e.g., reputation or innovativeness of customers) that may influence the effects of customer concentration. Although we include customer credit quality as a measure of the overall quality of a supplier's customers, scholars with proprietary data sets may find exploring the effects of individual customer characteristics a fertile area for future research. Third, while our measure of

customer concentration is derived from secondary data, our study does not include any qualitative information about the nature of customer relationships. We hope researchers will use primary data to learn about customer dependence and relationship quality to provide additional insights into the cause and effects of customer concentration. Finally, future researchers should identify other boundary conditions (e.g., environmental factors, organizational resources) and mediating mechanisms that could highlight other avenues for firms to mitigate the deleterious consequences of customer concentration.

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