BJM BRITISH JOURNAL of MANAGEMENT
BRITISH ACADEMY OF MANAGEMENT
British Journal of Management, Vol. 0, 1–22 (2022)
DOI: 10.1111/1467-8551.12659

How Does Selling Capability Impact Firm Value? The Moderating Roles of Relative Strategic Emphasis, Market Volatility, and Technological Volatility

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Firms develop and deploy selling capability to create and sustain a competitive advantage. Previous studies have focused predominantly on static, input-based selling capability, paying little attention to dynamic, efficiency-focused selling capability. This treatise reconceptualizes selling capability from a dynamic and efficiency (input–output) perspective and investigates the effect of selling capability on firm value with the contingent role of internal [i.e. relative strategic emphasis (SE)] and external (i.e. market volatility and technological volatility) factors. Using data from 341 US-based manufacturing and service firms over the period 2014–2020 and an endogeneity-robust dynamic estimation technique, the authors find that selling capability positively affects firm value, and firms with a relative SE on value appropriation (i.e. advertising) as opposed to value creation (i.e. R&D) reap more rewards from selling capability. That is, relative SE positively moderates the nexus between selling capability and firm value. Furthermore, the results demonstrate that the interactive effect of selling capability and relative SE is weaker when an industry experiences higher market volatility but stronger when technological volatility is higher. Overall, this study demonstrates that a firm's selling capability should be managed dynamically in light of its (internal) relative SE and (external) environmental conditions. The results are robust to several additional sensitivity analyses.

Introduction

An organization's portfolio of capabilities is viewed as a catalyst for enhancing and sustaining competitive advantage (Barney, 1991; Rahman *et al.*, 2022). Consequently, firms marshal and deploy resources to develop and bolster distinct value-creating capabilities, including selling capability (Rangarajan *et al.*, 2020; Schaarschmidt, Walsh and Evanschitzky, 2022). In fact, on average, firms expend 10–40% of their revenue to develop efficient sales systems (Mantrala *et al.*, 2010). A capability represents a firm's ability to efficiently combine various resources (inputs) to attain certain objectives (outputs) (Amit and Schoemaker, 1993; Dutta, Narasimhan and Rajiv, 2005). Albeit the literature on firm capabilities, such as marketing capability and innovation capability, has adopted an input–output approach (Rahman *et al.*, 2022), sales management researchers have hitherto focused on input-related selling capability and have defined selling capability as a firm's capacity to configure and deploy scant firm resources, salespeople's knowledge, selling skills, and control systems (Krush *et al.*, 2013; Schaarschmidt *et al.*, 2022). Also, the majority of earlier studies adopted a micro-perspective, investigating mainly individual- or group-level

selling capability (Hughes and Ahearne, 2010; Hughes and Ogilvie, 2020).

Research on organization-level selling capability warrants in-depth theoretical and empirical investigation because sales is a cross-functional process that is developed and implemented by multiple divisions within an organization (Storbacka, Polsa and Sääksjärvi, 2011). Hence, selling capability should be regarded as a transformational ability to utilize fewer resources (i.e. selling inputs) to attain maximum outcomes (i.e. selling outputs). Further, a focal organization's selling capability needs to be judged and measured relative to those of its competitors (Dutta *et al.*, 2005). Although scholars have adopted a relative perspective and employed an input–output approach to conceptualize and measure other strategic capabilities, such as marketing capability (Feng *et al.*, 2017; Nath, Nachiappan and Ramanathan, 2010), no research has applied this approach to selling capability, despite its usefulness for capturing the concept effectively.

A handful of studies have explored the effect of selling capability on organizational performance (e.g. Guenzi, Sajtos and Troilo, 2016; Schaarschmidt *et al.*, 2022), but these studies adopted a static view and ignored germane internal and external boundary conditions. The resource-based view (RBV) suggests that organizational performance is heterogeneous owing to the ownership of resources that have differential productivity (Makadok, 2001). Because a firm's capability pertains to its capacity to deploy fewer resources (inputs) to achieve maximum outcomes (outputs) (Dutta *et al.*, 1999), it is imperative to use an input–output (efficiency) framework to conceptualize and measure selling capability. Furthermore, regarding the need to maintain an optimal level of efficiency over time, dynamic capabilities enable firms to reconfigure resource allocation strategy from one time period to another, in keeping with the marketplace dynamism (Teece, Pisano and Shuen, 1997). Hence, the efficiency aspect of an organization's selling capability may change over time, meaning that selling capability should be viewed as one type of dynamic capability. Also, marketplace dynamism may induce a capability gap between a firm's existing configuration and its value-maximizing configuration in a changing environment (Wilden and Gudergan, 2015). In response to such a capability gap, a firm is likely to deploy its dynamic capabilities to identify an optimal configuration of the value-maximizing selling capability and relative strategic emphasis (SE). However, few studies have considered the contingency roles of a firm's other complementary strategies, such as relative SE on value creation (e.g. R&D) and value appropriation (e.g. advertising) activities (Han, Mittal and Zhang, 2017).

To fill these gaps, this study attempts to use a positivist approach and empirically address the questions of (1) whether organization-level selling capability affects firm value, and (2) how complementary firm strategy—particularly relative SE (value creation vs. value appropriation)—and two environmental factors (market volatility and technological volatility) separately and jointly moderate the association between selling capability and firm value. This research used the operational and financial data of 341 US firms in manufacturing and service industries over 7 years (2014–2020) and an endogeneity-robust, instrumental variable estimation technique (the generalized method of moments, or GMM) to examine the direct and interactive effects (two- and three-way interactions) of selling capability, relative SE, market volatility, and technological volatility on firm value. We also employed the data envelopment analysis (DEA) technique to measure selling capability, which is purported to be the most apposite technique to measure a firm's capabilities (Chen, Delmas and Lieberman, 2015). The findings show that selling capability increases firm value and that the positive link between the focal variables is moderated by internal and external factors. Specifically, a firm's relative SE on value appropriation (vs. value creation) amplifies the positive effect of selling capability on firm value. Furthermore, the interactive effect of selling capability and relative SE is negatively moderated by market volatility but positively moderated by technological volatility.

This treatise contributes to the extant literature in four significant ways. Firstly, combining propositions from the RBV and dynamic capabilities, we extend the extant stock of knowledge to better understand and measure *selling capability*. Unlike previous studies that examined input-oriented selling capability based on mostly *soft* (perceptual) data, the current study used *hard* (actual company) data to measure selling capability from an input–output perspective, which transforms sales support resources to achieve sales management goals. Secondly, our analysis documents the value relevance of selling capability: our results

Table 1. Contribution of the present research relative to earlier research

Author	Explanatory variable	Moderator	Outcome variable
Schaarschmidt *et al.* (2022)	Hybrid offering sales capability	None	Relative firm performance (survey data)
Vadakkepatt *et al.* (2021)	Marketing and R&D capital	Environmental munificence and dynamism	Sales leadership maintenance
Homburg *et al.* (2020)	Multichannel sales system	Governance mechanism	Earnings before interest and taxes
Panagopoulos *et al.* (2018)	Sales Force Downsizing	Product market fluidity, advertising intensity, accruals management, and CEO external focus	Idiosyncratic risk
Guenzi *et al.* (2016)	Sales force structuring capability, personal selling capability	None	Profitability, customer-based performance, and market-based performance
Panagopoulos and Avlonitis (2010)	Sales strategy	Transformational leadership, demand uncertainty, and customer solution orientation	Sales revenue and EBIT
This study	*Selling capability*	*Relative strategic emphasis, market volatility and technological volatility*	*Tobin's Q, Total Q, market value and market-to-book ratio*

demonstrate that selling capability positively affects a firm's value. Thirdly, this study shows that more of a firm's internal resources should be allocated to value appropriation (i.e. advertising) than to value creation (i.e. R&D) activities to maximize the impact of selling capability on firm value. This finding confirms not only the trade-off between two fundamental strategic processes (Mizik and Jacobson, 2003), but also the importance of considering the association of selling capability and relative SE (value creation vs. value appropriation) with firm value (Han *et al.*, 2017). Finally, this study incorporates two external boundary conditions, market volatility and technological volatility, which moderate the interactive effect of selling capability and the relative SE on firm value. Previous studies investigating the financial implications of selling capability ignored the moderating role of internal and external contextual factors and consequently failed to capture the extent to which contingency factors may accentuate or attenuate the effectiveness of selling capability.

We have summarized some related studies (Table 1) to show the gap in the literature as well as to demonstrate the relative contribution of this study.

Theoretical background and hypotheses

According to the RBV, firms possess specific, heterogeneous resources that enable them to execute value-creating strategies, which in turn lead to differences in inter-firm performance (Barney, 1991). The RBV suggests that firm resources and capabilities engender competitive advantage and lead to superior performance (Barney, 1991; Dubey *et al.*, 2019). In the same vein, firms can attain a sustainable competitive advantage by developing and deploying a selling capability that satisfies customer needs in ways that competitors are unable to replicate (Barney *et al.*, 2011; Schaarschmidt *et al.*, 2022). The RBV also acknowledges either the *complementary* or the *substitutive* effect of one specific capability when it is co-deployed with other capabilities (Feng *et al.*, 2017). However, the RBV adopts a *static* view of a firm's resource allocation strategy and does not incorporate the notion of resource reconfiguration to sustain competitive advantage over time in keeping with the external marketplace dynamism (Aragón-Correa and Sharma, 2003).

Dynamic capabilities—defined as a firm's ability to build, configure, and reconfigure firm-specific resources (Teece *et al.*, 1997)—allow firms to create value by (re)designing appropriate strategies (Teece, 2018). They also enable firms to (re)configure and (re)allocate their existing resource base in keeping with the external environment (Easterby-Smith *et al.*, 2009; Eisenhardt and Martin, 2000; Rahman, Rodríguez-Serrano and Hughes, 2021). That is, a firm's capabilities should be sufficiently dynamic to enable it to implement novel strategies that reflect marketplace dynamism

(Morgan, 2012; Rahman *et al.*, 2021). Hence, the combined perspectives of the RBV and dynamic capabilities suggest that firms should transform internal resources and strategies into realized value offerings in a volatile marketplace (Morgan, 2012; Teece, 2018).

It is imperative for firms to develop and deploy capabilities in those areas that are critical to competition because, to a great extent, their success hinges upon their idiosyncratic capabilities (Day, 1994). A capability has been broadly defined as a set of processes and routines used to marshal and deploy a firm's resources to create value (Vandaie and Zaheer, 2014). Previous studies on conceptualizing and measuring selling capability have focused mainly on the intra-firm sales support resources and capacities that contribute to the sales process (Jaakkola, Frösén and Tikkanen, 2015; Krush *et al.*, 2013; Schaarschmidt *et al.*, 2022). Also, existing conceptualizations adopt a *static* approach without a simultaneous consideration of selling outputs over time, such as the efficiency and effectiveness of sales-related resources. For example, marketing scholars contend that marketing capability is an integrative process in which a firm uses its resources to achieve, maximize, and sustain its market-related business goals over time (Vorhies and Morgan, 2005). As such, selling capability should also be considered as a dynamic input–output framework (Narsimhan, Rajiv and Dutta, 2006; Nath *et al.*, 2010).

In view of the aforementioned argument, this study reconceptualizes selling capability as a dynamic capability of a firm that requires the development of internal processes and routines, which in turn enable it to configure and reconfigure its sales-related resources from one time period to another, in keeping with the marketplace dynamism, and thereby attain maximum possible selling outputs (i.e. sales growth) using minimum possible selling inputs (i.e. size of sales force). Our conceptualization acknowledges that firms with superior selling capability are able to minimize selling inputs and maximize selling outputs, which is in keeping with the fundamental principle of the RBV—efficiency. Further, this conceptualization accommodates the notion of relative efficiency by considering whether a focal firm allocates selling inputs optimally to outperform its competitors—competitive advantage (Chen *et al.*, 2015). How a firm deploys its rare resources (selling inputs) and complements its existing (selling) capability infrastructure to achieve its objective can engender inimitability in the formation of (selling) capability (Song, Di Benedetto and Nason, 2007). In sum, deviating from prior studies that investigate the effectiveness of individual and absolute selling capability, this study incorporates three types of elements—longitudinal (over multiple periods), efficiency (inputs and outputs), and relative (focal and other firms)—in defining organization-level selling capability.

In keeping with the tenets of the RBV and dynamic capabilities, this research combines internal (capabilities co-deployment) and external (environmental volatility) views to investigate the impact of selling capability on firm value. Specifically, we explore the moderating role of internal strategy and external volatility because sales organizations amalgamate and use knowledge and expertise from various divisions to align internal processes with external conditions (Peterson *et al.*, 2021). From an internal perspective, this study incorporates a firm's relative SE between value-creation activities (e.g. R&D) and value-appropriation activities (e.g. advertising) as the moderator in the selling capability–firm risk link (Han *et al.*, 2017). Firms may search and explore opportunities across markets and technologies and reconfigure their capabilities in response to changes in environmental conditions (Teece, 2007). In that sense, a firm's relative SE (between R&D and advertising) can change over time through sensing and reconfiguring processes. Hence, relative SE should also be regarded as a dynamic process. As previous studies have reported mixed findings regarding the effectiveness of two strategic processes (e.g. Luo and Bhattacharya, 2009; McAlister, Srinivasan and Kim, 2007), it is necessary to address the moderating role of a firm's relative SE on value creation versus value appropriation when examining the impact of selling capability from the dynamic capabilities perspective.

From an external perspective, this study examines how the interactive effect of selling capability and relative SE on firm value may be further moderated by environmental conditions. This notion is based on the dynamic capabilities perspective, whereby firms acquire and deploy resources to match resource dispersion with environmental conditions, which in turn explains performance variance across firms (e.g. Morgan, 2012; Eisenhardt and Martin, 2000; Teece *et al.*, 1997). We focus on market volatility and

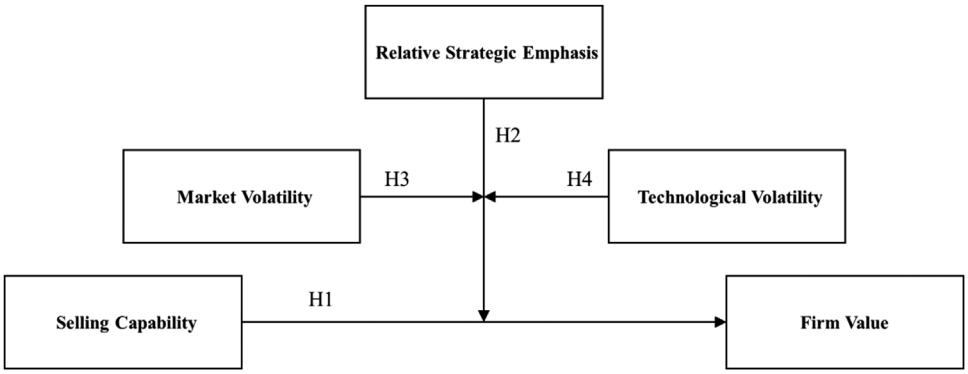

Figure 1. Research model of the study

technological volatility as key environmental conditions that affect the selling capability–firm value relationship, because environmental volatility emanates from dynamism in both the market environment and the technological environment (Carson, Madhok and Wu, 2006). Market volatility refers to the unpredictability and variability of customer preferences, whereas technological volatility denotes the uncertainty of product and process technologies in an industry in which a firm is active (Glazer and Weiss, 1993). By examining how the nexus between selling capability and relative SE works under volatile conditions, we seek to gain deeper insights into how firms should manage their selling capability and whether they should invest more in value-creation or value-appropriation activities for maximum business impact.

Figure 1 illustrates our research model, which investigates (1) the direct effect of selling capability on firm value, (2) the two-way interaction of selling capability and relative SE, and (3) the moderating role of market volatility and technological volatility on the interactive effect between selling capability and relative SE on firm value.

Selling capability and firm value

RBV theorists suggest that the strategic capabilities of a firm, such as selling capability, that meet the criteria of being valuable, rare, inimitable, and non-substitutable (VRIN) enable it not only to *attain* but also to *sustain* competitive advantage (Peteraf, 1993; Rahman *et al.*, 2018; Schaarschmidt *et al.*, 2022). The *valuable* and *rare* attributes of selling capability serve as an ex-ante limit to competition, and the *inimitable* and *non-substitutable* attributes serve as an ex-post limit to competition (Peteraf, 1993; Schaarschmidt *et al.*, 2022). Put simply, *valuable* and *rare* attributes help firms to attain competitive advantage, while *inimitable* and *non-substitutable* attributes assist firms in sustaining their competitive advantage (Guenzi *et al.*, 2016; Peteraf, 1993). In keeping with RBV theory, we argue that selling capability should be regarded as the level of *efficiency* with which a firm uses the inputs available to it (e.g. sales support resources) and converts them into desired outputs (e.g. sales revenue) (Dutta *et al.*, 2005; Rahman *et al.*, 2020). The efficient utilization of sales resources enables a firm to reduce its cost burden while attaining optimal sales (Chen *et al.*, 2015; Guenzi *et al.*, 2016; Rahman *et al.*, 2020). Hence, a firm's idiosyncratic practices embedded in its internal routines and processes for the deployment of its limited resources to attain the desired goals can engender *valuable, rare* and *inimitable* attributes (e.g. intangible assets) in the selling resource-capability framework (Song *et al.*, 2007).

From the dynamic capabilities perspective, selling capability not only involves complex coordinated mechanisms of sales skills and knowledge that become embedded as organization-level routines over time (Grant, 1996), but also is distinguished from other organizational processes by being performed well relative to competitors in the focal industry (Bingham, Eisenhardt and Furr, 2007). Hence, it is imperative to conceptualize and measure the firm-specific and relative selling capability that leads to competitive advantage in a particular industry. Furthermore, a firm's selling capability needs to be understood based on some reference points in order to draw inferences about a firm's relative selling capability, including

self-comparison (its current capability compared with its past capability), social comparison (capability levels of comparable firms), and both self-comparison and social comparison (a weighted average of self-reference and social reference points (Han *et al.*, 2017). Consequently, the dynamic nature of selling capability enables a firm to sense and reconfigure its selling-related inputs in response to environmental conditions while attempting to achieve its selling goals.

The productive deployment of a firm's selling capability can contribute to both revenue advantage and cost advantage, which in turn will positively affect the firm value. From the revenue advantage perspective, firms with stronger selling capability can bolster market-based performance by building and strengthening market-based assets, such as relational and intellectual assets (Guenzi *et al.*, 2016). Furthermore, firms with better selling capability understand their customers' needs better than their competitors do, which improves customer satisfaction and loyalty and thus positively affects their current revenue stream (Krush *et al.*, 2013; Panagopoulos *et al.*, 2018; Schaarschmidt *et al.*, 2022). From the cost advantage perspective, as firms with greater selling capability are able to use sales resources more efficiently, this ability to utilize sales-related inputs productively brings forth significant cost reduction, thereby positively affecting forward-looking stock market-based performance (Guenzi *et al.*, 2016; Patil and Syam, 2018). In fact, prior studies have shown that firms with greater strategic capabilities perform better based on stock market-based performance measures and have a higher firm value (Angulo-Ruiz *et al.*, 2018). In essence, a firm's selling capability that incorporates three elements—longitudinal (over multiple periods), efficiency (input and output), and relative (focal and other firms)—can be seen as a reliable determinant of firm value. That is, a firm's superior selling capability that is dynamically managed over time through recurrent reconfiguration fulfils the VRIN criteria, which assists the focal firm in sustaining its competitive advantage (Peteraf, 1993; Guenzi *et al.*, 2016)

In view of the arguments outlined above, we posit that having a stronger selling capability is likely to increase a firm's value. Thus,

H_1: There is a positive relationship between selling capability and firm value.

The interactive effect of selling capability and relative SE

Firms dynamically deploy their limited resources into two broad business processes, value creation and value appropriation, which are fundamental to achieving a sustained competitive advantage (Fang, Palmatier and Grewal, 2011). The process of value creation involves creating customer value through research and development initiatives, such as new products or innovative processes, whereas value appropriation focuses on extracting value through investment in branding and advertising (Mizik and Jacobson, 2003). Scholars have examined the efficacy of value creation and value appropriation both separately (e.g. Fang *et al.*, 2011) and jointly (e.g. Josephson, Johnson and Mariadoss, 2016). For instance, McAlister *et al.* (2007) demonstrated that R&D and advertising investments are positively related to a firm's financial performance, whereas Osinga *et al.* (2011) showed that advertising is negatively related to shareholder returns. Luo and Bhattacharya (2009) demonstrated that advertising increases the impact of corporate social strategies on a firm's financial performance, but the simultaneous pursuit of advertising and R&D decreases its impact. These mixed findings suggest that it is crucial to investigate the impacts of value creation and value appropriation jointly—in other words, employing relative SE (Mizik and Jacobson, 2003)—rather than separately (Han *et al.*, 2017).

Relative SE was used as a moderator to evaluate the relationship between a firm's selling capability and financial performance in this study because a firm's capability–performance link varies depending on the firm's strategic type (Feng *et al.*, 2017). The nexus between selling capability and firm value is also expected to be accentuated by the *complementary* effect of a firm's relative SE (Feng *et al.*, 2017; Mizik and Jacobson, 2003; Schaarschmidt *et al.*, 2022). Specifically, because selling capability and a relative SE on value appropriation are dynamically deployed with a common strategic objective (i.e. value extraction), a synergistic effect between them is envisaged (Feng *et al.*, 2017; Mizik and Jacobson, 2003; Schaarschmidt *et al.*, 2022). When a firm develops its selling capability, or when its selling capability is already advanced, the relative emphasis on value appropriation (e.g. advertising) compared with value creation (e.g. R&D) will enable it to build and

sustain customer relationships because both of these strategies emphasize extracting value from customers. In other words, the co-deployment of these complimentary mechanisms will help firms to satisfy the needs of existing customers better than their competitors. In sum, we theorize that the dynamic co-deployment of selling capability and a relative SE on value appropriation will have a synergistic effect on a firm's value. Thus,

H_2: The positive association between selling capability and firm value is stronger when firms place a greater relative strategic emphasis on value appropriation than they do on value creation.

The moderating effect of market volatility and technological volatility

Numerous studies have emphasized the importance of how a firm's external environment affects its capabilities (Feng *et al.*, 2017; Rahman *et al.*, 2021). Dynamic capability theory suggests that firms need to combine and reconfigure their intangible and tangible assets in novel ways to neutralize threats and exploit emergent opportunities in an ever-changing marketplace (Teece, 2007). Firms deploy and co-deploy a range of capabilities to best fit the external conditions they face and to deal with future opportunities and threats (Morgan, 2012; Porter, 1985). Researchers emphasize that firm capabilities have a greater effectiveness when (re)deployed in ways that are consistent with the external environment (Moorman and Slotegraaf, 1999). That is, different environmental conditions imply that different capabilities have differing degrees of importance and impact on a firm's value in different ways (Feng *et al.*, 2017), suggesting that the impact of selling capability and a firm's relative SE are contingent upon external environmental conditions.

In this study, we consider two types of external environments—market volatility and technological volatility (Carson *et al.*, 2006; Hanvanich, Sivakumar and Hult, 2006; Snyder and Glueck, 1982)—as moderating factors that affect the interplay among selling capability, relative SE, and firm value. Firms operating in an industry with high market volatility must satisfy the needs of new customers, which are heterogeneous compared with those of their existing customers, as well as the frequently changing needs of existing customers (Hanvanich *et al.*, 2006). To survive in a volatile market environment, a firm must become responsive to the changing preferences of existing customers as well as to the preferences of new customers, because the firm's existing value propositions are unlikely to satisfy customers' requirements (Kohli and Jaworski, 1990). During times of high market volatility, changing customer demands require that firms develop innovative strategies, which is particularly critical for satisfying the evolving needs of customers (Atuahene-Gima, Li and De Luca, 2006; Santos-Vijande and Alvarez-Gonzalez, 2007). When faced with a high degree of market volatility, firms require greater innovativeness to engage in value-creating activities (e.g. new product development) and perform well (Hult, Hurley and Knight, 2004). Also, value-extraction opportunity in a volatile market is limited and challenging owing to constantly changing customer needs (Snyder and Glueck, 1982; Santos-Vijande and Alvarez-Gonzalez, 2007). As a result, the precarity that persists in a highly volatile market renders value-extraction capabilities (selling capability and advertising) less effective (Snyder and Glueck, 1982; Mizik and Jacobson, 2003). Consequently, we posit that the positive interaction effect of selling capability and the relative SE on value appropriation will be attenuated when market volatility is high. Thus,

H_3: Market volatility moderates the joint effect of selling capability and relative strategic emphasis such that the joint effect of selling capability and relative strategic emphasis on firm value is weaker when market volatility is high.

Firms operating in industries with high technological volatility compete more on the basis of product and process technologies (Snyder and Glueck, 1982). When technological volatility is high, choosing the right technologies is difficult owing to the uncertainty and ambiguity endemic in such environments (Daft and Weick, 1984). Some firms may take a risk by adopting a highly speculative technology with a low commercial success rate, while others may consider low-risk existing technologies (Ross, 2014). Furthermore, technological volatility may invalidate successful innovation experiences, rendering them irrelevant for future practices (Zhang and Duan, 2010).

High technological volatility forces firms to continuously use resources and actively develop or buy fluctuating product and process technologies to generate new value propositions. Further,

a rapidly changing technological environment is characterized by the shortening of product lifecycles and the fast obsolescence of existing technologies (Atuahene-Gima and Li, 2004), which means that technological uncertainty leads to high product failure rates (Cunha *et al.*, 2014). As a result, a higher emphasis on value creation (e.g. R&D) compared with value appropriation (e.g. advertising) during times of technological turbulence may lead to a lower return on technological investments, which harms a firm's value. In technologically turbulent environments, a firm's success often hinges on its ability to better deliver value to customers through more effective supply-side operations and cost management (Jaworski, Kohli and Sahay, 2000). Hence, rather than focusing on value creation activities in environments where technology changes rapidly, firms should invest relatively more in value-appropriation activities and develop a few customer-need-centric appropriate technologies to satisfy customers' existing needs. That is, rather than adopting a future-oriented approach for innovation, firms should limit their innovation initiatives. Such a strategic choice will strengthen and stabilize firm performance. In essence, in a technologically volatile industry, even a highly innovative technology obtained through the investment of large R&D budget becomes obsolete in a short span of time (Snyder and Glueck, 1982). Consequently, firms fail to reap the reward from such innovations, which eventually hurts the financial wherewithal of the firm. Therefore, we propose that firms gain more by focusing on value-extraction activities rather than on value-creation initiatives in technologically volatile industries. Thus,

H_4: Technological volatility moderates the joint effect of selling capability and relative strategic emphasis such that the joint effect of selling capability and relative strategic emphasis on firm value is stronger when technological volatility is high.

Methodology

Data sources and sample

The sampling frame of this study is the annual 'Selling Power 500: The Largest Sales Forces in America' list (www.sellingpower.com). Selling Power ranks the top 500 US-based firms in terms of the size of their sales force. Selling Power lists have been used in previous studies (e.g. Panagopoulos *et al.*, 2018). This study worked with the most recent data. Specifically, the sample period of this study was from 2014 to 2020 (7 years). Our initial sample included all manufacturing and service firms (a total of 577 firms). Private firms were discarded owing to the unavailability of data; firms for which data were not available in Compustat were also discarded, leaving a final study sample of 341 firms (341 firms × 7 years). However, data for some firms for some years were still missing, so the final dataset used in this study was unbalanced. The total number of observations was a maximum of 2207 (for details, see Table 4). The sample consisted of firms belonging to 48 industries (according to two-digit SIC codes). The mean and the standard deviation of the size of the sales force of the sample firms were 3062 and 5030, respectively. Data relating to the measurement of the outcome variables, explanatory variable, moderating variables, and control variables were collected from Wharton Research Data Services' Financial Ratios Suite and Compustat.

Dependent variable: Firm value

This study used two measures of firm value. We used Tobin's Q (see Table 2), the ratio of a firm's market value to the current replacement costs of its assets (Germann, Ebbes and Grewal, 2015), as the first measure of firm value. While still being used across diverse disciplines, Tobin's Q appropriateness as a measure of firm value has been questioned recently (Edeling, Srinivasan, & Hanssens, 2021). Hence, we used Total Q (Peters and Taylor, 2017) as the second measure of firm value (Table 2).

Independent and moderating variables

Selling capability. Selling capability was measured using data envelopment analysis (DEA; see online Appendix A for details). We used *DEA window analysis* to measure the selling capability of each firm for each year. We used an input-oriented, variable return-to-sale DEA model to measure selling capability, because firms have more control over sales inputs than over sales outputs. Furthermore, sales outputs do not always increase proportionally when sales inputs are ramped up. Consequently, a variable return-to-scale model is appropriate. This study used three selling inputs:

Table 2. Operationalization of variables and data sources

Variable	Measurement	Data source
Selling capability	See text for details	Selling power and Compustat
Tobin's Q	Tobin's Q = (MV + LPS + DEBT)/BTA, where MV is the market value of equity, LPS is the liquidating value of the firm's preferred stock, DEBT is [(short-term liabilities — short-term assets) + (long-term debt)], and BTA is the book value of the total asset	Compustat
Total Q	$Q_{it}^{tot} = \frac{V_{it}}{K_{it}^{phy}+K_{it}^{int}}$, where V_{it} is the firm's market value measured as the sum of outstanding equity and book value of debt, minus the current asset; K_{it}^{phy} is the book value of property, plant and equipment; and K_{it}^{int} is the aggregate of externally purchased and internally created intangible capital. The externally purchased intangible capital is measured by the balance sheet item *Intangible Assets*. In contrast, the proxies for the two components of internal intangible capital – knowledge and organizational capital, are calculated using the perpetual inventory method accounting for the accumulated capital from past investments	Compustat
Relative strategic emphasis	See text for details	Compustat
Market volatility	$\frac{\frac{\sqrt{\sum_{i=1}^{x}\frac{(y_i-\bar{y})^2}{x}}}{\bar{y}}+\cdots+\frac{\sqrt{\sum_{i=1}^{x}\frac{(y'_i-\bar{y}')^2}{x}}}{\bar{y}'}}{z}$, where x is the number of years (for the purposes of this study, this time was set as 4 years, so x = 4 years); y is the sales revenue of firm y in each of the 4 years; $\bar{y}$ is the average sales revenue of firm y over 4 years; y′ is the sales revenue of firm y′ in each of the 4 years; $\bar{y}'$ is the average sales revenue of firm y′ over 4 years; and z is the number of firms in the industry (represented by a four-digit SIC code)	Compustat
Technological volatility	$\frac{\frac{\sum_{i=1}^{x}\frac{a_i+b_i}{c_i}}{x}+\cdots+\frac{\sum_{i=1}^{x}\frac{a'_i+b'_i}{c'_i}}{x}}{z}$, where x is the number of years (for the purposes of this study, this time was set as 4 years, so x = 4); a is the R&D expenditure of firm y in each of the 4 years; b is the capital expenditures of firm Y in each of the 4 years; c is the total assets of firm y in each of the 4 years; a′ is the R&D expenditure of firm y′ in each of the 4 years; b′ is the capital expenditure of firm y′ in each of the 4 years; c′ is the total assets of firm y′ in each of the 4 years; and z is the number of firms in the industry (four-digit SIC code)	Compustat
Firm size	Log of a firm's total assets	Compustat
Leverage	Long-term debt divided by the total assets	Compustat
Employee productivity	Sales revenue divided by the total number of employees	Compustat
Capital intensity	Invested capital divided by the number of employees	Compustat
Financial slack	Working capital divided by total assets	Compustat
Financial constraint	See text for details	Compustat
ROA (profitability) growth	Yearly growth of return on asset	Compustat
Industry differentiation	Industry advertising expenditure divided by industry sales	Financial ratio (WRDS)
Industry financial soundness (cashflow margin)	Income before extraordinary items and depreciation as a fraction of sales	Financial ratio (WRDS)
Market growth	Market growth was calculated as the annual percentage growth in industry (four-digit SIC) sales revenues	Compustat

the size of the sales force, operationalized as the total number of salespeople; selling and promotional expenditure, operationalized as selling, general, and administrative expenditure; and customer relationship commitment, operationalized as the dollar amount of account receivables. Two outputs were used: sales revenue and sales growth.

Relative SE. We followed extant studies (Mizik and Jacobson, 2003) to measure the effect of relative SE on value appropriation compared with value creation as follows:

$$\text{SE} = \frac{\text{Advertising expenditure}_{\text{it}} - \text{R\&D expenditure}_{\text{it}}}{\text{Total assets}_{\text{it}}},$$

where i is the firm and t is the time (year). A positive value of relative SE denotes a firm's relative SE on value appropriation as opposed to value creation, and a negative value signifies a firm's relative SE on value creation as opposed to value appropriation.

Market volatility and technological volatility. We followed prior studies to measure market volatility (Ghosh and Olsen, 2009; Habib, Hossain and Jiang, 2011; Snyder and Glueck, 1982) and technological volatility (Snyder and Glueck, 1982). See Table 2 for details.

Control variables

This study incorporated a set of firm- and industry-specific variables guided by theory and prior studies (Table 2).

Firm-specific controls. Prior studies have shown that a firm's financial gain varies depending on size, because firm size affects economies of scope (Feng, Morgan and Rego, 2017). Therefore, this study controlled for *firm size*. Firm value is influenced by *firm leverage* (Bayer *et al.*, 2020) and was thus also controlled for. Prior studies have shown that performance hinges upon employee productivity because employee productivity positively affects a firm's revenue streams (Shan, Fu and Zheng, 2017). Therefore, *employee productivity* was incorporated as a control variable. *Capital intensity* was also controlled for (Rahman *et al.*, 2021). Previous studies have documented that financial slack impacts firm performance (Tang, Hull and Rothenberg, 2012), so this variable was incorporated to control for its effect. Similarly, studies have shown that the extent of financial constraint also affects performance (Zhang, 2020), because a lack of funds prevents financially constrained firms from embarking upon gainful investment projects. Accordingly, this was controlled for as the effect of *financial constraints*. This study used the KZ index, which has been used in previous studies (Cheng, Ioannou and Serafeim, 2014), to measure financial constraints, as follows:

$$KZ\ Index = -1.002CF_{it}/A_{it-1} - 39.368DIV_{it}/A_{it-1} - 1.315C_{it}/A_{it-1} + 3.139LEV_{it} + 0.283Q_{it},$$

where $\text{CF}_{\text{it}}/\text{A}_{\text{it-1}}$ is cash flow over lagged assets, $\text{DIV}_{\text{it}}/\text{A}_{\text{it-1}}$ is cash dividends over lagged assets, $\text{C}_{\text{it}}/\text{A}_{\text{it-1}}$ is cash balances over assets, LEV_{it} is leverage, and Q_{it} is the market value of equity (price times shares outstanding plus assets minus the book value of equity over assets). This study also controlled for *return on asset (ROA) (profitability) growth*, as it is expected to affect firm value (Bayer *et al.*, 2020; Feng *et al.*, 2017). We first measured the yearly ROA as net income divided by total assets and then calculated the yearly ROA growth. Finally, we included two periods' lag values of the firm value variable as control variables (Marino *et al.*, 2015; Rahman *et al.*, 2021). The rationale for this decision is explained in the model estimation method section.

Industry-specific controls. As the sample firms used were drawn from multiple industries, this study incorporated a set of industry control variables, because firm value can be influenced by industry-specific attributes. *Industry differentiation* was controlled for because industry advertising intensity affects industry performance (Hull and Rothenberg, 2008; Vadakkepatt, Shankar and Varadarajan, 2021). *Industry financial soundness* (cashflow margin) was controlled for because performance across industries varies. We also controlled for *market growth*, as it varies from one industry to another (Vadakkepatt *et al.*, 2021).

Other unobserved factors. Even though this study used a set of relevant firm- and industry-specific variables, there are other time-invariant unobserved firm factors, such as firm culture, that can affect firm value. Hence, this study controlled for firm-specific unobserved time-invariant factors using the appropriate estimation technique, as discussed below. Firm value may also be affected by various time-invariant, unobserved, industry-specific factors, so industry dummies were included to control for their effect. Finally, because this study is longitudinal in nature, there could be time-specific exogenous shocks, the effect of which has to be controlled for, so we controlled for time-specific factors.

Table 3. Results of diagnostic tests

Diagnostic test	Purpose and results
Unobserved firm-specific effects	This study tested for unobserved fixed firm-specific effects using the Hausman test ($\chi^2 = 360.08$, p = 0.0000). As explained below, this study used system-GMM to estimate the model, which includes firm-fixed effects, to account for unobserved heterogeneities across sample firms (Marino *et al.*, 2015)
Serial correlation	One widespread challenge in the panel data structure is the autocorrelation in the idiosyncratic error term, which biases the standard errors. The results are less efficient in the presence of autocorrelation (Drukker, 2003). We conducted a Woolridge test using Stata's *xtserial* module, the results of which (F = 33.073, p = 0.0000) confirmed the presence of serial correlation in the idiosyncratic error term of the model. As autocorrelation was detected in the model, an appropriate model estimation method that can produce robust results must be used, which will be explained below
Endogeneity test	We conducted a *Durbin–Wu–Hausman* test using the lag values as instrumental variables (internal instruments) to check for endogeneity in the key explanatory variable of theoretical interest (*selling capability*). The results confirmed that selling capability is exogenous ($\chi^2 = 1.62025$, p = 0.203). Also, we conducted a *Durbin–Wu–Hausman* test for the moderating variables. Our analysis showed that relative strategic emphasis ($\chi^2 = 4.74510$, p = 0.029), market volatility ($\chi^2 = 7.01812$, p = 0.008), and technological volatility ($\chi^2 = 4.91890$, p = 0.027) are endogenous
Number of lags of dependent variable	Because a firm's value in the current period can be associated with previous periods' value (Marino, 2015; Rahman *et al.*, 2021), this study controlled for *persistence* in firm value by incorporating the lagged firm value (autoregressive model). Specifically, lagged firm values for the two periods were included based on two criteria. First, we ran a regression with a 1-year lag of firm value and increased the number of lags by one until the additional lag of firm value was found to be statistically insignificant (Duru, Iyengar and Zampelli, 2016). Second, we calculated the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) to determine the number of lags (Steenkamp and Fang, 2011). The values of AIC and BIC for the first lag were 1691.704 and 1874.57, respectively, and the values of AIC and BIC for the first and second lags were 1386.529 and 1562.236, respectively. The lower values for both AIC and BIC suggest that two period lags are preferable to one period lag, so we included the lagged values of the dependent variable in the final analysis

Model specification

The dynamic model used to explore the association between selling capability and firm value is as follows:

$$
\begin{aligned}
&Firm\ value_{it} \\
&= \beta + \alpha_0 Firm\ value_{it-1} + \alpha_1 Firm\ value_{it-2} \\
&\quad + \alpha_2 Selling\ capability_{it} + \alpha_3 Relative\ strategic\ emphasis_{it} \\
&\quad + \alpha_4 Market\ volatility_{it} + \alpha_5 Technological\ volatility_{it} \\
&\quad + \alpha_6\ Selling\ capability_{it} \times Relative\ strategic\ emphasis_{it} \\
&\quad + \alpha_7\ Selling\ capability_{it} \times Market\ volatility_{it} \\
&\quad + \alpha_8 Selling\ capability_{it} \times Technological\ volatility_{it} \\
&\quad + \alpha_9 Relative\ strategic\ emphasis_{it} \times Technological\ volatility_{it} \\
&\quad + \alpha_{10}\ Relative\ strategic\ emphasis_{it} \times Market\ volatility_{it} \\
&\quad + \alpha_{11}\ Selling\ capability_{it} \times Relative\ strategic\ emphasis_{it} \\
&\quad \times Market\ volatility_{it} + \alpha_{12}\ Selling\ capability_{it} \\
&\quad \times Relative\ strategic\ emphasis_{it} \times Technological\ volatility_{it} \\
&\quad + Covariates + Time\ fixed\ effects \\
&\quad + Industry\ fixed\ effects + \eta_i + \varepsilon_{it} \qquad (1)
\end{aligned}
$$

where i and t represent the firm and year, respectively, η_i is the possible firm-specific component of the error term, and ε_{it} is the error term.

Diagnostic tests and model estimation method

We conducted a number of tests (Table 3) on our panel data because they pose an array of econometric challenges, such as serial correlation, unobserved heterogeneity, and endogeneity.

Model estimation method. This study used a two-step system-GMM estimation technique incorporating Stata's *xtabond2* module (Roodman, 2009) for several reasons. Firstly, as indicated above, this study used two-period lagged values of the dependent variable on the right-hand side of the equation (autoregressive model). The system-GMM is particularly designed to estimate such autoregressive models because it can generate reliable coefficient estimates by accounting for the *dynamic panel bias* stemming from the inclusion of the lagged values of the dependent variable (Marino *et al.*, 2015; Roodman, 2009). Secondly, as shown above, the *Hausman* test confirmed the use of the fixed-effect model, and the GMM incorporated

Table 4. Descriptive statistics

Variable	Observations	Mean	Standard deviation	VIF
Tobin's Q	2199	1.545	1.397	
Total Q	1914	1.482	1.452	
Selling capability	1773	0.541	0.293	1.243
Relative strategic emphasis	2199	−0.016	0.047	1.381
Market volatility	2211	0.211	0.135	2.896
Technological volatility	2211	0.164	0.33	1.797
Leverage	2199	0.257	0.172	1.287
Capital intensity	2122	552.656	634.268	1.764
Profitability growth	2183	0.465	9.859	1.003
Employee productivity	2122	539.112	505.667	1.42
Firm size	2199	9.462	1.733	1.8
Industry differentiation	2048	0.006	0.011	1.178
Industry financial soundness	2048	−0.042	0.525	2.396
Firm financial constraint	2187	0.349	1.124	1.363
Market growth rate	2207	0.014	0.195	1.037
Firm financial slack	2199	0.122	0.153	1.342

firm fixed effects and accounted for unobserved heterogeneities across sample firms. Thirdly, the *Woolridge* test confirmed the presence of serial correlation in our dataset, for which GMM is an appropriate estimation method (Steigenberger and Wilhelm, 2018). Fourthly, our *Durbin-Wu-Hausman* tests confirmed that some of the key explanatory variable were endogenous, and the GMM produced endogeneity-robust results in the presence of endogenous regressors (Roodman, 2009). Finally, GMM allows for the use of lagged values of endogenous variables as internal instruments to generate endogeneity-robust results (Marino *et al.*, 2015; Steigenberger and Wilhelm, 2018).

As the *Durbin-Wu-Hausman* confirmed above, we employed relative SE, market volatility, and technological volatility as endogenous variables—that is, they were modelled as *GMM-style* variables and their lagged values were used as instruments. The remaining firm-specific control variables were also treated as endogenous and incorporated as *GMM-style* variables. Conversely, as the *Durbin-Wu-Hausman* test confirmed that selling capability was an exogenous variable, it was incorporated as an *IV-style* variable (standard instrument) along with year-dummies and industry-dummies. The remaining industry variables were also employed as standard instruments. As it is recommended that the number of instruments should not exceed the number of firms (Roodman, 2009), we controlled for the proliferation of instruments in two ways. Firstly, we used the *collapse* option to limit the number of instruments. Secondly, we used the *laglimits* option and the nearest lagged values of the endogenous variables. Finally, to minimize data loss (and maximize sample size), we used orthogonal deviation instead of first differencing (Roodman, 2009).

Descriptive statistics and correlations matrix

The low variance inflation factor (VIF) (Table 4) confirms that multicollinearity is not an issue. We winsorized variables at 1% and 99% to deal with the outliers. Correlations are reported in Table 5.

Main findings

The findings of the two-step system-GMM estimation are reported in Table 6. Models 1 and 2 report the results for Tobin's Q and Total Q, respectively. The lagged values of the dependent variables are significant in both models, confirming the benefit of using the system-GMM. We discuss the results reported in the two models concurrently. The first hypothesis (H_1) predicted a positive impact of selling capability on firm value. The coefficient for selling capability is positive and significant for Tobin's Q ($p < 0.05$) as well as for Total Q ($p < 0.05$), confirming H_1. The second hypothesis (H_2) predicted that the positive effect of selling capability on firm value would be greater if firms placed relatively greater SE on value appropriation as opposed to value creation. The coefficient for

Table 5. Correlations

Panel A: Dependent variable: Tobin's Q

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1) Tobin's Q	1.000														
(2) Selling capability	0.093*	1.000													
(3) Relative strategic emphasis	−0.045	−0.004	1.000												
(4) Market volatility	0.105*	−0.039	−0.347*	1.000											
(5) Technological volatility	0.100*	0.006	−0.303*	0.617*	1.000										
(6) Leverage	0.079*	0.013	0.121*	0.008	0.062*	1.000									
(7) Capital intensity	−0.086*	−0.036	−0.033	0.250*	0.260*	−0.014	1.000								
(8) Profitability growth	0.033	0.032	0.006	−0.019	−0.003	−0.025	−0.011	1.000							
(9) Employee productivity	−0.022	0.185*	0.057*	0.156*	0.094*	−0.070*	0.460*	0.001	1.000						
(10) Firm size	−0.258*	−0.331*	−0.019	0.075*	0.091*	−0.037	0.445*	−0.020	0.143*	1.000					
(11) Industry differentiation	0.056	0.023	0.306*	−0.210*	−0.126*	0.038	0.044	0.008	−0.118*	0.027	1.000				
(12) Industry financial soundness	0.040	0.134*	0.319*	−0.709*	−0.537*	−0.021	−0.222*	0.023	−0.086*	−0.181*	0.159*	1.000			
(13) Firm financial constraint	−0.039	0.121*	0.069*	−0.032	−0.042	0.371*	0.029	−0.005	−0.029	−0.116*	0.000	0.179*	1.000		
(14) Market growth rate	0.034	0.052	0.023	0.110*	0.064*	0.028	0.006	−0.011	0.085*	−0.034	−0.003	0.013	0.044	1.000	
(15) Firm financial slack	0.111*	0.040	−0.179*	0.036	0.064*	−0.146*	−0.082*	0.008	0.031	−0.354*	−0.142*	−0.017	−0.152*	−0.014	1.000

Panel B: Dependent variable: Total Q

(1) Total Q	1.000														
(2) Selling capability	0.024	1.000													
(3) Relative strategic emphasis	−0.050	−0.004	1.000												
(4) Market volatility	0.132*	−0.039	−0.347*	1.000											
(5) Technological volatility	0.137*	0.006	−0.303*	0.617*	1.000										
(6) Leverage	−0.035	0.013	0.121*	0.008	0.062*	1.000									
(7) Capital intensity	0.151*	−0.036	−0.033	0.250*	0.260*	−0.014	1.000								
(8) Profitability growth	0.025	0.032	0.006	−0.019	−0.003	−0.025	−0.011	1.000							
(9) Employee productivity	0.048	0.185*	0.057*	0.156*	0.094*	−0.070*	0.460*	0.001	1.000						
(10) Firm size	−0.041	−0.331*	−0.019	0.075*	0.091*	−0.037	0.445*	−0.020	0.143*	1.000					
(11) Industry differentiation	0.040	0.023	0.306*	−0.210*	−0.126*	0.038	0.044	0.008	−0.118*	0.027	1.000				
(12) Industry financial soundness	−0.005	0.134*	0.319*	−0.709*	−0.537*	−0.021	−0.222*	0.023	−0.086*	−0.181*	0.159*	1.000			
(13) Firm financial constraint	−0.099*	0.121*	0.069*	−0.032	−0.042	0.371*	0.029	−0.005	−0.029	−0.116*	0.000	0.179*	1.000		
(14) Market growth rate	0.023	0.052	0.023	0.110*	0.064*	0.028	0.006	−0.011	0.085*	−0.034	−0.003	0.013	0.044	1.000	
(15) Firm financial slack	0.120*	0.040	−0.179*	0.036	0.064*	−0.146*	−0.082*	0.008	0.031	−0.354*	−0.142*	−0.017	−0.152*	−0.014	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6. Regression results using a two-step system GMM

Variable	Model 1 DV: Tobin's Q	Model 2 DV: Total Q
Tobin's Q *(Lag 1)*	0.556***	
	(0.0814)	
Tobin's Q *(Lag 2)*	0.276***	
	(0.0676)	
Total Q *(Lag 1)*		0.635***
		(0.0765)
Total Q *(Lag 2)*		0.197***
		(0.0762)
Main effect (Hypothesis 1)		
Selling capability	0.907**	0.727**
	(0.371)	(0.362)
Two-way interaction effect (Hypothesis 2)		
Selling capability × Relative strategic emphasis	27.08***	25.98**
	(9.841)	(10.09)
Three-way interaction effect (Hypothesis 3)		
Selling capability × Market volatility × Relative strategic emphasis	−138.4***	−146.5***
	(32.74)	(37.69)
Three-way interaction effect (Hypothesis 4)		
Selling capability × Technological volatility × Relative strategic emphasis	61.29***	59.22***
	(15.76)	(15.96)
Technological volatility × Relative strategic emphasis	−43.23***	−38.72***
	(12.13)	(12.84)
Market volatility × Relative strategic emphasis	92.07***	83.88***
	(21.60)	(23.19)
Selling capability × Market volatility	−6.211***	−5.903***
	(2.067)	(2.112)
Selling capability × Technological volatility	2.756***	2.536***
	(0.996)	(0.968)
Relative strategic emphasis	−23.82***	−21.42***
	(5.966)	(6.337)
Market volatility	4.329***	3.453***
	(1.258)	(1.261)
Technological volatility	−2.036***	−1.827**
	(0.748)	(0.733)
Leverage	0.259	−0.119
	(0.212)	(0.229)
Capital intensity	−8.93e-05	−4.37e-05
	(6.00e-05)	(7.02e-05)
Profitability growth	−0.00673	−0.00563
	(0.00802)	(0.00753)
Employee productivity	0.000139**	6.95e-05
	(6.18e-05)	(6.40e-05)
Firm size	−0.0175	0.0116
	(0.0223)	(0.0221)
Industry differentiation	21.09***	12.63*
	(7.560)	(7.378)
Industry financial soundness	0.178*	0.194***
	(0.0939)	(0.0747)
Firm financial constraint	0.0180	0.0345
	(0.0403)	(0.0336)
Market growth	0.192*	0.346***
	(0.0987)	(0.0960)
Firm financial slack	0.177	0.147
	(0.227)	(0.205)
Year fixed effects	YES	YES

Table 6. (Continued)

Variable	Model 1 DV: Tobin's Q	Model 2 DV: Total Q
Industry fixed effects	YES	YES
Constant	−0.771**	−0.516
	(0.373)	(0.362)
Wald (χ^2)	1650.08***	1676.67***
Number of instruments	76	76
AR (1)	−2.91	−2.25
p value	0.004	0.024
AR (2)	−0.75	−0.86
p value	0.453	0.392
Hansen J test	41.00	40.56
p value	0.299	0.316
Number of observations	1119	981
Number of firms	333	294

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

the interaction term between selling capability and relative SE is positive and significant in both models (Model 1, $p < 0.01$; Model 2, $p < 0.05$), confirming H_2. The third hypothesis (H_3) predicted that market volatility would negatively moderate the joint effect between selling capability and relative SE on firm value. The three-way interaction term among selling capability, market volatility, and relative SE is negative and statistically significant in both models (Model 1, $p < 0.01$; Model 2, $p < 0.01$), confirming H_3. The fourth hypothesis (H_4) predicted that technological volatility would positively moderate the interaction effect between selling capability and the relative SE on firm value. The three-way interaction among selling capability, technological volatility, and relative SE is positive and statistically significant (Model 1, $p < 0.01$; Model 2, $p < 0.01$), confirming our prediction.

Robustness check

We conducted additional analyses (Table 7) to check the robustness of our findings. We used the *market-to-book ratio* and *log of market value* as alternative measures of firm value (Model 3 and Model 5). Also, we included additional control variables (Model 4 and Model 5). Specifically, we included a dummy variable for service versus manufacturing firms because the sample in the study includes both types. It could be argued that the selling capabilities of service and of manufacturing firms might have different impacts (Wang, Zhao and Voss, 2016). In addition, recent research in corporate finance has confirmed that the coefficients of the independent variables other than *firm size* often change in sign and significance when different operationalizations of firm size are used (Dang, Li and Yang, 2018). Accordingly, we used an alternative measure of firm size based on the number of individuals employed by a firm. As can be seen in Model 3, using the market-to-book ratio to measure the dependent variable indicated that all four hypotheses are supported, thus confirming the robustness of the findings reported in the preceding section. Models 4 and 5, using an additional control variable as well as an alternative measure of firm size, also confirmed that our results were robust.

Discussion and conclusion

Proponents of the RBV and dynamic capabilities theory contend that firm capabilities, including selling capability, should be relative compared with other firms and dynamic when they interact with internal resources in ways that match the external environment in determining firm outcomes (Barney, 1991, Teece *et al.*, 1997). This research improves our understanding of how to conceptualize and measure selling capability in terms of organization level (vs. individual level) and relativity (vs. absolute capability) and its effect on firm value. Also, this treatise identifies the internal boundary condition—relative SE (value creation vs. value appropriation)—and the external boundary conditions (i.e. market and technological volatility) under which firms must manage their selling

Table 7. Regression results using a two-step system GMM

Variable	Model 4 DV: Market-to-book ratio	Model 5 DV: Market-to-book ratio	Model 6 DV: Log of market value
Market-to-book ratio *(Lag1)*	0.622***	0.535***	
	(0.0875)	(0.114)	
Market-to-book ratio *(Lag2)*	0.218***	0.314***	
	(0.0695)	(0.0986)	
Log of market value *(Lag1)*			0.681***
			(0.120)
Log of market value *(Lag2)*			0.331***
			(0.118)
Main effect (Hypothesis 1)			
Selling capability	0.780**	0.915***	0.494*
	(0.345)	(0.343)	(0.284)
Two-way interaction effect (Hypothesis 2)			
Selling capability × Relative strategic emphasis	27.00***	23.56***	14.89**
	(9.018)	(8.348)	(7.506)
Three-way interaction effect (Hypothesis 3)			
Selling capability × Market volatility × Relative strategic emphasis	−138.2***	−134.1***	−71.18**
	(31.58)	(33.55)	(29.07)
Three-way interaction effect (Hypothesis 4)			
Selling capability × Technological volatility × Relative strategic emphasis	60.24***	56.22***	24.79**
	(15.00)	(15.90)	(12.11)
Technological volatility × Relative strategic emphasis	−43.05***	−39.05***	−22.15**
	(11.58)	(12.43)	(9.982)
Market volatility × Relative strategic emphasis	89.31***	81.40***	51.33***
	(21.05)	(22.02)	(19.71)
Selling capability × Market volatility	−5.234***	−5.685***	−2.260
	(1.957)	(2.042)	(1.524)
Selling capability × Technological volatility	2.412**	2.129**	−0.107
	(0.939)	(0.983)	(0.655)
Relative strategic emphasis	−22.78***	−19.08***	−11.95**
	(5.521)	(5.160)	(4.846)
Market volatility	3.807***	3.911***	1.410
	(1.200)	(1.294)	(0.906)
Technological volatility	−1.898***	−1.627**	−0.213
	(0.690)	(0.742)	(0.488)
Leverage	0.0504	0.0173	0.0782
	(0.189)	(0.192)	(0.118)
Capital intensity	−5.44e-05	−5.91e-05	−1.90e-05
	(5.69e-05)	(4.90e-05)	(4.83e-05)
Profitability growth	−0.00534	−0.00274	−0.0170**
	(0.00764)	(0.00799)	(0.00813)
Employee productivity	0.000104*	4.08e-05	−2.95e-05
	(6.18e-05)	(7.43e-05)	(5.58e-05)
Firm size (employees)		−0.000439	−0.00115
		(0.000342)	(0.000929)
Industry differentiation	16.48**	8.775	0.279
	(7.065)	(7.035)	(5.915)
Industry financial soundness	0.187**	0.165*	0.0426
	(0.0894)	(0.0880)	(0.0671)
Firm financial constraint	0.0365	0.0379	0.0361**
	(0.0395)	(0.0329)	(0.0173)
Market growth	0.173*	0.229**	0.102
	(0.102)	(0.104)	(0.0847)

Table 7. (Continued)

Variable	Model 4 DV: Market-to-book ratio	Model 5 DV: Market-to-book ratio	Model 6 DV: Log of market value
Firm financial slack	0.271	0.0951	−0.0908
	(0.231)	(0.228)	(0.188)
Service/Manufacturing dummy		−0.0793	−0.153
		(0.290)	(0.198)
Firm size (log of Assets)	−0.0167		
	(0.0213)		
Year fixed effects	YES	YES	YES
Industry fixed effects	YES	YES	YES
Constant	−0.620*	−0.520	−0.119
	(0.351)	(0.490)	(0.485)
Wald (χ^2)	2135.97***	1984.67***	26943.11***
Number of instruments	76	76	76
AR (1)	−3.45	−2.54	−2.96
p value	0.001	0.011	0.003
AR (2)	−0.57	−1.22	−0.86
p value	0.568	0.221	0.387
Hansen J test	38.75	31.91	49.04
p value	0.391	0.663	0.072
Number of observations	1119	1119	1015
Number of firms	333	333	303

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

capability to maximize firm value. Our results show that organization-level selling capability is positively associated with firm value. Although the association of capability with firm value is positive and robust across different industries (manufacturing and service) and different firm attributes (e.g. firm size), it is still moderated by internal and external factors. Specifically, the relative SE on value appropriation as opposed to value creation strengthens the positive association of selling capability with firm value, while the interactive effect of selling capability and relative SE is moderated negatively by market volatility but positively by technological volatility. Our findings provide scholars and managers with strategic guidance on how to deploy and measure selling capability and internal resources under external conditions to maximize firm value.

Theoretical implications

This study contributes to the literature on marketing and sales strategies in three ways. Firstly, this study contributes to the selling capability literature by providing a more precise conceptualization and measurement of selling capability. The integration of RBV and dynamic capabilities theory assists the reconceptualization by avoiding some of the limitations that have been ascribed to the capability view, such as a static orientation and subjectivity. The extant literature on selling capability is dominated by the individual- or group-level selling inputs based on perceptual data for the measurement of selling capability (e.g. Guenzi *et al.*, 2016; Jaakkola *et al.*, 2015; Krush *et al.*, 2013; Schaarschmidt *et al.*, 2022). Past studies relied on the static and non-contingent RBV to conceptualize selling capability from the input-oriented and absolute perspective; these studies consequently failed to measure the relative efficiency of a firm's selling capability, which transforms resource inputs into outputs over time compared with other firms' selling capability. Our reconceptualization, grounded in both the RBV and dynamic capabilities, provides a more accurate definition of a firm's selling capability because a firm uses its resources to achieve its desired objective in changing environments (Dutta *et al.*, 1999; Vorhies and Morgan, 2005). The reconceptualized selling capability, which is a dynamic capability, fulfils the VRIN criteria because the longitudinal, integrative processes of transforming selling

inputs into selling outputs are firm-specific assets (Song *et al.*, 2007; Teece *et al.*, 1997).

Secondly, this study adds to the literature that describes how firms should configure their internal resources (value creation and value appropriation) and capabilities (selling capability) over time and dynamically adapt the capability-driven firm value framework accordingly. The empirical evidence on the relationship between selling capability and firm value extends our knowledge about how the RBV and dynamic capabilities can be applied to operations management (Hitt, Xu and Carnes, 2016). Our findings reveal that if a firm allocates more resources to value appropriation, its managers generate market knowledge and insights pertaining to the predictability and stability of future revenue-generating activities (Luo and Bhattacharya, 2009), and the association of SE on value appropriation with selling capability leads to an increase in firm value. Although value-creation activities can help a firm to stay ahead of competitors through impactful innovation (e.g. Vorhies, Orr and Bush, 2011), a firm's relative emphasis on or shift towards value creation may jeopardize the extraction of economic rents from the current market opportunities (e.g. Mizik and Jacobson, 2003). A balanced alignment of the two processes may allow a firm to satisfy current marketplace demands while simultaneously attending to its long-term position, as a firm tends to emphasize one process more strongly than the other (He and Wong, 2004). Our results suggest the importance of a relative SE on value appropriation (vs. value creation) in strengthening the positive impact of selling capability on firm value. Hence, this study adds to the literature on dynamic capability theory extensions to the RBV in that (selling) capability and (internal) resources interact with one another and further explain interfirm performance variations (Teece *et al.*, 1997).

Finally, this study contributes to the dynamic capabilities literature by demonstrating that external volatility may generate a selling capability gap and the deployment of dynamic capabilities engenders reconfiguration of internal resources and capabilities that outline how to close the capability gap. As the RBV has traditionally focused on the competitive implications of internal resources and capabilities, the application of dynamic capabilities theory to the selling capability–firm value link can better capture the efficiency and effectiveness of selling capability, depending on the source of volatility. This study identified two sources of volatility, namely market volatility and technological volatility, and showed their divergent impact on the nexus among selling capability, relative SE, and firm value. Prior studies investigating the financial implications of selling capability have ignored the moderating role of pertinent internal factors and external conditions, which may not capture the extent to which contingency factors accentuate or attenuate the effect of selling capability on firm value. However, our results show that when a market is volatile, firms should explore new knowledge through R&D activities to better serve changing customer needs (Atuahene-Gima *et al.*, 2006). In contrast, when technology is volatile, firms must focus more on efficiency and refine their existing value-extraction capabilities to optimize their short-term results owing to the difficulty of choosing the right technologies (Daft and Weick, 1984). To date, most studies on selling capability have ignored the effects of various moderating factors (i.e. internal resource allocation and external environmental turbulence) in examining the outcomes of selling capability. The results of our boundary conditions, obtained by capturing two- and three-way interaction effects, provide the basis for future research in marketing and sales management.

Managerial implications

This study has several useful implications for marketing and sales managers. Sales managers should adopt a dynamic and an input–output approach to manage the selling capability of a firm efficiently. That is, for the successful deployment of selling capability, managers should consider three elements simultaneously: efficiency (i.e. sales-related inputs and outputs), relativity (i.e. comparison with other firms), and longitudinal (i.e. over time). In addition, they must be aware of their firm's internal SE. When the selling capability of a firm is strong, managers should shift their SE towards value-appropriation activities (i.e. advertising) to maximize firm value. Successful alignment of selling capability with that of relative SE necessitates a well-coordinated effort across several divisions, including sales, marketing, and R&D.

Furthermore, this study highlights that managers should identify the sources of environmental volatility (market or technological), because selling capability and relative SE (i.e. value creation and value appropriation) fit external

conditions differently. Put differently, managers should dynamically manage internal resources (i.e. R&D and advertising) and capabilities (i.e. selling capability) in line with external contextual factors. In a highly volatile market where customer needs change rapidly, marketing managers should increase investment in value-creation activities to unearth new opportunities. Conversely, when product and process technologies are volatile, managers should enhance exploitative marketing actions, such as selling capability and advertising. In essence, our findings suggest that managers should develop and deploy selling capability dynamically while considering the internal resource allocation process and external conditions.

Limitations and future research

Our study has a few limitations. Firstly, the sample firms in the current study are mostly large firms that can attain economies of scale in sales operations more easily than can smaller firms. Hence, future studies should incorporate the *scale effect* of sales operations to further expand our understanding of the effect of selling capability on firm value. Secondly, this study explored a single internal strategy (relative SE), so future studies should examine how the impact of selling capability varies when they interact with multiple firm strategies/capabilities. Thirdly, this study focused only on US-based firms, so future studies should draw samples from multiple countries to enhance generalizability. Finally, future studies should examine the non-linear moderating effect of external contextual factors.

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Supporting Information

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