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WHEN AND WHY DO CUSTOMER SOLUTIONS PAY OFF IN BUSINESS MARKETS?

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When and why do customer solutions pay off in business markets?

Abstract

Manufacturers invest in customer solutions to differentiate their offerings and sustain profitability despite declining margins from goods sales. Notwithstanding strong managerial and academic interest, an examination of *whether* and explanations for *when* and *why* solutions translate into superior performance are lacking. We test hypotheses developed from the resourcebased theory and transaction-cost economics, supplemented with in-depth theory-in-use interviews, on primary and secondary data collected from 175 manufacturers. From a model that corrects for endogeneity, the findings suggest that, compared with other service offerings, solutions are associated with increased return on sales. This positive profitability effect is enhanced in firms with greater sales capabilities; it is stronger in industries with greater buyer power but weaker in technology-intensive industries. These results caution against the simplistic view of solutions as a universal route to gaining competitive advantage and aid in better identifying the role of solutions in a manufacturer's offering portfolio.

Keywords: Customer solutions, B2B services, B2B marketing, Firm performance, Return on sales, Differentiation

Goods-centric firms in many business-to-business (B2B) markets are under increasing pressure to combat margin pressure as growth and profitability from equipment sales decline (Mcdonald et al. 2016; Reinartz and Ulaga 2008). At the same time, there is growing acknowledgment of the opportunity for B2B manufacturers to provide service-based offerings (Fang et al. 2008; Suarez et al. 2013). In the past decade, service sales have grown at more than twice the rate of manufacturing in the European Union (2006–2015: 21% vs. 9%; http://ec.europa.eu). Despite the growing importance of services, B2B manufacturers have little guidance on *how* to expand their service offering portfolios. According to Cusumano et al. (2015, p. 559), they "lack a comprehensive framework to understand *when to make significant investments in particular kinds of services*" (emphasis added). Specifically, "empirical research that explores the outcomes of a solution strategy" in B2B markets is lacking (Lilien 2016, p. 549). Thus, the objective of this article is to examine whether, when, and why solutions pay off.

Solutions represent innovative custom combinations of goods and services geared to outcomes relevant to B2B customers (Sawhney et al. 2004; Shankar et al. 2009; Ulaga and Reinartz 2011) and have four specific traits. They (1) are built on understanding customer requirements, (2) are customized to implement *customer activities* and/or *processes*, (3) take the form of an *output-based performance* contract that delivers on customer-specified metrics, and (4) provide post-deployment support (Tuli et al. 2007; Ulaga and Reinartz 2011).

Customer solutions differ from other goods–service combinations and reflect two critical characteristics. First, suppliers design end-to-end offers around customer activities and/or processes, not around supplier products. For example, the coatings supplier BASF offers automotive manufacturers a customer solution in which it operates and takes responsibility for

the entire paint shop in an automotive plant rather than just providing services related to the paint

itself. BASF cooperates closely with the customer, paint robot manufacturers, and other partners to seamlessly execute the entire process and deal with environmental compliance issues. The second critical characteristic of solutions is a fundamental shift of the vendor's value proposition. Rather than committing to deploying resources and performing activities, solutions providers take on the responsibility to achieve specific outcomes defined by the customer. For example, the supplier charges the carmaker per number of flawlessly painted cars instead of liters of coatings supplied. In this way, both parties contractually define the performance-based output.

A systematic review of prior research on customer solutions identifies three research gaps with significant theoretical and practical value. First, empirical research on the outcomes of service strategies has mostly aggregated across service types, leaving unaddressed the specific question of whether solutions affect firm performance differently from other service offerings. Thus, the critical issue of conducting "an empirical investigation to see if the financial benefits of moving towards solutions outweigh the risk" (Sawhney 2006, p. 378) still remains to be researched. Second, only limited established knowledge exists on how solutions' performance is contingent on firm capabilities and industry characteristics. Third, conceptual research does not delve into the mechanisms by which solutions affect performance.

To address these gaps, we combine in-depth theory-in-use interviews among senior executives with a quantitative study, integrating primary data from senior executives with archival data on manufacturers' financial performance and industry-level competition. We draw on resource-based theory (RBT) of the firm and transaction cost economics (TCE) as theoretical bases, supplemented with insights from theory-in-use interviews (Bendapudi and Leone 2002), to examine two research questions: (1) What is the relationship between a firm's customer solutions offering and profitability? and (2) Under what firm and industry conditions is the impact of customer solutions on firm performance attenuated or enhanced?

We offer three important research contributions. First, to the best of our knowledge, our study is the first to empirically examine whether there is financial benefit in offering solutions in B2B markets on top of other services (Ulaga and Reinartz 2011). Despite the strong managerial interest in selling solutions in business markets and the growing number of articles in the business press touting their benefits, manufacturers report a significant challenge in turning a profit with these offerings (Johansson et al. 2003). We find that solutions result in increased return on sales (ROS). The estimated ROS growth is 2.45 percentage points, equal to a 44% increase for our sample. Our results are relevant for B2B managers to justify the contribution of significant investments in solutions offerings to senior management (Reibstein et al. 2009).

Second, the findings on the contingency effects ("when") show that firm- and industrylevel moderators such as sales capability, technology intensity, and buyer power moderate the link between solutions and profitability. This helps explain reports of mixed success of solutions offerings (Johansson et al. 2003) and cautions against the overly simplistic view of solutions as a universal route to gaining competitive advantage in all market conditions. Our findings confirm the RBT perspective that the payoff from solutions is conditional on specific capabilities and that solutions are more effective in certain markets. Thus, the contingency analysis helps identify the boundary conditions and establishes the range of the theory (Whetten 1989).

Third, we extend the nomological net of extant theory on customer solutions in B2B marketing and marketing strategy by elaborating on the underlying mechanisms that link solutions to financial outcomes—namely, cost-efficiency and customer retention (MacInnis 2011; Yadav 2010). We do so by drawing on the intrinsic differences between solutions and other service offerings. By shedding light on the mechanisms, the study helps B2B managers

better understand the implications of moving toward solutions and how to enhance solutions' outcomes.

Research on service strategy outcomes and customer solutions

Although manufacturing firms increasingly offer services and solutions, academic research on these domains has been relatively recent. Table 1 summarizes research on performance outcomes of service strategies. Fang et al. (2008) and Suarez et al. (2013) find that manufacturing firms need to grow their service business to at least 20%–50% of revenues for a positive impact on financial performance. In turn, Josephson et al. (2015) report that service growth increases idiosyncratic risk. Dotzel et al. (2013) focus on business-to-consumer (B2C) services and find that people-enabled and electronic services affect firm value in different ways. Eggert et al. (2014) and Antioco et al. (2008) distinguish between the broad categories of services supporting the product and services supporting the client and find that both affect firm performance differently. Other studies suggest that the breadth and depth of a service portfolio (i.e., the number and type of services) lead to growth in sales and profits (Antioco et al. 2008; Homburg et al. 2002). These studies also find that service strategies' financial impact is dependent on market characteristics and firm resources. The majority of empirical studies aggregate across various types of service offerings. As such, they do not distinguish solutions from other services. Yet the most critical question for B2B managers today is *which types* of services to offer (e.g., solutions vs. other services), rather than *whether* to offer (more) services (Cusumano et al. 2015; Lilien 2016).

Research specifically investigating solutions is mostly conceptual and qualitative (see Table 2). Tuli et al. (2007) define solutions as a relational process requiring both supplier- and customer-driven factors to succeed. Ulaga and Reinartz (2011) develop a typology of service

offerings in which solutions represent one of four fundamental goods–service combinations in B2B markets. Cusumano et al. (2015) develop a similar typology of services for B2C and B2B markets. Conceptual research identifies a set of customer- and firm-related factors that affect solution success (Friend and Malshe 2016; Mcdonald et al. 2016; Tuli et al. 2007; Ulaga and Reinartz 2011). Yet, despite the conceptual insights into the nature of customer solutions, a systematic empirical examination of the financial performance outcomes of selling solutions still represents a key gap in the literature. Moreover, the majority of studies do not explore the role of contextual variables, which serves as a research opportunity to create insights into the boundary conditions of a solutions strategy.

----------Insert Tables 1 and 2 about here----------

Theory and hypotheses

Fig. 1 presents the conceptual model. We draw primarily on the RBT of the firm as the theoretical foundation for our research because solutions leverage providers' capabilities. We also draw on TCE because solutions involve high levels of transaction-specific investments and risk transfer for providers, which RBT does not address (Kozlenkova et al. 2013). We complement these theoretical lenses by employing a discovery-oriented, theory-in-use approach to build the conceptual model and develop the hypotheses for two reasons (Zaltmann et al. 1982). First, it provides richer texture to help explain the costs and benefits of offering solutions, enriching the conceptual explanations and developing organic theory (Challagalla et al. 2009; Kohli 2009; Rust 2006). Second, it supplements the theoretical view with managerial relevance, which is especially valuable given the sparseness of extant literature (Tuli et al. 2007).

----------Insert Figure 1 about here----------

We interviewed senior executives from a cross-section of functions in 22 firms, covering

a diverse range of firm sizes and industries. To allow for broader sampling of manufacturers with different experiences, we drew from firms that had already implemented solutions strategies and others that were transitioning to more complex service offerings. Our interviews focused on understanding the mechanisms behind performance outcomes of solutions. Interviews lasted 90 minutes on average and were audiotaped and transcribed verbatim. In analyzing the data, we employed open, axial, and selective coding to identify solutions' performance outcomes. Table 3 provides illustrative interview quotes for each hypothesis.

----------Insert Table 3 about here----------

Customer solutions and firm performance

Building on the theoretical lenses of RBT and TCE, we identify two opposing mechanisms expected to underlie the main effect of solutions offerings on firms' profitability growth: *cost-efficiency* and *customer retention*. We define cost-efficiency as *the extent to which manufacturers are able to manage the costs of providing a service offering*. Retention reflects *manufacturers' ability to prevent their customers from switching to the competition*. We expect solutions offerings to affect firm-level profitability for two reasons. First, as most firms offer just one or two solutions, these are important for revenues and should affect firm-level profits noticeably. Second, because (1) solutions cannibalize previous product and service revenues and (2) assets are shared among the product, services, and solutions business, examining solutions' profit in isolation would not be meaningful. We develop two competing hypotheses.

Reduced cost-efficiency. TCE-based arguments suggest that solutions offerings reduce firm profitability. By their nature, solutions offerings involve (1) a high degree of specific investments by providers and (2) risk transfer to providers, potentially reducing profitability in several ways, First, because solutions are customized, the *investments made are highly customerspecific (idiosyncratic).* These investments can be exploited opportunistically by buyers,

engendering uncertainty and elevating transaction costs. This negative impact on costs is exacerbated by the long-term duration of the solution delivery, increasing the risk of opportunistic behavior by the customer and thus hurting profitability (Galbraith 2002; Johansson et al. 2003; Sawhney 2006). As a case in point, an industrial gas supplier that we interviewed reported that he needed to invest in on-site installations to deliver a "total gas and chemicals management solution" to semi-conductor manufacturers. Likewise, coatings manufacturers must make significant non-retrievable investments when taking on responsibility of automotive customers' paint shop as part of a solutions offering. In addition, with these customer-specific investments, solutions are likely to provide lower scale economies than other service offerings, thus reducing cost-efficiency and profitability.

Second, as outcome-based promises to customers, solutions involve a transfer of risk from buyers to sellers. However, the delivery of the outcome is not exclusively in the hands of the provider but also depends on the behavior of customers (i.e., potential moral hazard) as well as on hidden characteristics of their businesses (i.e., potential adverse selection), resulting in *uncertainty of outcomes*. The provider needs to invest in screening, monitoring, and contracting to mitigate the information asymmetry and opportunism, reducing the cost-efficiency of the solution (Galbraith 2002). Furthermore, some solution providers (e.g., key interfacing vendors of multi-component/multi-vendor solutions) even take on the risk of the performance of the partners with whom they work (Johansson et al. 2003; Macdonald et al. 2016). Failure to account for the consequences of transferred risk may hurt cost-efficiency, negatively affecting the profitability of the solutions offering.

Taken together, the TCE explanation suggests that the elevated exposure to opportunism, stemming from specific investments made for solutions customers, and uncertainty caused by risk transfer can increase search, information, contracting, and enforcement costs (Kozlenkova

et al. 2013; Rindfleisch and Heide 1997), lowering cost-efficiency of the solution and ultimately leading to reduced firm profitability. Formally,

H1a: Solutions offerings reduce firm profitability growth.

Enhanced retention. In contrast, the RBT predicts that customer solutions offerings enhance profitability by enabling firms to attain a sustainable competitive advantage. Extant conceptual research on customer solutions indicates that to offer solutions, manufacturers must leverage unique resources or capabilities (e.g., customer knowledge, understanding of customer requirements and outcomes) (Macdonald et al. 2016; Tuli et al. 2007; Ulaga and Reinartz 2011). As we explain, these resources satisfy the VRIO (valuable, rare, imperfectly imitable, and organizationally exploitable) criteria and thus enable a sustainable competitive advantage. First, these resources are valuable because they enable manufacturers to implement a strategy that enhances the value delivered to customers, enhancing their likelihood to sign long-term contracts and willingness to pay, thus increasing profitability (Palmatier et al. 2007; Worm and Srivastava 2014).

Second, solutions-specific capabilities are rare. Manufacturers are usually focused on capabilities for product design, efficient production, and feature-based product sales. Thus, solutions providers' competitors often lack the resources for solutions (Ulaga and Reinartz 2011). For example, an industrial equipment manufacturer had deployed thousands of electricity meters in customers' commercial buildings. The manager we interviewed described how the supplier could leverage the unique energy consumption data obtained from these meters to develop intimate knowledge about customers' energy usage. With these insights, the firm was able to offer an energy management solution that was difficult to replicate by competitors, which lacked access to the data and thus could not derive this knowledge.

Third, solutions-specific capabilities are difficult to imitate. The significant time, effort, co-specialized knowledge, and financial resources it takes to acquire the capabilities required for their firms to be "ready" to deliver solutions provide the time compression dis-economies and resource inter-connectedness necessary to serve as barriers to imitation for competitors (Fang et al. 2008; Srivastava et al. 2001; Srivastava et al. 1998). Importantly, solutions providers can further build and expand these resources throughout the delivery of solutions by gaining in-depth insights into customers' needs and processes, and ways of serving them, adding to inimitability.

Fourth, solution-specific capabilities can be exploited by a manufacturer's organization via solutions. This is because manufacturers typically already have complementary, nonsolution-specific resources, such as product expertise, customer relationships, and firm recognition, required for solutions (Ulaga and Reinartz 2011).

In summary, the RBT perspective suggests that because they leverage VRIO resources, solutions offerings create a sustainable competitive advantage for providers, making competitive offers less attractive, helping retain customers, and thereby enhancing firms' ability to attain higher profitability. Formally,

H1b: Solutions offerings increase firm profitability growth.

Given these competing predictions (based on TCE and RBT), the overall direction of the direct effect is unclear and appears contingent on moderators affecting the two mechanisms' relative magnitude. Consequently, we explore the roles of firm- and industry-level moderators on these mechanisms' relative magnitude to help identify the conditional direction of the impact of a solutions offering through their effect on cost-efficiency, customer retention, and, ultimately, firm profitability growth.

Firm-level moderator hypotheses

According to the RBT perspective, solutions leverage VRIO resources. We draw on the resource-based approach taken by the conceptual literature on customer solutions (e.g., Tuli et al. 2007; Ulaga and Reinartz 2011)[1] and our theory-in-use interviews to identify two VRIO firmlevel capabilities: sales capability and value creation know-how. The conceptual literature in solutions and the organic theory provided by the theory-in-use interviews (see Table 3) helped justify the choice of these capabilities as firm-level moderators. We chose these two capabilities over others mentioned in the literature because they represent "meta-capabilities" that are required across firms and industries to ensure that manufacturers "sell solutions right" and "sell the right solutions."

Moderating role of sales capability. Sales capability refers to the knowledge and skills of the sales force in identifying the appropriate decision makers and providing proficient justification for the solutions offering. It is about selling the solutions offering right. Ulaga and Reinartz (2011) emphasize the need for sales capability, which is critical to profitability of solutions because it both mitigates the cost-inefficiencies of solutions (TCE perspective; see H1a) and enhances the retention effect of solutions (RBT perspective; see H1b) by buttressing the VRIO criteria.

First, sales capability reduces solutions-induced cost-inefficiencies from specific investments and risk transfer. When solutions contracts are negotiated with an understanding of the customer's operational and political landscape, they will more effectively align buyers' and providers' interests to limit exposure to opportunistic behaviors and safeguard specific

[1] Ulaga and Reinartz (2011) and Tuli et al. (2007) primarily draw on a capabilities lens in line with the RBT of the firm.

investments. For example, a well-connected sales force, by means of political counseling with the customer (Tuli et al. 2007), will anticipate and minimize organizational resistance to solutions-induced change on the customer side (Ettlie and Reza 1992). Furthermore, a capable sales force can minimize uncertainty and information asymmetry in solutions selling; strong relationships with the right decision makers in the customer firm help the sales force gain access to private information about the customer's operating and political environment and its business challenges (Cannon and Homburg 2001; Kozlenkova et al. 2013; Tuli et al. 2010).

Second, sales capability is a VRIO resource that providers can leverage via solutions to retain customers. Sales capability is valuable because it helps overcome requirements ambiguity, which poses tremendous challenges for solutions providers. Customers often find it difficult to articulate their requirements for customized solutions (Dhar et al. 2004). To overcome such ambiguity, a deep understanding of the customer's requirements and its operational and political landscape is necessary (Tuli et al. 2007). This calls for strong sales force capabilities of the supplier (Day 1994). Solutions designed through this richer knowledge better meet the customer's requirements, are customized and better integrated with the customer's environment, and ultimately create superior value for customers.

Sales capability for solutions is also rare, inimitable, and organizationally exploitable. Acquiring tacit and complex knowledge about buying firms' organizational processes requires interaction with knowledgeable, senior decision makers (Uzzi and Lancaster 2003; Wuyts et al. 2004). Furthermore, solutions require selling to senior managers based on total cost of ownership, contrasting sharply with typical hardware sales (Ulaga and Loveland 2014). Competitors lacking sales capability would need to invest heavily in their sales force, retraining or even replacing their sales staff. In general, B2B manufacturers typically have the customer relationships and deep product expertise required to exploit sales capability via solutions. In

summary, sales capability helps reduce cost-inefficiencies from solutions and, as a VRIO resource, can be leveraged via solutions to increase customer retention, leading to profitability growth of the supplier and/or preventing erosion of profitability. Formally,

> H2: Sales capability positively moderates the relationship between solutions offerings and firm profitability growth.

Moderating role of value creation know-how. Value creation know-how ensures that firms market the right solutions offering. Value creation know-how is the supplier management's ability to understand how it can (1) help enhance customers' business and (2) create or enhance perceived value better than the competition. The former requires detailed knowledge of customers' business processes and marketplace challenges, and the latter builds on an intimate understanding of how customers evaluate competing alternatives.[2] This capability involves the entire management team, which decides on a provider's overall solutions offering, rather than the sales force, which sells to individual customers. Ulaga and Reinartz (2010) and Tuli et al. (2007) contend that the ability to succeed with solutions hinges on the ability to create superior value beyond existing offerings. Mcdonald et al. (2016) find that solutions providers require very different approaches to market research, highlighting the need to understand how to improve the firm's business by creating customer-perceived value more effectively than competition. An executive emphasized the criticality of frequent exchange between senior management and customers to build value creation know-how for solutions:

> I mean our best solutions, actually, often come from the customer.… We are a company, where even the senior, senior management and even the CEO, they sit, on a regular basis, with normal ordinary salespeople, in their cars, going to customers, talking to customers, seeing how the business on the floor is running,

[2] These two facets are not always correlated because value created tends to be intangible and reflected in "peace of mind," enabling customers to focus on their core business (Ulaga and Eggert 2006). In addition, in our interviews, managers noted that they had difficulties in assessing customers' value perceptions of their solutions offerings. They found it even more difficult to benchmark their own offers against the competition and to attain insights into how customers compared next-best alternatives.

> seeing what the demands are, so that they can make sure that whatever they decide up on top, is somehow relevant [to the customer]. (Member, board of management, construction tools manufacturer)

As a key resource, value creation know-how satisfies the VRIO criteria. First, it is valuable; providers can leverage it to invest in solutions that create value for customers. Getting ready to offer solutions often requires organizational change, which is difficult and costly (Shin et al. 2012; Ye et al. 2007) because new skills, processes, procedures, and reward structures are necessary to coordinate different functions (Tuli et al. 2007). Firms with strong know-how of customers' business can focus resources on value-generating solutions with the potential to retain customers.

Value creation know-how is also rare among B2B manufacturers, difficult to imitate, and exploitable. Developing value creation know-how requires a significant shift in management's business logic from competing on price reductions, excellence in product manufacturing, and tangible product features to maximizing the value created by the solutions offer (Srivastava et al. 1999; Ulaga and Eggert 2006); it also requires changing from arm's-length negotiations and price haggling to value co-creation (Gupta and Zeithaml 2006; Tuli et al. 2010). Competing suppliers typically lack the deep insights into customers' business processes and require significant time and effort to catch up. Ultimately, B2B manufacturers are able to exploit value creation know-how, using their product expertise to implement solutions specified with this capability. Therefore, solutions offerings leveraging value creation know-how, a VRIO resource, yield a stronger retention-based positive effect on profitability growth. Thus:

> H3: Value creation know-how positively moderates the relationship between solutions offerings and firm profitability growth.

Industry-level moderator hypotheses

Strategy research has long contended that no strategy is universally superior and

independent of the environmental context, calling for a contingency view to understand the industry settings in which solutions potentially enhance profitability (Lawrence and Lorsch 1967; Venkatraman 1989). The RBT posits that the value a strategy creates is dependent on the market environment (Amit and Schoemaker 1993; Eisenhardt and Martin 2000). Building on the conceptual literature and our qualitative interviews, we identify technology intensity (Bahadir et al. 2008) and buyer power in the industry (Porter 1980) as industry-level moderators. We chose these moderators for their potential to alter the relative magnitude of the TCE-based and RBT mechanisms. That is, these moderators not only serve to identify the boundary conditions of "when" to offer solutions but also help identify the direction of the effect of solutions on firm performance.

Moderating effect of technology intensity. TCE indicates that transaction cost increases with specific investments and growing uncertainty, both of which are associated with *technology intensity of the industry* (Ghosh and John 2005; Kozlenkova et al. 2013). As such, technology intensity as a moderator is particularly pertinent to the study context. It reflects the degree to which manufacturers in an industry compete on technological innovation (Bahadir et al. 2008), making it different from the common notion of equating technology with information technology and software. We suggest that an increase in technology intensity strengthens the undesirable TCE-based mechanisms through which solutions affect financial performance while attenuating the effect of the desirable retention-based mechanism.

First, solutions offerings in technology-intensive industries likely require more extensive customer-specific investment in development, adaptation, and testing. This aggravates opportunism and increases safeguarding cost. Similarly, because technology intensity brings technological uncertainty (Ghosh et al. 2006), more risk is transferred to solutions providers (e.g., outcomes promised could depend on future technological developments). Furthermore,

technology-intensive solutions are inherently more complex because of the greater number of parties involved (e.g., supplier and customer departments, certification agencies). These factors add to potential opportunism.

Second, the retention effect (RBT) could be weakened in technology-intensive industries. The sustainable competitive advantage derived from solutions may diminish because the incremental differentiation offered by the solution will be less valuable given the multitude of alternative ways of differentiating technology-intensive products. Customers make technology buying decisions based on greater differentiation of (tangible) products, concerns about compatibility of technological standards, availability of upgrades for the installed base, and costs and risks involved in switching technologies or suppliers. In terms of the VRIO criteria, competitors can more easily substitute the value created by a focal provider's solution through well-differentiated goods-based offerings, so the incremental value provided by solutions will have a lower influence on buying decisions and, ultimately, customer retention (Barney 1991).

In summary, both the larger cost dis-economies of solutions in technology-intensive industries and the diminished power of solutions in providing a sustainable competitive advantage relative to technology-based differentiation limit the provider's profitability gain. Thus:

> H4: Industry technology intensity negatively moderates the relationship between solutions offerings and firm profitability growth.

Moderating effect of buyer power

Buyer power reflects buyers' negotiating and bargaining abilities relative to the suppliers' (Porter 1980). It represents a key competitive force for B2B manufacturers. Both academic and practitioner literature suggests that firms offer solutions to counter buyer power and capture better prices (Sawhney et al. 2004; Ulaga and Reinartz 2011). As an executive noted:

> [Ten] years ago, we were capable of pushing our products with the engineering team. Now, even if they love us, at the end of the day, it's a competitive tender [i.e., bid] and there is an erosion of price.… So people think "Okay, let's do 'services." Doing that, we will sleep with the customer, and we will diminish the power of the purchasing function and come back to really what we like: describing our solutions, and so on. (Executive vice president, strategic deployment and services division, automation electronics)

With few exceptions, B2B suppliers face increasing buyer power, as more buyers source globally and seek to reduce their supply base (Senn et al. 2013). Typically, powerful buyers multisource largely commoditized components to pit manufacturers against each other, negotiate prices downward, and ultimately reduce product manufacturer margins.[3] The sustainable competitive advantage obtained from solutions according to the VRIO criteria is greater when buyer power is high because the additional value provided by solutions is more difficult to imitate and substitute in a market in which buyers perceive (tangible) offers as differing mainly in price.

Solutions offer customization and integration to the customers' environment, creating greater value. Insights into customers' political landscapes enable solutions providers to design offerings that deliver on outcomes relevant to the customers. This ability to deliver on the metrics relevant to the customer differentiates the offering (Ulaga and Eggert 2006), which is particularly critical in industries with greater buyer power. Unlike commoditized offerings, customized solutions built through an understanding of customers and private information about operational needs cannot be easily globally sourced, nor can suppliers be pitted against each other, as all suppliers do not have the capabilities for solutions. Consequently, this ability to deliver superior, inimitable value in a solution enhances customer retention for the offering, thus countervailing the buyer power. Thus, even for customers with strong buying power, such

[3] On average, ROS, or operating profit margin, for the firms in our sample decreased by 1.24 percentage points in just two years. Against a base of an average margin of 6.1%, this represents a decrease in margin by 20%.

solutions providers then become more valuable, akin to strategic partners. In line with this expectation, in our interviews, executives mentioned that their solutions offerings were particularly effective in markets with large, powerful buyers. Viewing sellers as strategic partners leads to the immediate consequence that buyers must adopt a new non-price-based mindset when dealing with key solutions vendors. The expectation that a solutions offering (compared with a standardized offering) enhances customer retention, which in turn has a stronger effect on profitability growth under conditions of strong buyer power, leads to the following:

> H5: Buyer power in the industry positively moderates the relationship between solutions offerings and firm profitability growth.

Methodology

Data collection

We draw on three sources to build the data set for the study, combining survey data with archival measures of financial performance and industry characteristics. Using different data sources for the dependent and independent variables, we eliminated many of the concerns with common method variance in survey research (e.g., Homburg et al. 2012; Lindell and Whitney 2001). First, in the absence of accurate archival information on these variables, we collected measures of solutions offerings, the firm-level moderators (sales capability and value creation know-how), and the control service industrialization through a survey of senior executives in manufacturing companies in France and Germany. Two key challenges motivated our approach: (1) a review of firm websites and brochures indicated a lack of common understanding of what constitutes a customer solution, and (2) our qualitative research revealed that executives who were competent to report on solutions offerings carried a broad range of titles, making them difficult to identify. We addressed the first challenge by manually coding a detailed description

of the service offerings provided by informants on a newly developed scale and by supplementing these descriptions with archival information from firm websites (see the "Measures" section for the coding procedure). Informants selected and described a typical service offering that had sufficient time to affect their firms' performance. With the goal to measure whether a firm offered solutions or not, we instructed informants to select a customer solution if their firm marketed such an offering and, if not, to provide data on a different service offering. This approach encouraged informants to report on a service that captured their firms' current state of service development. As a validity check, a research assistant collected and coded data on the complete service portfolio of 25 firms that provided this information on their websites (using http://archive.org/). This check confirmed that our survey approach enabled us to reliably measure whether firms offered solutions. We addressed the second challenge by carefully screening informants through multiple telephone calls to each company, following Campbell's (1955) key informant approach. We identified 969 key decision makers. High competence ratings strengthened our confidence in informant quality.[4] After two reminders and a telephone follow-up, we received 258 completed questionnaires (response rate = 26.6%). We discarded 11 responses because of missing data and/or misspecification of the unit of analysis.

Second, to rule out common method bias, we collected archival financial data for the firms surveyed from the ORBIS database. Profitability measures were available for 175 of the observations. We compared the firms for which no archival financial data could be retrieved with the 175 firms in our final sample and found no significant differences in sales (p = .70), firm size (p = .66), service revenue percentage (p = .54), or service capabilities (p = .80). Third, to avoid the measurement error of industry-level variables self-reported by managers (Homburg et al.

[4] Informant involvement in marketing and selling the service offering was 5.9/7; informant knowledge about the service offering was 6.1/7.

2012), we collected secondary data on marketplace factors and competitive forces in each industry from Datamonitor Group profiles.

Measures

We manually coded the *solutions offering* described to ensure that we operationalized it consistently across firms. We coded it in two ways: (1) as a binary variable based on Ulaga and Reinartz's (2011) categorization of hybrid service offerings and (2) as a continuous measure, with ratings on a nine-item scale. For the binary measure, we coded process delegation services, which are equivalent to solutions offerings according to Ulaga and Reinartz (2011), as 1 and all other service offerings as 0. We coded the solutions offerings measure manually from the detailed verbal descriptions of the offerings. Two criteria were required for a service offering to be coded as a solution: (1) The value proposition of the service needed to be output-based, and (2) the offering needed to be oriented toward the customer's process. In addition, we crosschecked our classification using "six defining aspects" of customer solutions (see Ulaga and Reinartz 2011, p. 19). The coding procedure followed three steps. First, two members of the research team independently coded all offerings. Second, a doctoral student, not involved in the study, independently coded the offerings following the same protocol as the two researchers. Third, the three raters compared, discussed, and reconciled inconsistencies in coding outcomes. Three ambiguous cases were discarded.

For the continuous measure, we developed a nine-item scale that captures the degree to which an offering represents a solution, based on Tuli et al.'s (2007) and Ulaga and Reinartz's (2011) definitions (see Table 4). Pretesting the scale in a telephone survey with 37 B2B executives (coefficient $\alpha = .71$) indicated that they understood the terminology.[5] We then scored

[5] The telephone survey enabled us to conduct an additional validity check by asking respondents for the percentage of revenues generated from solutions for their firm or business unit. A correlation coefficient of .55 between service

the detailed verbal descriptions of the offering from executives in the survey (21 words on average) on the scale. We supplemented the descriptions with information on the services obtained from the suppliers' websites and web archives (http://archive.org/) to ensure high accuracy of ratings. Initially, one member of the research team and two doctoral students independently rated the service offerings. To resolve disagreements between coders' initial ratings, we had a fourth rater code the offering and also collected additional information from the Internet. An index of inter-rater agreement of .97 (James et al. 1984, 1993) indicates strong consistency among raters. Intra-class correlation coefficients (ICCs) also indicated high interrater reliability (average ICC = .82). The raters compared, discussed, and reconciled inconsistencies in ratings and discarded three ambiguous cases. To triangulate the rating, an assistant recoded 20 random offerings using information from web archives only. The correlation of the two measurements is .97, providing further evidence of their reliability. Our analysis reveals good scale properties (composite reliabilities, average variances extracted [AVEs], and coefficient alpha > .7; comparative fit index = .96; root mean square error of approximation = .06).

Because many B2B suppliers are privately owned, we focus our analysis on an accounting-based indicator of solutions vendors' financial performance—namely, profitability growth. We use profitability growth instead of the level of profitability for three reasons. First, it captures the change in financial performance for suppliers that offer solutions. Second, as the change or growth is relative to the firm's prior performance level, it allows comparing performance across firms and industries. Third, as a measure of change, it helps control for biases from time-invariant performance drivers. We operationalize profitability using ROS,

offerings' rating on the new solutions offering scale and the self-reported percentage of solution sales provides additional face validity for our measure.

which is an important financial ratio for marketing managers (Mintz and Currim 2013). We measure *supplier profitability growth* as the increase in a supplier's ROS between two points in time, two years before the survey and at the time of the survey, using ORBIS data (Table 4).[6]

For the development of the reflective three-item survey scale for the firm-level moderator *sales capability*, we draw from Tuli et al.'s (2007) and Ulaga and Reinartz's (2011) discussion of sales capabilities for solutions. We measure *value creation know-how* as a formative construct (Diamantopoulos and Winklhofer 2001) that captures two key facets: suppliers' ability to understand (1) how they can help enhance customers' businesses and (2) how they can create or enhance perceived value in the eyes of customers better than competitors.[7] We measure *industry technology intensity* as the average ratio of R&D expenditures to revenues across the firms with the same four-digit Standard Industrial Classification code (Bahadir et al. 2008). Finally, we obtain the *buyer power* variable from Datamonitor industry profiles, reporting on a set of competitive forces in a section on competitive landscape (Porter 1980). A doctoral student matched each of the 59 industries in the sample with their corresponding report and recoded the verbal ratings from the reports on a seven-point scale (e.g., 1 = "buyer power is very weak," 7 = "buyer power is very strong"; see Table 4; Worm and Srivastava 2014).

We control for *service industrialization*, or the extent to which firms take a "productionline approach" to services (Ulaga and Reinartz 2011, p. 14), as a higher-order construct (see Table 4). Tuli et al. (2007) suggest that an approach of focusing on efficiency, modularity, and standardization is negatively related to solutions that require customization. The *firm size* control is the logged number of employees. In line with previous marketing strategy

[6] Customer solutions offerings represent a medium- to long-term-oriented strategy, so we expect the outcomes of customer solutions offerings to occur over an extended period and use two-year growth.
[7] See Footnote 2 for the rationale behind the formative operationalization.

research (Narver and Slater 1990), we control for the potential influence of competitive forces on supplier financial performance using four measures obtained from Datamonitor: *rivalry*, *threat of substitutes*, *product differentiation in industry*, and *supplier power* (Porter 1980). The models using the binary measure of solutions offerings further include dummy variables for the other three types of hybrid offerings (Ulaga and Reinartz 2011).

As discussed subsequently, we address endogeneity by controlling for the firm's decision to introduce a solutions offering. For the selection model, we obtain four additional variables as *potential antecedents of solutions strategies*: competitive intensity in the supplier industry (log value of the change in Herfindahl concentration indices at times t and t – 1; Tuli et al. 2010), margin pressure in the supplier industry at the time of the introduction of the service (average difference in ROS between year t – 3 and year t – 2 among firms with the same four-digit Standard Industrial Classification code), customers' switching costs and product differentiation (both at the supplier-industry level; Datamonitor), and a supplier's competitive position in the product market underlying the service offering (two-item survey measure).

----------Insert Table 4 about here----------

Scale validation

As Tables 4 and 5 show, the reflective constructs have good scale properties. All coefficient alpha values and composite reliabilities are greater than .70, and all AVEs exceed .60 (Bagozzi and Yi 1988). The goodness-of-fit statistics indicate good fit (comparative fit index = .96, root mean square error of approximation = .06).

----------Insert Table 5 about here----------

First, the Fornell and Larcker (1981) test indicates discriminant validity. Second, we conducted chi-square difference tests for each pair of survey constructs (Bagozzi et al. 1991) indicating discriminant validity. For the formative scale of value creation know-how, we

followed Diamantopoulos and Winklhofer's (2001) guidelines to establish validity.[8] Extensive additional tests confirmed key informant accuracy, sample representativeness, and absence of a non-response bias (see Web Appendix for details).

Analysis procedure and results

Model specification

We estimate the following model using an ordinary least squares estimator:

(1) Firm profitability (ROS) growth = γ_0 + γ_1 solutions offering + γ_2 sales capability + γ_3 value creation know-how + γ_4 technology intensity of industry + γ_5 buyer power in industry + γ_6 (sales capability × solutions offering) + γ_7 (value creation know-how × solutions offering) + γ_8 (technology intensity of industry × solutions offering) + γ_9 (buyer power in industry × solutions offering) + γ_{10} service industrialization + γ_{11} size + γ_{12} rivalry + γ_{13} threat of substitutes + γ_{14} product differentiation + γ_{15} supplier power + γ_{16} Mills lambda + $_{\gamma 17\text{-}23}$ industry dummy + ε.

Because multiple business units of a few firms are included in the sample, we use clustered robust standard errors (Wooldridge 2003). We follow standard guidelines for moderated regression analysis, such as mean-centering all independent variables to create the interaction terms (Cohen et al. 2003).

A firm's decision to offer customer solutions is a choice variable that may be endogenously determined. Failing to account for endogeneity in firm performance could lead to potentially mis-specified and biased results. Instrumental variables are one approach to address endogeneity. The Heckman econometric two-step procedure represents an alternative approach (Greene 2003). We use the two-step Heckman procedure. For the first stage, we adopted

[8] First, for indicator and content specification, we carefully considered the two facets of the construct: (1) understanding how to enhance a customer's business and (2) understanding how to enhance or create value better

Merton's (1957) motivation–ability framework (see Boulding and Staelin 1995; Grewal et al. 2001) to identify four industry environment motivators and two firm-level ability variables as predictors of a solutions offering. We first estimate a Probit model using maximum likelihood to assess which of the six variables influence the firms' decision to offer customer solutions (Bharadwaj et al. 2007). We then treat the Mills lambda (or inverse Mills ratio) as a control variable in the second stage of our model (Eq. 1).

than competition. Second, for indicator collinearity, the average variance inflation factor was 1.18, well below the critical cutoff of 10. Third, value creation know-how had a positive and significant correlation with ROS growth, indicating nomological validity.

Results

Table 6 reports the results for the selection and profitability growth models. The profitability growth models in Panel B explain a significant amount of the variance in the archival ROS measure (R^2 = .39/.40). Furthermore, the hierarchical regression analysis indicates that the incremental variance explained by the moderating effects of solutions is significant (ΔR^2 = .07/.07, F = 16.31/18.24, $p < .05$). Variance inflation factors (VIFs) are substantially below the value of 10 (maximum VIF = 1.55), indicating that multicollinearity is not an issue (Neter et al. 1995).

----------Insert Table 6 about here----------

We find support for the positive main effect of a solutions offering on firm profitability formulated in H1b using both the binary and continuous solutions offering measure (γ = .19/.14, $p < .01/.05$; Table 6, Panel B, first and second column, respectively). Thus, H1a is not supported. In effect, we find that, on average, solutions offerings are positively associated with firm performance. With regard to the moderation hypotheses, we find support for H2—namely, the role of sales capability as a moderator of solutions offering (γ = .11/.11, $p < .05$). In contrast,

though directionally correct, we do not find statistically significant support for the moderating role of value creation know-how (γ = .05/.07, *n.s.*); thus, H3 is not supported.

The analysis confirms the negative interaction effects of an industry's technology intensity and solutions offering on firm profitability growth (γ = –.10/–.11, $p < .05$), in support of H4. We also find support for H5 (γ = .12/.12, $p < .01$); the effect of a solutions offering on profitability growth is more positive when buyer power is strong in an industry. The results for the main effects of the control variables are consistent with expectations. Both rivalry and firm size hurt profits. Additional robustness checks using alternative dependent variable operationalizations, controls, estimation approaches, and model specifications provide consistent results (see Web Appendix).

Supplementary mediation analyses

We conducted supplementary mediation tests to assess the theoretical mechanisms that account for the relationship between solutions and profitability. In developing the competing paths for the outcomes of solutions, we put forth two mediating mechanisms that account for this effect: cost-efficiency of solutions provision and customer retention. We argue that while solutions offerings enhance financial performance by retaining customers (because over time they become increasingly difficult to replicate for competitors), they also have the downside of being less cost-efficient because of their potential for moral hazard, risk transfer, opportunism, and dis-economies of scale due to customization. Table 7 shows the mediation test using Hayes's (2013) PROCESS procedure. As mediators, we use a single-item survey scale for retention and a two-item scale for cost-efficiency, both gathered through the survey. In line with expectations, solutions offerings affect the two mediators asymmetrically in the first stage of the mediated model. Similarly, the indirect effect of a solutions offering on profitability is positive and significant for the mediator customer retention (d = .41/.10, $p < .05$) but negative and significant

for the mediator cost-efficiency of solutions provision (d = –.56/–.09, $p < .05$). The direct effect of a solutions offering on performance is non-significant, suggesting full mediation. This significant mediation test provides additional evidence of the two mechanisms, which also surfaced in our qualitative interviews with executives.

----------Insert Table 7 about here----------

We further explored the mechanisms behind the moderating effects using moderated mediation. We tested for moderation of the two-mediator model (see previous paragraph) using Hayes's (2014) index of moderated mediation. As expected, high levels of sales capability alleviate the indirect (negative) effect of a solutions offering on profitability through costefficiency of solutions provision ($p < .05$, confidence interval excludes zero). For the moderator value creation know-how, we found no significant effect of moderated mediation (confidence interval includes zero). The (positive) indirect effect of a solutions offering on profitability through customer retention is attenuated under high levels of technology intensity, as suggested in our theory development ($p < .05$, confidence interval). Ultimately, we find no significant mediated moderation for the moderator buyer power. With the relatively small sample and regression coefficient size, and thus the limited information available to construct the confidence intervals for moderated mediation, we expected moderate levels of empirical power (Preacher et al. 2007).[9] That we found moderated mediation for two of the three significant interactions from our main model provides further support for the mechanisms developed in our theory.

[9] In their simulation study, Preacher et al. (2007) estimate the empirical power of a moderated mediation model containing one mediator and one moderator at approximately .34 for a regression coefficient of .14 and a sample size of 200 when using bootstrapping. That is, the probability of correctly detecting a moderated mediation when it actually exists is 34% under these conditions. Our sample size is only 175, and our model has two mediators.

Discussion

Research contributions: financial impact of solutions offerings

Executives in many B2B manufacturing firms question whether they should venture into solutions, and managerially oriented literature has identified customer solutions as the next source of competitive advantage (Sawhney et al. 2004; Shankar et al. 2009). Prior research (Reibstein et al. 2009), the Marketing Science Institute (2010), and the Institute for the Study of Business Markets (Grewal et al. 2015; Wiersema 2012) have all repeatedly called for research on customer solutions. In particular, guidance is lacking on when manufacturers should invest in which type of service (Cusumano et al. 2015), specifically whether and when solutions offerings pay off (Lilien 2016). However, prior research on the performance outcomes of service transition strategies has not compared the financial impact of solutions with that of other types of service offerings, treating all service offerings alike. We extend this stream of research by showing that not all types of services are created equal. Previous research on B2B solutions, in turn, has been predominantly conceptual and has not examined financial performance outcomes (Mcdonald et al. 2016; Tuli et al. 2007; Ulaga and Reinartz 2011).

Against this backdrop, we contribute to marketing theory by presenting the first systematic empirical examination of *whether*, *when*, and *why* customer solutions offerings affect financial performance (i.e., return) of B2B manufacturers differently from situations in which firms offer just other types of services. We draw on the RBT and TCE literature as well as supplementary theory-in-use data from managers. We find that, on average, enriching the service portfolio by offering solutions helps grow financial returns ("whether"). Solutions offerings affect firm performance through two asymmetric theoretical mechanisms: cost-efficiency and customer retention ("why"). Furthermore, we develop expectations of how firm-level capabilities

and environmental characteristics moderate these mechanisms to understand the contingency of firm performance outcomes ("when").

We find that solutions offerings enhance profits by increasing customer retention, consistent with the RBT. As a result of their defining characteristics (i.e., outcome-based value proposition, risk transfer, and customization), solutions require providers to leverage VRIO market-based assets to create superior value for customers, enhancing profitability. To understand "when solutions are appropriate," we test for moderation of the main effect of solutions on profitability by two key capabilities that solutions providers leverage according to the conceptual solutions literature and our qualitative interviews. First, solutions' impact on profitability is amplified when the provider has strong sales capability (simple slope significant, $\gamma = 1.76$, $p < .01$, Fig. 2, Panel A). Second, in Panel B, although the interaction term between value creation know-how and solutions offerings was not significant, the significant simple slope ($\gamma = 1.53$, $p < .01$) provides evidence that solutions leverage value creation know-how. These results provide support for the RBT moderator hypotheses. Furthermore, the impact of solutions on profitability growth is significant only when buyer power is high ($\gamma = 1.84$, $p < .001$, Panel D). This result confirms the RBT explanation that, by enhancing retention, solutions are more valuable when buyers are powerful (e.g., Shankar et al. 2009).

In contrast, solutions offerings decrease profitability by aggravating cost-based diseconomies, in line with TCE. The output-based value proposition of solutions increases behavioral and environmental uncertainty and risk transfer, and solutions' customization implies higher relationship-specific idiosyncratic investments of solutions providers. The resulting increased search, information, contracting, and enforcement costs, in conjunction with lack of economies of scale, add to transaction cost. We successfully probe this mechanism by using the moderator industry technology intensity; solutions have a more positive impact on profitability

growth in low-technology-intensive industries, characterized by lower uncertainty and specific investments for providers (simple slope $\gamma = 1.78$, $p < .01$, Fig. 2, Panel C). This finding is also in line with the RBT notion that in high-technology industries, solutions offerings could provide less incremental differentiation than technology-based differentiation, reducing the retentionbased benefits. This may explain why many suppliers of specialty products have been slow to venture into solutions and, instead, still focus on engineering superior product features.

Moreover, the results suggest that RBT and TCE serve as complementary explanations for "when" and "why" solutions pay off. By supplementing extant knowledge, the theory-in-use method helps build and enrich theory and choose practically relevant moderators, thus addressing calls for organic theory in marketing (Kohli 2009; Rust 2006). We identify two firmlevel and two industry-level moderators that determine whether a solutions offering likely helps or hurts a firm's financial performance. Neglect of these contingencies may explain why prior managerial studies report mixed financial outcomes of solutions strategies (Johansson et al. 2003). Thus, our study contributes to the emerging contingency perspective on the marketing– finance interface (Reibstein et al. 2009).

----------Insert Figure 2 about here----------

Managerial implications

This research provides important novel insights for researchers about *whether*, *why*, and *when* firms' investments in solutions offerings pay off. Yet the results also pinpoint managerial issues that executives must be cognizant of and address before venturing "head down" into a solutions strategy. Table 8 identifies four main areas of managerial concern highlighted by our research and provides guidelines for how managers can address these challenges to successfully offer solutions.

----------Insert Table 8 about here----------

To master customer solutions, companies need to address all four areas. First, executives must build a business case for customer solutions and communicate the potential gains of an approximately 44% higher ROS from solutions to key organizational stakeholders (i.e., addressing the question "whether" solutions enhance profitability) (absolute ROS growth = 2.45 percentage points when sales capability, value creation know-how, and buyer power = mean + .5 SD, technology intensity = mean – .5 SD; sample mean ROS = 5.6%). Yet, though beneficial in general, solutions are not the universal silver bullet they are often expected to be—they are not for every industry and firm. Second, managers must take stock of the potential negative and positive outcomes of customer solutions (i.e., addressing the question of "why" solutions affect profitability). On the one hand, they must account for the potentially reduced cost-efficiency caused by uncertainty about the behavior of customers and partners, risk transferred to the solutions provider, or lack of economies of scale. On the other hand, solutions can enhance firm profits by retaining customers by leveraging customer-specific knowledge accumulated by the provider, unique skills, and long-term contracts. Third, firms need to critically assess whether their respective industry is favorable to solutions (i.e., addressing the question of "when" solutions enhance profitability). Industry contexts in which the undesirable effect of reduced cost-efficiency is exacerbated due to factors such as complex, expensive, and risky technologies are less suitable for solutions. Conversely, in industries in which strong benefits are to be expected from locking in customers via solutions (e.g., because they aid in dealing with powerful customers and offer an alternative to unavailable technology-based differentiation), solutions carry promise. Fourth, executives must ensure that their firm has the critical skills required for solutions. For example, providers need to be able to offer the right solutions (have the requisite value creation know-how) and to sell solutions right (have the sales capability). Our findings suggest that firms that address these imperatives in parallel are those that reap the highest

financial rewards from customer solutions. That such a complex understanding and integrated set of skills are necessary makes them less easily imitable by competitors.

Limitations and future research directions

This research has several limitations that offer fruitful avenues for further research. First, although we took care to address the concerns with endogeneity, common method variance, variable operationalization, and omitted variables, the results are prone to the general limitations of survey research, such as informant bias and perceptual measures. We relied on singleinformant data, but we also collected data from a second informant for a subset of companies.

High inter-rater reliabilities for the multiple informant data increased our confidence that the single-informant measures are reliable.

Second, this study investigates the outcome of solutions offerings at the firm level. The strategy–performance relationship is often evaluated at this unit of analysis, as doing so represents a conservative statistical test, and data availability is much better at the firm level.[10] However, further research could examine the performance impact of solutions at the customeraccount level or at the level of individual offerings. Such a study could, for example, examine optimal segmentation and targeting strategies for manufacturers selling both solutions and regular services to distinct customer groups.

Third, we collected the independent variables in a single period, and thus the study capitalizes only on cross-sectional variation. Further research could examine the solutions offering–performance process longitudinally. Such a study could identify the evolution of solutions offerings and performance. It could also provide richer insights into the payback period

[10] Profit data at the customer level, on services versus solutions offering lines, or at the individual offering level are often not available from firms' accounting systems. In the absence of such data, it is difficult to obtain reliable and valid measures across a larger set of firms and industries, which is required for the current study.

of such strategies. Moreover, longitudinal data would open up additional opportunities to account for potential endogeneity of a firm's service strategy selection.

Fourth, in testing for moderation with two of the most prominent capabilities from both the literature (Tuli et al. 2007; Ulaga and Reinartz 2011) and our interviews, our research demonstrates the important role of key capabilities for the success of solutions. Research could investigate a broader set of firm capabilities required for solutions in depth, such as relationship capabilities, organizational structure, contracting ability, and operations skills, along with other firm-level variables like, e.g., technology investments.

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Table 1

Relevant empirical research on performance outcomes of service strategies

Study	Service Offering Measure (Independent Variable)	Firm Performance Metric (DV)	Distinguish Service & Solutions?	Account for Endogeneity of Strategy Selection?	Sample	Data Source	Key Findings
Homburg et al. 2002	• # of services • Breadth of service offering • Emphasis on services	• Market performance • Return	No	No	B2C: Retail stores	• Survey	• A service-oriented business strategy enhances (self-assessed) market performance and profitability
Fang et al. 2008	Service ratio (service segment revenue/total revenue)	• Return	No	No	B2B/B2C: Manu-facturing	• Archival	• There is a U-shaped relationship between sales from services and firm value.
Antioco et al. 2008	Service business orientation • # of customers a service is offered to • Proactivity in offering the service	• Sales • Service ratio (both selfreported)	No	No	B2B/B2C: Manu-facturing	• Survey	• Depending on service type, a servicebusiness orientation generates service sales or leverages product sales.
Suarez et al. 2013	Service ratio (service revenue/total revenue)	• Return	No	Yes	B2B/B2C: Software	• Archival	• There is a U-shaped relationship between sales from services and profitability.
Dotzel et al. 2013	# of service innovations by type	• Return • Risk	No	No	B2C	• Archival	• Electronically enabled service innovativeness enhances firm value via customer satisfaction. • People-enabled service innovativeness directly increases firm value. • Both types of service innovativeness increase risk.
Eggert et al. 2014	# of services offered by type	• Return • Sales	No	No	B2B: Mechanical engineering	• Survey	• Industrial service strategies enhance sales, while they reduce the level of profits but enhance profit growth.
Josephson et al. 2015	Service ratio (service revenue/total revenue)	• Risk	No	No	B2B/B2C: Manu-facturing	• Archival	• An increase in sales from services increases firm risk.
Steiner et al. 2016	Product–service bundle or separate pricing.	• Willingness to pay	No	N/A	B2B: Machinery	• Conjoint survey	• Industrial buyers are willing to pay more when services are priced separately than bundle pricing.
Current study	**Continuous (degree of solution characteristics) and ordinal measure (solution = 1, other services = 0)**	• **Return**	**Yes, Solutions vs. other service types**	**Yes**	**B2B: Manufacturers offering services**	• **Survey and Archival**	• **Firms offering solutions (in addition to other services) have better profitability growth.** • **A prerequisite is that they possess critical capabilities.**

Table 2

Relevant conceptual research on solutions

Study	Definition of Solutions	Dimensions of Solution Effectiveness	Drivers of Solution Effectiveness: Supplier Variables and Capabilities	Drivers of Solution Effectiveness: Customer Variables and Capabilities	Discuss Performance Impact of Solutions?	Distinguish Solutions from other service	Approach
Tuli et al. 2007	A set of customer–supplier relational processes	• Requirements definition • Customization and integration • Deployment • Post-deployment support	• Contingent hierarchy • Documentation emphasis • Incentive externality • Customer interactor stability • Process articulation	• Customer adaptiveness • Political counseling • Operational counseling	No	No	• Qualitative Interviews • Managers from customer and supplier organizations • Multi-industry
Ulaga and Reinartz 2011	A service offering that (1) has an outputbased value proposition and (2) is oriented toward the customer's process	N/A	• Data processing and interpretation capability • Risk assessment and mitigation capability • Design-to-service • Sales capability • Deployment capability	N/A	No	Yes, service typology	• Qualitative interviews • Managers from supplier organizations • Multi-industry
Cusumano et al. 2015	Combinations of products and services tailored to the needs of a particular customer	N/A	• Organizational capabilities • Product knowledge • Knowledge on customers' product usage behavior	N/A	Yes	Yes, service typology	• Purely conceptual
Friend and Malshe 2016	An ongoing, relational process of defining, meeting, and supporting a customer's evolving needs	N/A	• Diversity sensitivity • Multipoint probing • Orchestration • Stability preservation	N/A	No	No	• Qualitative interviews • Managers from customer organizations • Multi-industry

Table 3

Macdonald et al. 2016	Combinations of supplier–customer processes and resources through a joint resource integration process	• Collective value in use (e.g., fast problem solving, low costs) • Individual value in use (e.g., task simplicity, perceived control)	• Organizational competence • Employee competence • Sourcing network competence • Customer orientation	• Organizational competence • Employee competence • Sourcing network competence	No	No **types?**	• Qualitative interviews • Managers from four customer organizations • 4 industries

Theoretical mechanisms and illustrative quotes from qualitative interviews

Theoretical Mechanisms	**Theoretical Rationale**	**Illustrative Quotes from Qualitative Interviews**	**Theoretical Rationale**	**Illustrative Quotes from Qualitative Interviews**

Table 4

Main Effect Mechanisms	(H1a) Negative, TCE-based mechanism: Compared with other service offerings, solutions involve a higher degree of uncertainty and specific investments for providers. -> Elevated transaction costs in the context of opportunism and moral hazard.	Behavioral uncertainty - moral hazard: "As soon as we had signed our first solution contracts, we noticed that tire wear dramatically increased for truck fleets under solution contracts compared to those that were not. When we analyzed what was going on, we found that truck drivers had changed their driving behavior; as tires now were managed under the responsibility of an external provider, they couldn't care less. Frankly, we had anticipated this change and had to step in and alert our customers." (Director fleet solutions business, tire manufacturer) Environmental uncertainty -risk transfer: "Solving a customer's problem by offering him a solution also means that the client's risk is transferred to the seller. You are taking over part of the customer's problem. You will solve the problem on the customer's site. This means that you will commit yourself to specific performance levels and results." (Vice president, international marketing, power generation equipment manufacturer).	(H1b) Positive, RBT mechanism: Solutions are customized to create superior value for customers. In comparison with other service offerings, solutions require firms to leverage and further build inimitable and valuable (VRIO) firm capabilities (e.g., marketbased assets such as customer intimacy). The latter act as an isolating mechanism to extract the rent created through better margins and customer retention.	Customer retention: A manager illustrated the role of solutions offerings in increasing retention reflected in terms of switching costs for the customer and establishing barriers to entry for competition: "This is the loyalty tool. If you think about it, [competitor A] or [competitor B], whatever, all these direct sellers or whoever else, walks in there, every day, to try and sell them a [product]. If they say, 'I've got [our firm's solutions offering]' these guys turn around on their heel, because they know, for four years, I have nothing to worry about here … because, you know, they're locked [in]." (Member, board of management, construction tools manufacturer); Inimitability: "The more we provide [solutions] at a customer's site, the more we become irreplaceable. The more we enter into a customer's business, the more he forgets how things are done. The customer doesn't know any more how to perform these things. We currently manage 132 industrial sites like this. And our experience shows us that this is almost like being married to the customer. It represents a huge barrier to entry for competitors." (Corporate market manager services, industrial gases supplier)
Firm-Level Moderators	(H2) Sales capability enables the solutions provider to mitigate the dysfunctional impact on cost and to enhance the retention effect of solutions by (1) overcoming requirements ambiguity, (2) selling and explaining the solution's utility to customers, and (3) overcoming customer's organizational resistance, thus enhancing profitability from solutions.	Ambiguity about customer requirements: "How to work with customers on committing to a result, instead of committing to a means ... is a strong trend among customers, and [our company] wants to be prepared for this tendency. However, this requires that the customer provides his vendor with the necessary information…. Yet customers are not always willing or able to do that." (Corporate market manager services, industrial gases supplier) Selling the solution's utility to the appropriate decision makers: "For instance, … you go to a purchaser and we talk about [total cost of ownership, and the purchaser will say:] 'I am sorry, this is not my problem. My target is to have a cheaper price from you. Period. I am not interested in your total cost of ownership approach and this is not my problem.'" (Key Account director, bearings manufacturer)	(H3) Value creation knowhow mitigates the cost impact and enhances the retention-based positive effect of solutions by helping solutions providers (1) avoid waste of time and resources on non-valuegenerating solutions, (2) to be viewed by customers with greater credibility, and (3) shift buyers' objective from price reductions to maximizing value created.	Criticality of senior managements' value creation know-how for new solutions: "I mean our best solutions, actually, often come from [our deep knowledge of] the customer.… We are a company, where even the senior, senior management and even the CEO, they sit, on a regular basis, with normal ordinary salespeople, in their cars, going to customers, talking to customers, seeing how the business on the floor is running, seeing what the demands are, so that they can make sure that whatever they decide up on top, is somehow relevant [to the customer]." (Member, board of management, construction tools manufacturer).
Industry-Level Moderators	(H4) Technology intensity provokes uncertainty and specific investments. It strengthens the undesirable transaction cost-based mechanism through which solutions affect financial performance while attenuating the effect of the desirable retention-based outcomes of solutions.	Challenge to differentiate via service offerings in high-technology environments: "Our key challenge is to find, to create, to invent a service that will differentiate [us] from the other companies. This is not obvious. We are more successful in product innovation and portfolio use than others, I believe. For example, last year we sold $80 million of one product ... $28 million [of which] was sold on the basis of improving [product characteristics]. Our customers were not looking for this application, they didn't ask for it. We invented it, and it helped them to improve their yield. Thus, we show them the benefits and create value from that. But it is not services! Its product based." (Chief executive officer, country subsidiary, specialty chemicals and biotechnology firm).	(H5) Buyer power increases the impact of the retention afforded by solutions. As they are built on unique capabilities and customized to customer needs, they offer superior, inimitable value. Even powerful buyers have a hard time negotiating prices down.	Cushioning against buyer power with solutions: "[The customer] would play this game because he knows that by dividing [between multiple suppliers] he will pressure us more…. So we have changed the debate; instead of focusing on the price of the part, and the margin, or what they can find elsewhere, we have developed a solution." (Global services director, EMEA, chip card printer manufacturer).

Table 4 Summary of measures and data sources

Variable	Measure	Data Source

Independent Variables

• Solutions offering (binary)	Service offering coded manually following Ulaga and Reinartz's (2011) classification scheme for B2B services: • Solutions offering: (1) value proposition of the service is output based, and (2) the service is oriented toward the customer's process. • No solutions offering: any other service.	Survey
• Solutions offering (continuous)	Service offering coded manually on a nine-item scale developed after Tuli et al. (2007) and Ulaga and Reinartz (2011) (seven-point reflective scale): The service offering… • Requires understanding of each customer's requirements. • Integrates products and services into customers' environment. • Is customized to each customer's specific needs. • Requires customer involvement in development and/or implementation. • Requires detailed specifications of mutual contractual obligations. • Involves taking over the customer's activities / process. • Promises an outcome specified by customer-specific metrics. • Includes implementation of the service/solution (over time). • Includes post-deployment support.	Survey, firm websites, web archives (http://archive.org/)

Dependent Variable

• Profitability growth	$\Delta ROS_{i,t_1,t_2}\% \Rightarrow ROS_{i,t_2} - ROS_{i,t_1}$ Supplier firm i, years t_1 and t_2	ORBIS

Moderator Variables

• Sales capability	Multi-item scale based on Tuli et al. (2007) and Ulaga and Reinartz (2007) (seven-point reflective scale): • Our salespeople know how to sell this offering. • Our sales force knows how to reach the right decision makers when selling this offering. • Our sales force uses the appropriate arguments to sell this service offering.	Survey
• Value creation know-how	Multi-item scale based on Tuli et al. (2007) (seven-point formative scale, average VIF = 1.18):[b] • We really understand what we can do to help our customers become better off. • We know how we can create value for customers better than others.	Survey
• Technology intensity of industry	$R\&D\ Intensity_{j,t}(\%) = K \sum_{k=1}^{n_{Industry}} \frac{R\&D\ Expenditures_{k,t}}{Revenue_{k,t}}$ Industry j, competitors k in industry j, year t	ORBIS
• Buyer power in supplier	Obtained from archival industry profiles; draws from extensive primary and secondary research industry databases and modeling/forecasting tools. Coded on seven-point scale.	Datamonitor

Control Variables and Antecedents of Solutions Offerings

• Service industrialization	Higher-order construct capturing a supplier's capabilities on the following dimensions:[c] • Efficiency focus for service offering (CR = .9, AVE = .7, α = .9)[b] • Modularity of service offering (CR = .8, AVE = .6, α = .8)[b] • Standardization of service delivery process (CR = .9, AVE = .7, α = .9)[b]	Survey
• Firm size	Log (employees) for supplier	ORBIS
• Industry characteristics	Rivalry, threat of substitutes, product differentiation in industry, supplier power, customers' switching costs in industry (coded on seven-point scale)	Datamonitor
• Competitive intensity in industry	$Competitive\ Intensity = \log\left\{\frac{Herfindahl\ Index_{j,t_2}}{Herfindahl\ Index_{j,t_1}}\right\}$ Industry j, years t_1 and t_2	ORBIS
• Industry margin pressure at introduction	$Commoditization\ at\ Introduction_{j,t_1,t_2} = K \sum_{i=1}^{n} \left(ROS_{i,t_1} - ROS_{i,t_2} \right)$	ORBIS

	!!! Industry j, competitors k in industry j, years t_1 and t_2	
• Supplier's product-market position	Composite factor combining two items that capture the supplier's position in the market for (tangible) products: • In the market for this product (three-point scale, endpoints: "we are the clear leader/we are not a major player"). • In the market for this product, our market share is N %.	Survey

[a] $ROS\ (\%) = 100 * \frac{!\ "\#\$\%\&()\ \ !"\#\$\%\&_{!"}}{!"\ \ \ \ \ \ \ \ \ \ !"\#"\$\%"_{!"}}$.

[b] CR = composite reliability, α = Cronbach's alpha, VIF = variance inflation factor.

[c] Extreme values identified and eliminated using Dfbeta.

Table 5 Descriptive statistics and correlations

			M	SD	CR	AVE	α	Correlations													
								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Solutions offering (continuous)	3.07	1.81	0.8	0.7	0.7		1.00															
2.	Solutions offering (binary)	N.A.	N.A.	N.A.[a]	N.A.[a]	N.A.[a]	0.78	1.00															
3.	Profitability growth	-1.25	7.36	N.A.[a]	N.A.[a]	N.A.[a]	0.09	0.15	1.00														
4.	Sales capability	4.50	1.33	0.9	0.7	0.9	0.00	-0.05	0.09	1.00													
5.	Value creation know-how		5.60	0.90	N.A.[a]	N.A.[a]	N.A.[a]	0.00	-0.01	0.17	0.25	1.00											
6.	Technology intensity of industry	0.04	0.15	N.A.[a]	N.A.[a]	N.A.[a]	-0.04	-0.01	-0.02	-0.09	-0.21	1.00											
7.	Buyer power in industry		4.03	0.32	N.A.[a]	N.A.[a]	N.A.[a]	0.02	0.01	-0.14	0.01	-0.12	0.00	1.00									
8.	Service industrialization		5.11	0.98	0.9	0.7	0.8	-0.11	-0.11	0.35	0.28	0.39	-0.16	-0.02	1.00								
9.	Firm size 7.58 2.62 N.A.[a] N.A.[a] N.A.[a] 0.17 0.02 -0.02 0.02 0.07 0.05 -0.16 -0.08 1.00 10. Rivalry 5.43 0.90 N.A.[a] N.A.[a] N.A.[a] -0.02 -0.02 -0.09 0.06 -0.08 0.02 0.14 -0.09 -0.12 1.00 11. Threat of substitutes 3.19 1.05 N.A.[a] N.A.[a] N.A.[a] -0.08 -0.09 0.02 -0.04 0.04 -0.10 -0.11 0.06 -0.04 -0.12 1.00																							
12. Product differentiation 3.42 1.32 N.A.[a] N.A.[a] N.A.[a] -0.11 -0.09 0.09 -0.08 0.07 -0.09 0.00 0.10 -0.15 0.02 0.04 1.00 13 Supplier power 4.23 0.67 N.A.[a] N.A.[a] N.A.[a] -0.03 -0.10 -0.14 0.06 -0.01 -0.02 0.22 -0.08 0.04 -0.01 -0.13 -0.01 1.00																							
14.	Competitive intensity	-0.02	0.10	N.A.[a]	N.A.[a]	N.A.[a]	0.10	0.15	0.15	0.01	-0.06	-0.02	0.07	-0.12	0.12	0.05	-0.10	-0.03	0.01	1.00			
15.	Industry margin pressure at introduction		1.94	9.89	N.A.[a]	N.A.[a]	N.A.[a]	0.03	0.07	0.28	0.00	-0.05	-0.08	-0.07	-0.09	0.01	-0.25	0.04	0.00	0.04	0.18	1.00	
16.	Customer switching cost in industry		2.46	1.79	N.A.[a]	N.A.[a]	N.A.[a]	0.06	0.03	0.09	0.10	0.03	-0.01	-0.17	-0.07	0.12	0.02	0.12	-0.15	-0.05	0.12	0.05	1.00
17.	Supplier's product-market position		0.02	0.78	0.8	0.7	0.7	-0.02	-0.13	-0.01	0.01	-0.10	0.06	-0.14	-0.07	0.08	0.17	-0.01	0.12	-0.05	0.18	-0.07	0.11

Notes: All correlations greater than .12 are significant at $p < .05$ (one-tailed). [a]Archival or formative measure, composite reliability, AVE, and coefficient alpha are not applicable. CR = composite reliability, and α = coefficient alpha.

Table 6 Estimation results for the effects of solutions offering on profitability growth

A. Solutions Offering Selection Model

Predictors	Exp. Sign	Logistic Regression Coefficient (Clustered Robust Standard Errors)	
Industry Effects			
Product differentiation in industry	-	-0.90*	(0.16)
Competitive intensity in industry	+	0.90*	(0.17)
Industry margin pressure at introduction	+	0.62	(0.017)
Customers' switching costs in industry	+	0.79*	(0.16)
Firm Controls			
Supplier firm size	+	0.06	(0.10)
Supplier's product-market position	-	-1.31**	(0.25)
Wald χ^2		22.58***	
N		228	
Pseudo-R^2		0.104	

B. Effects of Solutions Offering on Profitability Growth

Predictors	Hypo-theses	Standardized Regression Estimates (Clustered Robust Standard Errors) Binary Solutions Offering Measure		Continuous Solutions Offering Measure	
Main Effects					
Solutions offering	H_1	0.190**	(1.10)	0.140*	(0.23)
Interactions Sales capability × solutions offering	H_2	0.133*	(1.17)	0.113*	(0.44)
Value creation know-how × solutions offering	H_3	0.053	(1.42)	0.071	(0.47)
Technology intensity of industry × solutions offering	H_4	-0.097*	(1.34)	-0.110*	(0.46)
Buyer power in industry × solutions offering	H_5	0.115**	(0.55)	0.118**	(0.31)
Main Effects of Moderators					
Sales capability		-0.017	(0.54)	0.058	(0.50)
Value creation know-how		-0.025	(0.67)	-0.007	(0.58)
Technology intensity of industry		0.044	(0.24)	-0.070	(0.37)
Buyer power in industry		-0.251**	(0.53)	-0.247**	(0.53)
Firm and Industry Controls					
Service industrialization		0.319**	(0.53)	0.315**	(0.55)
Firm size		-0.100¥	(0.19)	-0.114¥	(0.19)
Rivalry		-0.136*	(0.52)	-0.158*	(0.50)
Threat of substitutes		-0.039	(0.45)	-0.038	(0.45)
Product differentiation		0.181**	(0.38)	0.162*	(0.37)
Supplier power		0.065	(0.71)	0.040	(0.75)
Service type 2 dummy		0.036	(1.34)		

Service type 3 dummy	0.086	(1.73)		
Inverse Mills ratio	0.363**	(1.70)	0.372**	(1.75)
Industry dummy 1–7	included		included	
F	5.14***		3.48***	
N	175		175	
R^2 of full model	0.39		0.40	
R^2 of constrained model	0.32		0.33	
F-test statistic full vs. constrained model	16.31*		18.24*	

***Significant at $p < .001$. **Significant at $p < .01$. *Significant at $p < .05$. ¥Significant at $p < .1$ (directional one-tailed test). Notes: All parameter estimates are standardized estimates. Standard errors are in parentheses. The ΔR^2 of the full model over the constrained model in the case of both regressions is statistically significant at $p < .05$.

Table 7 Supplementary mediation tests

	Mediation Test Using the PRO (Hayes 2013) DV: Profitability Growth	
Dependent Variable/Predictors	**Using Binary Measure of Solutions offering**	**Using Continuous Measure of Solutions offering**
DV: Customer retention		
Solutions offering	0.64*	0.15*
DV: Cost-efficiency Solutions offering	-0.40*	-0.07¥
DV: Profitability growth. Direct effect of solutions offerings		
Solutions offerings	1.91	0.17
DV: Profitability growth. Indirect effect of solutions offerings through mediators:		
Mediator: Customer retention	0.41*[a]	0.10*[a]
Mediator: Cost-efficiency of solutions provision	-0.56*[a]	-0.09*[a]
N	173	173

*: Significant at $p < .05$; ¥Significant at $p < .1$ (directional one-tailed test). Notes: All parameter estimates are unstandardized estimates. [a] Confidence interval excludes zero.

The item wording for customer retention of the service offering was as follows: "It would be very expensive for customers to switch suppliers for this service offering"; items for cost-efficiency of solutions provision were (1) "Our process for producing this service offering is cost-efficient" and (2) "We are able to manage our costs to serve this service offering" (seven-point Likert scales).

Table 8 Customer solutions in business markets: key insights and managerial guidelines

Research Question	Key Managerial Insight	Guidelines for Executives
Whether	On average, customer solutions enhance the provider's profitability.	**Build a business case for customer solutions.** Communicate the potential gains of approximately 44% enhanced ROS growth from solutions to key stakeholders, while also emphasizing that solutions are not for every firm (see contingencies addressed in the research question "When").
Why	The profit impact of solutions occurs via two opposing mechanisms: retention of customers and reduced costefficiency.	**Take stock of both negative and positive intermediate outcomes of customer solutions.** 1) Need to assess the potential of customer solutions to retain customers (through customer-specific knowledge, unique skills, and long-term contracts). 2) Need to account for potentially reduced cost-efficiency of firm from customer solutions (due to uncertainty about behavior of customers and partners, risk transferred to provider, and lack of economies of scale).
When	The competitive advantage derived from customer solutions varies by industry.	**Assess whether industry is favorable toward customer solutions.** 1) Customer solutions are more appropriate if buyer power in industry is high. That is, it is a good strategy to counter buyer power. 2) When competing in industries with high potential for technologybased innovation, customer solutions create lower value for customers than the technology. Consequently, industries in which technologydriven differentiation exists are less suitable for solutions.
	Firms must invest in a set of specific resources and skills.	**Ensure that firm has the critical skills required for solutions.** 1) Audit for the presence of relevant resources and skills such as value creation know-how (selling the right solutions) and sales capability (selling solutions right) before venturing into solutions. 2) Identify a roadmap for acquiring missing skills and competencies.

Fig. 1 Conceptual model

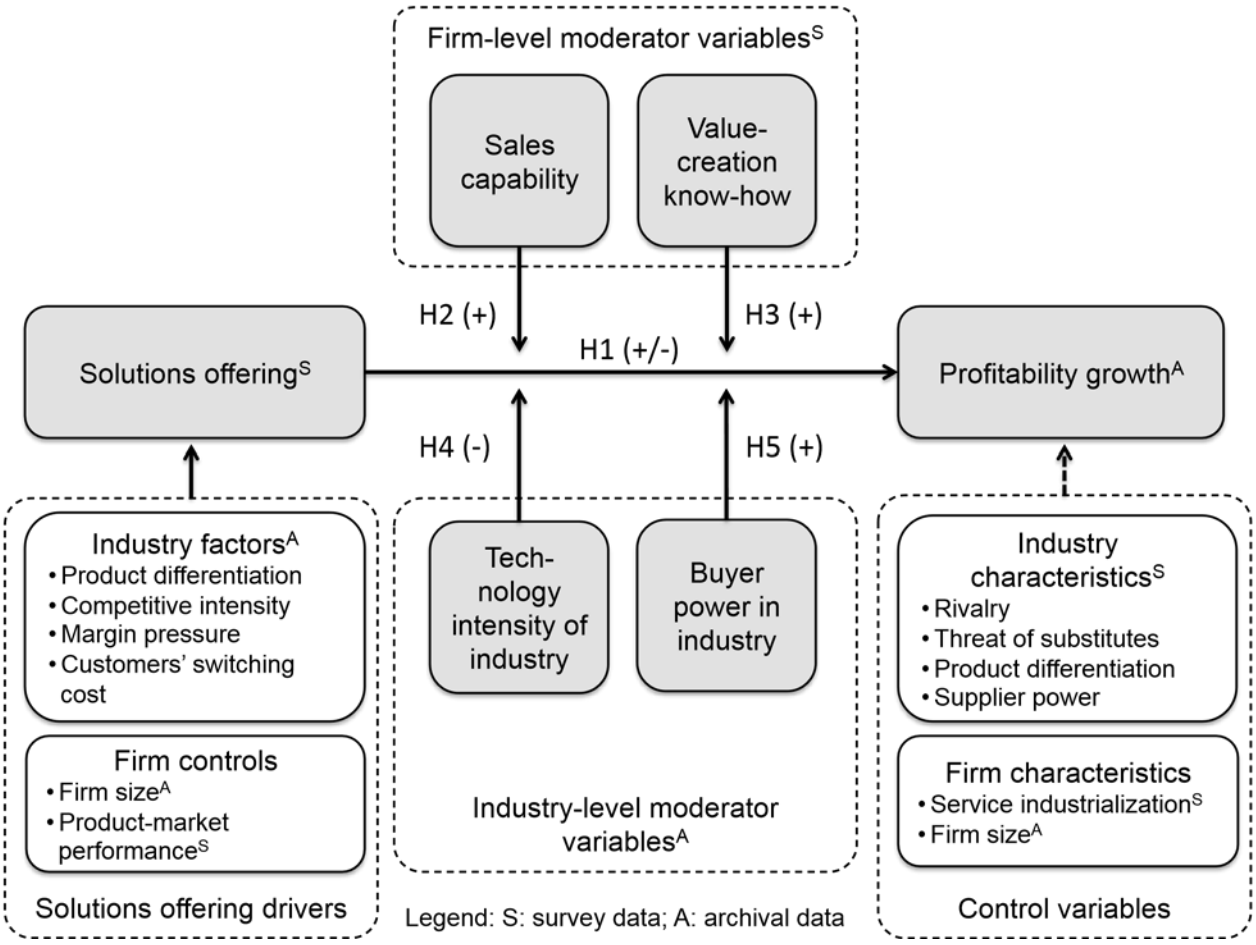
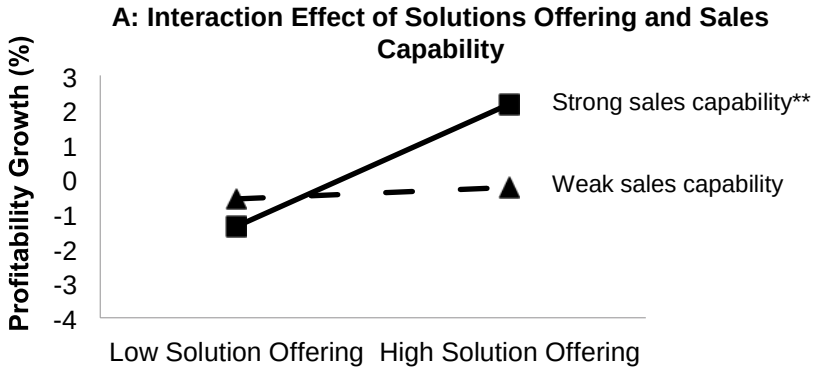
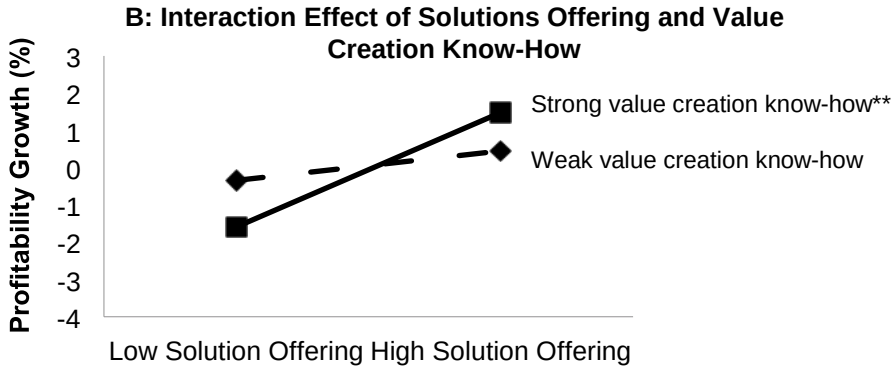

Firm-level moderator variables[S]
Sales capability
Value-creation know-how
H2 (+)
H3 (+)
H1 (+/-)
Solutions offering[S]
Profitability growth[A]
H4 (-)
H5 (+)
Industry factors[A]
• Product differentiation
• Competitive intensity
• Margin pressure
• Customers' switching cost
Firm controls
• Firm size[A]
• Product-market performance[S]
Solutions offering drivers
Tech-nology intensity of industry
Buyer power in industry
Industry-level moderator variables[A]
Legend: S: survey data; A: archival data
Industry characteristics[S]
• Rivalry
• Threat of substitutes
• Product differentiation
• Supplier power
Firm characteristics
• Service industrialization[S]
• Firm size[A]
Control variables

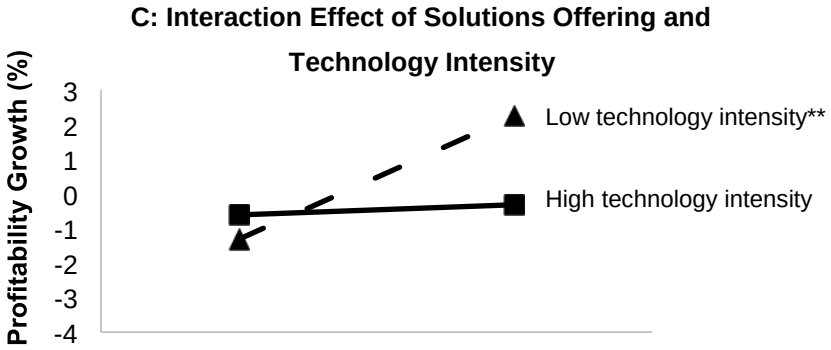
Fig. 2. Moderating effects of sales capability, value creation know-how, technology intensity, and buyer power on profitability growth

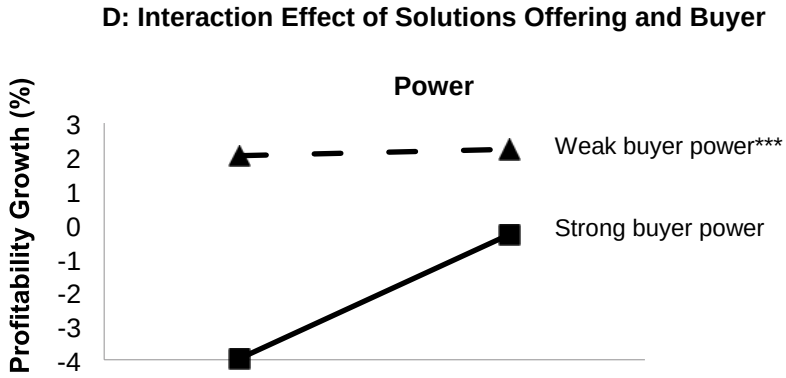


For firms with low sales capability, there is no significant effect of solutions offerings on profitability growth (simple slope: γ = .17, n.s.). In contrast, for firms with strong sales capability, solutions offerings enhance suppliers' profitability growth significantly (γ = 1.76, $p < .01$).



There is no significant effect of solutions offering on profitability growth for firms with weak value creation know-how (γ = .40, n.s.). However, solutions offerings have a significant, positive impact on profitability growth when firms possess strong value creation know-how (γ = 1.53, $p < .01$).





Low Solution Offering High Solution Offering

There is no significant effect of solutions offerings on profitability growth in in hightechnology-intensive industries (γ = –.15, n.s.). However, solutions offerings have a significant, positive impact on profitability growth in low-technology industries (γ = 1.78, $p < .01$).

Low Solution Offering High Solution Offering

In industries with weak buyer power, solutions offerings do not enhance profitability growth γ = .10, n.s.). However, solutions have a significant, positive effect on profitability growth in industries with strong buyer power, in which the level of profitability growth is generally lower (γ = 1.84, $p < .001$).

*** Simple slope significant at $p < .001$. **Simple slope significant at $p < .01$ (directional one-tailed test). Notes: Plots are based on results for model using continuous measure of

Web Appendix: Validity testing and robustness checks

Key informant accuracy, sample characteristics, and non-response bias

We collected responses to the survey items from a second informant for a subset of our sample (N = 65 firms) to assess the reliability of measures provided by key informants. We compared the responses from each informant pair and measured them by calculating the average deviation from the mean (Burke and Dunlap 2002). The mean index was .504, with a minimum of .125 and a maximum of 1.208 for the individual dyads. Only one of the 65 dyads exceeded the cutoff threshold of 1.17 (Burke and Dunlap 2002), further increasing our confidence in the reliability of responses provided by informants.

To assess the representativeness of firms in our sample, we compared the distribution of annual firm revenues with the revenue distribution in the industries covered and found no difference ($\chi^2 = 7.08$, d.f. = 3, $p > .05$). Firms had average sales of €1.49 billion and an average of 1900 employees. The job functions further confirm that only senior-level managers, with an average experience of 17 years, participated in the study.

A comparison of early and late respondents showed no significant differences (Armstrong and Overton 1977). In addition, we contacted a random sample of 31 non-respondents by telephone to answer five questions about the performance of their service offering and their background. No significant differences emerged between non-respondents and respondents, so we did not consider non-response bias a problem in the study.

Robustness checks

First, we estimated the model using industry-adjusted ROS growth instead of controlling for industry dummies in the analysis to test whether the results are sensitive to the approach of

controlling for industry effects (see Web Appendix Table 1). Second, we used return-on-assets growth as an alternative operationalization to profitability growth. Third, to assess whether the dichotomization into solutions and other types of services is appropriate for the binary solutions offering measure, we re-ran the model without the dummy variables for the other three types of hybrid offerings in the model. Fourth, to test for sensitivity to alternative estimation approaches controlling for endogeneity, we ran the treatment effects model with the STATA procedure TREATREG. The pattern of signs and the significance of the estimated coefficients are consistent, providing support for the robustness of our results. Fifth, we also provide a robustness check using a supplier's level of profitability (i.e., ROS) as the dependent variable instead of profit growth. While our hypotheses are specific to profit growth as a dependent variable, and the use of an incremental dependent variable also comes with the advantage of eliminating variance caused by unobserved time-invariant firm-specific factors, the pattern of estimated signs and the significance are largely consistent with our focal model. Ultimately, we estimated the model using a reduced sample comprising only a single observation per firm. The results are again consistent.

References [for Web Appendix]

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*(3), 396-402.

Burke, M. J., & Dunlap, W. P. (2002). Estimating interrater agreement with the average deviation index: A user's guide. *Organizational Research Methods, 5*(2), 159-172.

Web Appendix Table 1 Robustness checks using alternative measures, model specifications, and dependent variables

Predictors	Continuous Solutions Offering Measure	Binary Solutions Offering Measure

Dependent Variable	IndustryAdjusted ROS Growth[ab]	ROA Growth[b]	ROS Growth without Controls for Other Types of Hybrid Offerings[b]	Using Alternative Estimation Method TREAT-REG (ROS Growth)[b]	ROS Level[b]	ROS Level[b], (Lagged DV as Control)	ROS Growth[b] Using Reduced Sample (One Observation per Firm)
Main Effects							
Solutions offering	0.15** (0.39)	0.18* (1.16)	0.17** (1.010)	12.19*** (3.35)	0.14* (2.50)	0.15*** (1.12)	0.15** (1.36)
Interactions							
Sales capability × solutions offering	0.12* (0.44)	0.13¥ (1.15)	0.14* (1.16)	2.76** (1.13)	0.13¥ (2.73)	0.09* (1.23)	0.15** (1.44)
Value creation know-how × solutions offering	0.07 (0.49)	0.11 (0.47)	0.05 (1.42)	-0.52 (1.70)	0.006 (3.29)	0.02 (1.59)	.05 (1.84)
Technology intensity of industry × solutions offering	-0.06¥ (0.28)	-0.17** (0.86)	-0.10** (1.32)	-2.44*** (0.82)	-0.08** (1.98)	-0.07** (1.20)	-0.10* (1.59)
Buyer power in industry × solutions offering	0.12** (0.30)	0.11** (1.69)	0.12*** (0.53)	1.50** (0.54)	-0.04 (1.12)	0.06** (0.49)	0.13*** (0.61)

***Significant at $p < .001$. **Significant at $p < .01$. *Significant at $p < .05$. ¥Significant at $p < .1$ (two-tailed test for main effect, directional one-tailed test for interactions) based on clustered robust standard errors. [a] Industry-adjusted ROS model excludes industry dummies as controls. [b] Standardized coefficient estimates for all models except for TREATREG model.
Notes: ROA = return on assets; DV = dependent variable.