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ORIGINAL EMPIRICAL RESEARCH

Chief marketing officer presence and firm performance: assessing conditions under which the presence of other C-level functional executives matters

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Abstract

This research extends understanding of the relationship between chief marketing officer (CMO) presence and firm performance by investigating how it is affected by the presence of three other functional heads (or CXOs) under various environmental and strategic contingencies. Results based on a panel of 401 U.S. manufacturers reaffirm the positive CMO presence–firm performance relationship and establish that the linkage is (a) strengthened by chief sales officer presence when industry sales volatility is high, (b) strengthened (weakened) by chief technology officer presence when industry innovation and firm differentiation (cost leadership) are high, and (c) strengthened (weakened) by chief supply chain officer presence when firm diversification (differentiation) is high. The study: expands top management team research by investigating executive dyads formed by the pairing of heads of functions advocated in the organizationally embedded view of marketing; delineates CXOs' roles and orientations to clarify mechanisms that aid or hamper the CMO; and, identifies industry and firm-level contexts that affect the CMO–CXO interfaces. Additionally, the findings underscore the importance of appointing CMOs and, of CMOs spanning organizational silos.

Keywords Chief marketing officer · Executive dyad · Inter-functional interfaces · Organizationally embedded view of marketing · TMT functional dyads · Financial performance · Contingency

Introduction

There is burgeoning evidence that marketing representation in firms' upper echelons can lead to favorable financial consequences (e.g., Feng et al. 2015; Kim et al. 2016; Srinivasan and Ramani 2019; Whitler et al. 2018). One form of such representation is the presence of a chief marketing officer (CMO), the firm's senior-most marketing executive. Firms employing a CMO are expected to fare better than those that do not because this executive can elevate the marketing concept to corporate-level strategic decision-making (Jaworski 2011). While earlier research reported a mix of positive and non-significant main effects (see summaries by Nath and Mahajan 2017; Wiedeck and Engelen 2018), studies with longer observation windows and robust empirical methods taking selection and endogeneity issues into account have established the benefits of CMO presence (Germann et al. 2015; Homburg et al. 2014).

However, scholars have also proposed that a specific C-level functional head—referred to as CXO hereafter—is unlikely to be solely responsible for driving a firm's performance (Aaker 2008; Boyd et al. 2010; Menz 2012) and have consequently called for research that investigates contingencies affecting the CMO's impact (Moorman and Day 2016; Nath and Mahajan 2008, 2011; Wang et al. 2015). In response, we investigate the environmental (industry-level) and strategic (firm-level) conditions under which the presence of other key functional heads can either strengthen or weaken the CMO presence–firm performance relationship (see Fig. 1 for this study's conceptual model).

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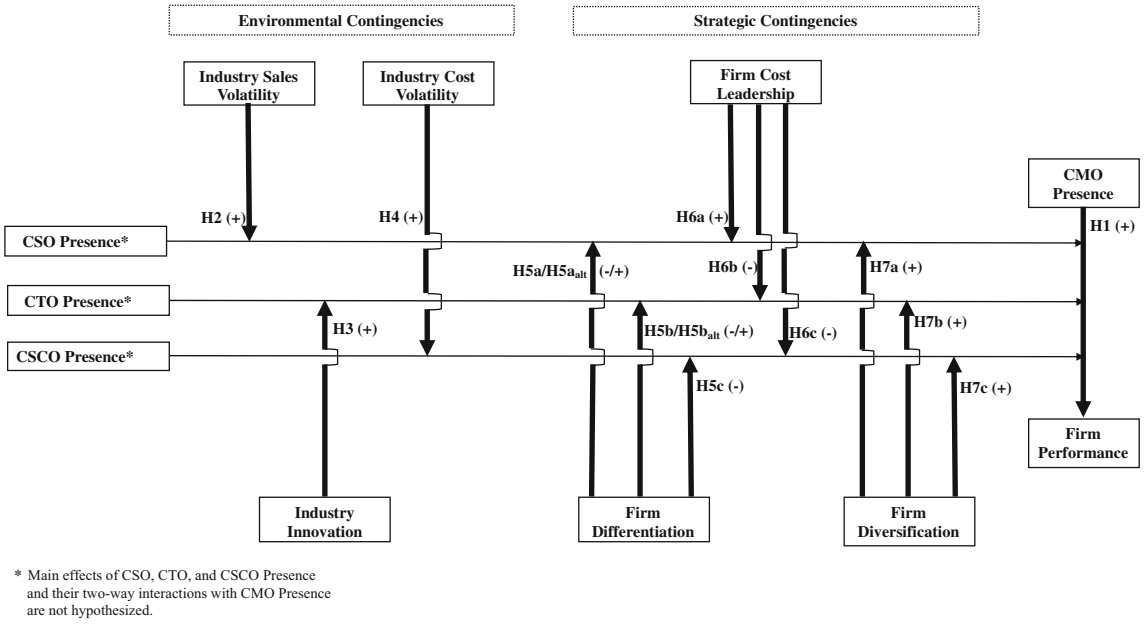


Fig. 1 Conceptual model

Much like the appointment of a CMO, that of other CXOs also represents a choice by firms to elevate these functions to the top-management team (TMT) and create specialized corporate-level capabilities (Guadalupe et al. 2014; Menz 2012). As a result, the presence of a CMO and each of the other CXOs creates *structural or dyadic*, inter-functional interfaces that have implications for how effectively the CMO can perform his/her role (Kohli and Deshpandé 2005).[1] Given the need to study the synergistic effect of the CMO and other CXOs in shaping firm performance (Moorman and Day 2016; Vomberg et al. 2015), we examine the dyadic interfaces resulting from the CMO's presence in conjunction with that of the functional head of sales, i.e., the CSO (chief sales officer); technology, i.e., the CTO (chief technology or R&D officer); and the supply chain, i.e., the CSCO (chief supply chain officer).

Our choice to examine these three CXOs is informed by the organizationally embedded view of marketing (Srivastava et al. 1999), which advocates connecting marketing to the cross-functional business processes that are critical for generating and sustaining customer value (i.e., customer relations, product development, and supply chain management). Other scholars have similarly emphasized the importance of interfacing marketing's capabilities with those of sales, R&D, and operations (Dutta et al. 1999; Moorman and Rust 1999). Additionally, the literature on marketing's inter-functional interfaces (e.g., Griffin and Hauser 1992; Hutt et al. 1988; Maltz and Kohli 1996, 2000)—in which the unit of analysis is the department or function—argues that each of these other functional areas (i.e., sales, technology, and supply chain management)[2] possesses unique resources and capabilities. Thus, it is instrumental for marketing to seek greater integration with these other areas (e.g., Gupta et al. 1986; Luo et al. 2006; Workman et al. 1998). This literature, however, also cautions that while integration with these other core functions can be beneficial for instrumental reasons, each area possesses distinct thought-worlds and orientations that can give rise to communication barriers and conflict (Homburg and Jensen 2007; Lawrence and Lorsch 1967). Additionally, other departments might be less cooperative in contexts where interfacing with the marketing function results in relinquishing power (Gupta et al. 1985). Therefore, such interfaces can also hinder marketing's contributions to a firm's performance for cognitive and political reasons.

Accordingly, scholars studying marketing's interfaces have taken a contingency view by exploring contexts in which they operate, recognizing that the aforementioned instrumental,

[1] We use the terms *structural* or *dyadic* to emphasize that the interfaces we study result from the simultaneous or *dyadic* presence of the CMO and each of the other CXOs in the TMT's *structural* configuration. In comparison, the focus in the functional-level marketing interfaces literature (subsequently cited in this paper) is on process measures such as inter-functional cooperation where the interfacing functions are always present.

[2] Notably, this literature precedes the rising importance of big data, which would make the CMO–CIO interface also worthy of study (Sleep and Hulland 2019; Whitler et al. 2017). Conversely, the marketing–finance interface explored in this literature cannot be studied at the structural level using data from recent history because almost all public firms have a CFO, making the issue of presence of CFOs and CMO–CFO dyads moot. As such, we acknowledge the importance of these and other possible CMO–CXO interfaces, but limit our scope to the three that we have studied given that our research represents one of the early efforts to investigate structural dyads in TMTs.

cognitive, and political reasons can differ in salience as a function of moderators, leading to these interfaces' conditional effects (Ernst et al. 2010; Fisher et al. 1997; Homburg et al. 2017). TMT researchers similarly examine the interplay of contexts that are external and internal to the firm in conjunction with TMT-level structural facets (cf. Carpenter et al. 2004). Therefore, we follow convention and investigate the environmental (industry-level) and strategic (firm-level) contingencies under which the CMO–CXO interfaces can moderate the CMO presence–firm performance relationship (see Fig. 1).[3] While the contingencies we study are motivated by work on marketing's interfaces with other departments, they are also relevant in terms of being germane to marketing's impact at different levels in the firm, such as the TMT (cf. Germann et al. 2015; Homburg et al. 2017; Menon et al. 1997; Nath and Mahajan 2008).

We conduct empirical testing with a longitudinal panel of U.S. manufacturers and find that the CMO's positive impact on firm performance (as measured by Tobin's Q) is strengthened by CSO presence when industry sales volatility is high, strengthened (weakened) by CTO presence when industry innovation and firm differentiation (cost leadership) are high, and strengthened (weakened) by CSCO presence when firm diversification (differentiation) is high.

This research contributes to theory in four main ways. First, it answers the call to broaden the scope of TMT research beyond studying a functional head in isolation or the entire TMT as a group (Menz 2012; Simsek et al. 2018). To this end, it examines dyadic interfaces featuring the presence of a CMO along with heads of functions prescribed by the organizationally embedded view of marketing (Srivastava et al. 1999), namely, the CSO, CTO, and CSCO. Second, it delineates these executives' roles and orientations, providing the conceptual foundation needed to draw on the inter-functional interfaces literature in marketing, which posits complementarities or conflicts arising within such interfaces. Third, it answers the call in the marketing organization (Moorman and Day 2016) and CMO (Nath and Mahajan 2008) literature to assess CMO–firm performance moderators, by studying the environment- and strategy-contingent effects that CSO, CTO, and CSCO presence have on CMO presence. Lastly, it reaffirms a positive relationship between CMO presence and firm performance, in light of prior mixed results. This study is also pragmatically useful as it can inform firms and CEOs about the importance of employing a CMO (who is not present in most TMTs) and guide CMOs in line with Aaker's (2008) suggestion that spanning organizational silos and partnering with other CXOs is indeed a "CMO imperative."

Conceptual overview

There is growing recognition that researchers should go beyond studying only a single executive's value relevance. In this regard, Moorman and Day (2016) underscore the need to better understand the complementarity between the head of marketing and those of other functions. In this section, we provide a theoretical basis for focusing on specific CMO–CXO interfaces and draw on the discipline-specific CMO and CXO literature to isolate the roles these focal executives perform and the orientations they espouse. *Roles* are closely related to the resources that these executives possess while *orientations* are the cognitive lenses through which they view the world (Homburg and Jensen 2007). Hence, by delineating them, we lay the foundation for subsequently hypothesizing why a particular CXO can aid or hamper the CMO.

The *organizationally embedded view of marketing* (Srivastava et al. 1999) prescribes that corporate-level marketing strategy should (a) aim to increase shareholder value and (b) be integrated with core business processes to create and sustain customer value. Regarding the former, research at the marketing–finance interface has long advocated moving beyond customer mindset metrics to demonstrate marketing's value relevance (e.g., Lehmann 2004; Rao and Bharadwaj 2008; Rust et al. 2004). As a result, it is widely accepted that firm value represents the key financial performance response variable in strategic marketing impact studies. Regarding the latter, Srivastava et al. (1999) propose that marketing should align with three core business processes to develop customer-led strategies: customer relationship management, product development management, and supply chain management. This proposition suggests that the head of marketing should seek integration with the functional heads of sales, technology or R&D, and supply chain to create superior customer value, which, in turn, can increase shareholder value. However, much ambiguity surrounds what CXOs actually do (cf. Wagner and Kemmerling 2014; Whitler and Morgan 2017). We therefore synthesize and delineate the salient actors' roles and orientations in Table 1, which we subsequently use for our hypotheses related to their dyadic interfaces.[4] Below, we offer some details on these respective roles and orientations.

Following Boyd et al. (2010), we classify CXOs' roles as *informational* (i.e., providing input to the corporate strategy dialogue), *relational* (i.e., developing and managing relationships with key constituencies), and *decisional* (i.e., justifying

[3] The moderation of the CMO presence–firm performance relationship by any CMO–CXO interface is essentially the interaction between the CMO's and this CXO's presence. The addition of environmental and strategic contingencies discussed in the body of this paper as well as the resulting hypothesized relationships shown in Figure 1 are, therefore, three-way interactions between CMO presence, CXO presence, and each of these contingencies.

[4] We thank an anonymous reviewer for suggesting this Table.

Table 1 CXO roles and orientations

Feature/ Function	Marketing [a]	Sales [b]	Technology [c]	Supply Chain [d]
Informational Role	Gathering, analyzing, and disseminating knowledge of marketplace opportunities and threats (customers; competitors; and social, cultural, economic, political, and regulatory trends)	Gathering, analyzing, and disseminating knowledge of go-to-market and customer-experience realities and keeping the TMT apprised of key trends and practices	Monitoring and assessing new technological developments that may lead to enhanced offerings, and guiding product and quality improvements in manufacturing new products	Monitoring and assessing developments regarding the inbound and outbound supply chain that may impact customer-related strategies
Relational Role	Identifying target market(s), prioritizing customer portfolio, coordinating marketing programs with units, and developing relationships with marketing service providers	Developing and managing relationships with key customers and channel members, and coordinating sales management activities across units	Establishing and maintaining relationships with scientists and public/private research agencies, and coordinating technology efforts across units to leverage synergies	Developing and managing relationships with suppliers and intermediaries and coordinating supply chain activities across units
Decisional Role	Determining marketing budgets and level and types of investments in customer-led strategies	Determining sales budgets and evaluating the viability of salesforce-related investments	Prioritizing innovation budgets and activity to ensure alignment with business goals and future growth	Prioritizing supply chain activities to improve operational efficiency
Orientation	Outside-in, centered on formulating superior customer value propositions	Outside-in, centered on implementing customer value propositions	Inside-out, centered on achieving scientific breakthroughs	Inside-out, centered on improving efficiency

Some exemplary studies include *a.* Boyd et al. (2010), Day and Moorman (2010); *b.* Kotler et al. (2006); *c.* Hartley (2011); Roberts (2001); *d.* Roh et al. (2016)

proposed initiatives, managing budgets, and making strategic choices). In their informational capacity, CMOs advise the TMT about market opportunities and threats (Homburg et al. 2014) as well as champion the "voice of the customer." The CMO's relational role includes fostering relations with business units and enlisting marketing agencies that can aid in creating and delivering customer-led strategies (Nath and Mahajan 2008). In a decisional capacity, CMOs demonstrate the financial accountability of proposed marketing investments and resource allocations (Boyd et al. 2010).

The roles of the other executives can also be traced along the same lines. In an informational capacity, CSOs update TMTs on customers, intermediaries, and competitors (Kotler et al. 2006). In their relational role, CSOs coordinate sales management activities across business units to deliver value to customers; their decisional role includes allocating budgets across sales territories (Malshe and Sohi 2009). Similarly, the CTO's informational role includes monitoring technological developments and guiding improvements in developing new products (Roberts 2001). In their relational capacity, CTOs interact with external constituencies, such as scientists, and work with business units to leverage technological synergies. The decisional role of CTOs involves prioritizing initiatives in the firm's innovation portfolio to generate revenues from exploitation and exploration. Lastly, CSCOs monitor trends affecting the supply chain in an informational capacity. Their relational role involves coordinating activities across the firm's units and engaging with suppliers and intermediaries (Wagner and Kemmerling 2014). Furthermore, the CSCO's decisional role includes sourcing, inventory management, and logistics to improve operational efficiency (Roh et al. 2016).

As shown in Table 1, CXOs also differ in their orientations, or their world views and goals (Dougherty 1992). Day and Moorman (2010) identify two orientations—outside-in, which places primacy on customer-led strategies, and inside-out, which emphasizes exploiting internal capabilities.[5] CMOs have an outside-in view that guides the development of customer value propositions, and they are well-informed about the marketplace (Sleep and Hulland 2019). CSOs have a similar outside-in, customer-centric orientation as they also play a role in matching the firm's offerings to customer requirements. On the other hand, the CTO espouses a scientific orientation of pursuing scientific/technical improvements (Hartley 2011). According to Day and Moorman (2010, p. 5), such an orientation asks, "Where can we apply our new technology (that we have developed internally)?" Thus, CTOs have an inside-out orientation. Lastly, CSCOs strive to keep the TMT apprised of key developments in the inbound and outbound supply chain. Therefore, their focus on efficiency

[5] We preclude delineating CXO orientations along the temporal dimension even though it has been used at the functional level—e.g., Homburg and Jensen (2007) find that marketing is relatively more long-term oriented than sales—since TMTs, and by extension CXOs, are generally long-term oriented in strategic decision making.

and removing nonvalue-added costs from internal processes also results in an inside-out orientation (Wagner and Kemmerling 2014).

Hypotheses

To investigate conditions under which the presence of the CSO, CTO, and CSCO influences the CMO presence–firm performance relationship, we begin by hypothesizing the main effect of CMO presence on firm performance.[6] Subsequently, to develop the theoretical underpinnings for the moderating effects depicted in the conceptual model, we draw on the inter-functional interfaces literature in marketing that explains why these interfaces can either enhance or dampen marketing's contribution to performance based on rationales that are *instrumental* (i.e., domain-specific resources determined by the roles of other functions complementing those of marketing); *political* (i.e., power struggles due to resource dependence that can interfere with successful integration); or *cognitive* (i.e., distinct orientations of differing functions/departments leading to diverse interpretations of information and communication challenges). This theorizing in conjunction with the specific roles and orientations summarized in Table 1 enables us to substantiate why a particular CXO's presence (and the resulting CMO–CXO dyadic interface) impacts the relationship between CMO presence and firm performance under various environmental and strategic contingencies.

CMO presence and firm performance

CMO presence represents marketing's elevation to the firm's upper echelons (Kerin 2005). As such, a greater role for specialized marketing knowledge in the TMT is expected to improve firm performance (Moorman and Rust 1999; Verhoef and Leeflang 2009). In particular, resources of CMOs from their informational and relational roles and their orientations make it more likely that the strategy dialogue in the TMT starts with external opportunities and challenges (Day and Moorman 2010). CMOs not only scan and interpret customer- and competitor-related trends in the marketplace but also disseminate their insights (and those of the marketing function) to the rest of the TMT, reducing complexity in the marketing domain (Nath and Mahajan 2008). Consequently, CMO presence is expected to enable firms to make strategic choices that better fit marketplace realities, leading to a superior customer value proposition and, in turn, financial success. Furthermore, CMOs, in their relational and decisional roles, coordinate marketing programs at the corporate level and across the firm's units (Jaworski 2011). Their interactions with unit heads ensure broader buy-in and remove implementation barriers when spanning organizational silos (Aaker 2008). Thus, having a seat at the corporate strategy table makes it more likely that the CMO's strategic proposals will be formulated and executed more effectively and efficiently, leading to superior performance (Lehmann 2004; Boyd et al. 2010).

The accumulated empirical evidence for these arguments (in the nascent empirical CMO research) is a mix of significant and non-significant effects (Nath and Mahajan 2017; Wiedeck and Engelen 2018). Research with strong empirical methodologies and longer, more recent observation windows demonstrates a positive CMO presence–firm performance relationship in line with our arguments (cf. Germann et al. 2015). Hence, we too predict the following:

H1: CMO presence has a positive effect on firm performance.

CMO's structural interfaces with the CSO, CTO, and CSCO

As shown in Fig. 1, we expect that the main effect of CMO presence will be moderated by the presence of the CSO, CTO, and CSCO under certain conditions, i.e., we hypothesize three-way, or conditional, moderating effects. We do so because the literature suggests that these CMO–CXO interfaces' moderating effects are a result of instrumental, political, and cognitive rationales, which—all else being equal—do not offer a clear direction for unconditional two-way moderations by them. We elaborate on this issue by first explicating these three rationales as discussed in the literature on marketing interfaces and applying it to our CMO–CXO interfaces. This theoretical foundation sets the stage for discussing the conditional moderations hypothesized in our model.

Instrumental rationale A vast literature has been accumulated on marketing's interfaces with other functions (e.g., Anderson 1982; Narver and Slater 1990). Ruekert and Walker (1987) propose that these interfaces are forms of open social systems where "[b]ehavior among the members of the social system is motivated by both individual and collective interests" (p. 2). Differentiation, or the division of labor and the allocation of roles and responsibilities, results in resource dependence, wherein units in the firm need specialized resources that others possess to add value to the organization (Lawrence and Lorsch 1967; Pfeffer and Salancik 1978). Such resources include domain-specific knowledge; human skills and expertise; social capital; tacit capabilities; and if relevant, physical, financial, and legal assets (Hunt and Morgan 1995). Consequently, while marketing's own resources are central to its success, those of other functions are likely to

[6] Because the main effects of CSO, CTO, and CSCO presence are not central to our conceptual model, we do not hypothesize them; however, we report and comment on them in subsequent sections of this paper.

complement its outside-in perspective and aid in making strategic actions more effective and efficient (Day 1994; Kahn and Mentzer 1998). We refer to this explanation as the *instrumental rationale* for the impact of marketing's inter-functional interfaces.

A functional head's appointment in the TMT is a recognition of the need to integrate that function's specialized capabilities within the firm's strategic decision-making (Guadalupe et al. 2014; Nath and Mahajan 2008). In essence, there is a division of labor at the corporate level, resulting in those executives being bestowed with ownership (or at least relatively greater control) over their function-specific resources (Nath and Mahajan 2011; Roh et al. 2016). Accordingly, the instrumental rationale is also relevant to the CMO's structural interfaces with the CSO, CTO, and CSCO because it suggests that the presence of these CXOs can be beneficial to the CMO by virtue of the resources they control, given their informational, relational, and decisional roles. As presented in Table 1, the CXOs we study play distinct roles.

Consider the CSO whose appointment signifies a greater role for personal selling in the overall strategy (Kotler et al. 2006). In overseeing the selling function, this executive has direct experience with key constituencies in the sales funnel, resulting in in-depth knowledge and social capital related to customers and channels (Homburg and Jensen 2007; Malshe and Sohi 2009). These resources, in turn, allow the CMO to better incorporate the realities of the selling environment in harnessing the customer's voice to the firm's strategic marketing efforts, thereby making the CMO–CSO interface instrumental for the CMO.

Similarly, the appointment of a CTO indicates that R&D is central to the firm's activities (Garms and Engelen 2018). As shown in Table 1, the CTO's roles are closely associated with internal and external technological developments. As a result, the CTO oversees resources that include a deep knowledge of technology's capabilities and limits, controls physical assets such as laboratories, and engages in research collaborations that allow for shifts in technological trajectories (Medcof 2008). Consequently, the CMO–CTO interface can be instrumental for the CMO as well, given the importance of technology and innovation to the role of marketing and the CMO (Nath and Mahajan 2008).

Lastly, the CMO is also likely to benefit from the CSCO's resources that accrue from supply-side responsibilities related to sourcing, making, and delivering throughputs (Hendricks et al. 2015; Wagner and Kemmerling 2014). These resources include an understanding of supply chain costs as well as expertise in efficiently matching supply to demand, through relationships with suppliers or control over physical assets such as manufacturing plants (Roh et al. 2016).

Political rationale Individual and collective interests can cause conflict at marketing's inter-functional fault lines (Feng et al. 2017; Rouziès and Hulland 2014). One reason is that achieving organizational-level outcomes requires compromise from each party in the interface (Fisher et al. 1997; Griffin and Hauser 1996; 1987). Yet, functions may be unwilling to do so due to concerns about signaling a relative lack of influence over strategic choices and eventually ceding power within the organization (Frankwick et al. 1994; Hutt 1995). Accordingly, the division of labor into functional domains could lead to conflict regarding strategic choices (Hulland et al. 2012; Maltz and Kohli 2000). We refer to this logic as the *political rationale* that can potentially hamper marketing's inter-functional interfaces, which is in line with the behavioral view of firms that recognizes the role of politics and power (Cyert and March 1963).

Much like the instrumental rationale, the political rationale at the functional level also operates in the CMO–CXO dyads, causing conflict in the CMO's interfaces with these CXOs. Goals such as brand equity and customer satisfaction, which are likely important for CMOs, may not align with the other CXOs' goals, such as sales targets for CSOs, technical/scientific discovery and excellence for CTOs, and operational efficiency for CSCOs (Cetindamar and Pala 2011; Griffin and Hauser 1996; Nath and Mahajan 2008; Roh et al. 2016). Thus, fearing a loss of power, CXOs may be less willing to provide resources to the CMO and less open to relinquishing their own functions' distinct goals to help the CMO and the marketing function achieve theirs (Nath and Mahajan 2011).

Cognitive rationale Another reason for conflict in marketing's interfaces stems from differences in each function's orientation (Dougherty 1992; Frankwick et al. 1994). Differing world views create communication and interpretive barriers between functions, leading to lower cooperation and potentially weaker performance (Homburg and Jensen 2007; Hutt 1995; Maltz and Kohli 2000). We refer to this logic as the *cognitive rationale* for explaining differences in the impact of the marketing function's inter-functional interfaces. Cognitive conflict at the functional level is also relevant to the CMO–CXO interfaces in the TMT since these executives have spent most of their careers in the functions they oversee. Specifically, we expect it in the CMO's dyads with the CTO and the CSCO whose inside-out orientations are distinct from the CMO's outside-in orientation (Hambrick and Mason 1984; Wang et al. 2015). For example, CTOs may view the addition of numerous features as genuine innovation while CMOs may see it as causing feature fatigue that results in lower long-term satisfaction (Thompson et al. 2005).

In sum, CMOs need the resources of CXOs for *instrumental* reasons, but are also engaged in a *political* battle of give-and-take with them and, more often than not, have a different *cognitive* point of view. As a result, the CMO's structural interfaces with these CXOs are fraught with tension because of competing forces from these three rationales. Therefore, we do not offer two-way moderation hypotheses because these arguments suggest that, all else being equal, there are both positive and negative implications for the CMO presence–firm performance relationship from the presence of these CXOs (Griffin and Hauser 1996; Homburg and Jensen 2007; Kahn and Mentzer 1998).[7] Instead, as discussed next and shown in our conceptual model (Fig. 1), we propose that environmental and strategic contingencies make these rationales more or less salient than their baseline levels—proposed thus far for the CMO's interfaces with the CSO, CTO, and CSCO—thereby strengthening or weakening the positive impact of CMO presence. In doing so, we also entertain the possibility that dyads seek to reduce political and cognitive conflict when instrumental reasons for cooperation dominate, and magnify cognitive differences to hinder collaboration if the political rationale is strong.

Environmental and strategic contingencies relevant to the CMO's structural interfaces

Our contingencies are based on well-established internal and external contexts from the broader TMT literature (Carpenter et al. 2004); the relatively smaller body of work on CMOs (cf. Boyd et al. 2010; Nath and Mahajan 2008; Wang et al. 2015); and research on marketing's inter-functional interfaces at the departmental level (cf. Ernst et al. 2010; Homburg et al. 2017; Menon et al. 1997). We focus on moderators particularly relevant to the roles of the CMO and to the instrumental resources, political motivations, and cognitive orientations that the other CXOs bring to bear on these roles.

The environmental contingencies we study are industry-level moderators associated with complexity and uncertainty about the firm's external context since these characteristics are particularly relevant to the CMO's informational and decisional roles (cf. Nath and Mahajan 2008). Specifically, we focus on industry-level sales volatility, innovation, and cost volatility that respectively make the resources and roles of each of our study's CXOs, namely, the CSO, CTO, and CSCO, instrumental to the CMO. Therefore, as shown in Fig. 1, we posit that each contingency will only be selectively relevant to the dyads formed by the CSO, CTO, and CSCO. In other words, an environmental context is not expected to affect a CMO–CXO dyad unless it changes the salience of the instrumental reasons that make the resources and roles of the CXO in that dyad relevant to the CMO. Additionally, we argue that each context increases complexity for the respective CXO, making it likely that the CXO will also depend on the CMO, causing both executives in the dyad to try to reduce political and cognitive conflict under that contingency.

Our choice of strategic (firm-level) contingencies is likewise driven by the consideration of conditions under which these rationales become less or more prominent. In that regard, two contexts that have been explored in the literature on marketing's inter-functional interfaces are firm differentiation and cost leadership (cf. Götz et al. 2009; Homburg et al. 2017). The expectation is that an emphasis on these strategies increases the importance of the resources and roles of some functions more than others, making it likely that political forces in particular will come to bear. Furthermore, given that differentiation requires the resources of not only the CMO but also the CSO and CTO, and the functions they oversee (Homburg et al. 2017), we also expect the instrumental rationale to come to bear under this strategy for these CMO–CXO dyads.

Notably, the inter-functional literature has typically investigated interfaces within firms' business units and has therefore eschewed the study of firm-level diversification. Yet, diversification is a corporate-level strategy under which, as we subsequently explain, the political and instrumental rationales in particular can become relevant given the decisional and relational roles of the CMO and other CXOs spanning these units (Nath and Mahajan 2008; Roh et al. 2016). Therefore, we also include diversification as a firm-level moderator. We discuss our moderating hypotheses beginning with the environmental contingencies.

Industry sales volatility Volatility of demand in a firm's industry makes interpreting customer trends more challenging. As discussed earlier, the sales function has frequent interactions with key customers and downstream intermediaries (Malshe and Sohi 2009). Consequently, a CSO can provide the CMO with a nuanced understanding of emerging challenges and opportunities regarding key customers and the channels used to reach them (Ernst et al. 2010). The CSO's centralized position as sales head also gives him/her greater control over the salesforce, enabling the CMO to better interpret the marketplace, and generate and implement customer-led strategies that consider the range of contingencies possible in volatile markets. In other words, CSO presence is expected to be instrumental to the CMO's efforts at being effective in carrying out his/her informational and decisional roles in the face of this contingency. Furthermore, we expect political and cognitive

[7] Since we study structural CMO–CXO interfaces that are captured by the simultaneous presence of the CMO and a CXO, we do not consider process measures such as cooperation and conflict. Such facets of an interface can have opposing effects as discussed in the body of this paper. Consequently, the net effect on performance, if any, is not clear, leading to our preclusion of directional two-way hypotheses for these interfaces.

CMO–CSO conflict to decrease because demand volatility also increases complexity for the CSO, which makes it more likely that the CSO will cooperate with the CMO to better perform his/her role. For example, the CSO may be keen to ensure that marketing plans in such environments are able to better anticipate the activities required of the sales function (Slotegraaf and Dickson 2004). These arguments lead us to hypothesize the following:

H2: The positive effect of CMO presence on firm performance is strengthened by CSO presence as industry sales volatility increases.

Industry innovation A firm's technological environment is deemed a key external contingency in marketing (Homburg et al. 2017). As competitors increase their research and development activities, consumers are faced with an increasing array of choices to satisfy their needs (Li and Calantone 1998). In such settings, CMOs need to be more vigilant about gauging the customer's voice and devising marketing plans that address the resulting competitive pressures. However, the scientific nature of research activities is complex and not easily interpretable, making the CTO instrumental to the CMO's informational and decisional roles in industries emphasizing innovation. In fact, research has found a similar need at the level of the marketing function for integration with R&D (Gupta et al. 1985; Song and Parry 1992). CTOs are also likely to become more reliant on CMOs as they need to better understand the trajectory of customer preferences with respect to the technological innovations available to them in such environments. Consequently, we expect that both executives will try to reduce political conflict and overlook their cognitive dissimilarities. In sum, we expect the following:

H3: The positive effect of CMO presence on firm performance is strengthened by CTO presence as industry innovation increases.

Industry cost volatility Much like the technological environment makes the CTO instrumental to the CMO, supply-side industry conditions should also be relevant to the CSCO's impact on the CMO–firm performance relationship. Specifically, we expect the industry's cost structure to have a bearing on the efficiency of the strategies that the CMO devises. Volatile costs increase the difficulty of being flexible in adjusting production volumes to demand fluctuations (Jack and Raturi 2003). They also prevent devising pricing strategies that can ensure a stable cash flow (Srivastava et al. 1999). Therefore, in such an environment, the instrumentality of the CSCO's resources should become salient to the CMO's decisional role of devising efficient and effective customer solutions. These resources, stemming from the CSCO's informational, relational, and decisional roles, include a deep understanding of the source of costs, supplier relationships, and supply chain management capabilities. The CSCO is also likely to need the CMOs' resources on the demand-side to be effective in such conditions, making it likely that these executives will set aside their political and cognitive differences. Hence, we hypothesize the following:

H4: The positive effect of CMO presence on firm performance is strengthened by CSCO presence as industry cost volatility increases.

Firm differentiation As we detail first in our arguments, the political rationale suggests that each CXO's presence should weaken the CMO's impact under this strategic (firm-level) contingency. However, the instrumental logic also leads us to subsequently offer competing hypotheses for the CMO–CSO and CMO–CTO dyads.

On one hand, we expect the CMO–CSO interface to weaken the CMO's impact when firms emphasize differentiation. Such a strategy is more likely to rely heavily on the resources of the marketing function and the CMO in creating demand through a pull strategy rather than a push-based one that uses the selling function (Götz et al. 2009). Similarly, scholars have argued that a strategy of differentiation, typically measured by advertising expenditures, emphasizes value appropriation, e.g., through brand building, at the expense of value creation through R&D (Mizik and Jacobson 2003). Given the roles of the CMO and CTO (see Table 1), value appropriation (vs. creation) is likely to be driven by relying on the CMO's (vs. CTO's) resources. Consequently, the CMO is more likely to experience conflict with the CSO and the CTO since the power of these latter executives is threatened when firms pursue differentiation. This political rationale is likely also stronger in the context of the CMO–CSCO interface because the CSCO's resources in the supply chain are less critical under differentiation than those of the CMO, which instead provide a deeper understanding of the market (Homburg et al. 1999). Lastly, political conflict may also motivate the executives in the CMO–CTO and CMO–CSCO dyads to emphasize their cognitive differences with a view to hampering each other's efforts. Therefore, we hypothesize the following:

H5: The positive effect of CMO presence on firm performance is weakened by (a) CSO, (b) CTO, and (c) CSCO presence as firm differentiation increases.

On the other hand, marketing, sales, and R&D are all considered to be output functions that monitor and adjust *markets*

and *products* (Hambrick 1981). Differentiation may therefore increase the importance of not just the CMO's resources, but also those of the CSO and the CTO because it requires a deep understanding of customers and competition (i.e., markets), and innovation (i.e., products), to create superior value propositions effectively (Day and Moorman 2010; Homburg et al. 2017). Thus, these executives can be instrumental to each other under this strategy, which also motivates them to reduce political and cognitive conflict, leading us to offer the following alternative hypotheses for the CMO–CSO and CMO–CTO dyads:

H5(alt): The positive effect of CMO presence on firm performance is strengthened by (a_{alt}) CSO and (b_{alt}) CTO presence as firm differentiation increases.

Firm cost leadership CMOs in firms emphasizing cost leadership must formulate and implement strategies based on efficiently producing and delivering standardized products (Homburg et al. 1999; Homburg et al. 2017). Such firms are primarily concerned with economies of scale that utilize the skills and assets of the firm's R&D and supply chain functions (Hutt and Speh 1984; Workman 1993). Consequently, on the one hand, the CMO and the CSO are politically motivated to become allies under this strategy—by forming a stronger coalition for acquiring resources to allow an outside-in orientation in the face of an inside-out focus on costs—thus making CMO–CSO conflict less likely. On the other hand, the CMO–CTO and CMO–CSCO interfaces are likely to have a power imbalance disfavoring the CMO, leading to greater political conflict. Furthermore, the emphasis on product standardization and lower costs is better addressed through an inside-out world view that the CTO and CSCO possess instead of the CMO's outside-in orientation (Cetindamar and Pala 2011; Hendricks et al. 2015). Accordingly, cognitive conflict also becomes potentially more salient for the CMO–CTO and CMO–CSCO dyads. In sum, the preceding discussion leads us to expect the following:

H6: The positive effect of CMO presence on firm performance is (a) strengthened by CSO presence and weakened by (b) CTO and (c) CSCO presence as firm cost leadership increases.

Firm diversification CMOs are likely to face greater resistance to their corporate-level, centralized efforts as firms increase their levels of diversification because finding synergies across diverse business segments is harder (Guadalupe et al. 2014). We posit that under this contingency, the CMO is politically motivated to form coalitions with other CXOs in the same position to tilt the power balance in their favor and to enable their contributions to the strategy dialogue to be recognized (Menz 2012; Michel and Hambrick 1992). These CXOs' resources could also help the CMO better understand how to functionally integrate units' marketing efforts at the corporate level (Nath and Mahajan 2011). In other words, we expect the baseline levels of political conflict and, to some extent, instrumental motivations between the functional heads in these dyads to be lower and higher, respectively, in diversified firms, making the CMO more effective in his/her decisional and relational roles. Therefore, we hypothesize the following[8]:

H7: The positive effect of CMO presence on firm performance is strengthened by (a) CSO, (b) CTO, and (c) CSCO presence as firm diversification increases.

Methodology and results

Sample

A longitudinal sample of public U.S. firms was drawn from the COMPUSTAT Database to test our hypotheses. While sampling from multiple industries increases the generalizability of findings, we also required the focal constructs to be consistently defined across the industries. We balanced these considerations by sampling from a diverse range of industries (at the two-digit SIC level) but only within the manufacturing sector where CTOs and CSCOs are prevalent.[9] We also included only those firms whose revenues were above $500 million in fiscal year 2013 (we began data collection in early 2015) to limit the study to relatively large firms, increasing the odds of finding dedicated functional executives such as the CMO, CSO, CSCO, and CTO (Lubatkin et al. 2006). Notably, the selected firms represent 95% or more of the sales generated by all public firms listed in Compustat within each of our sample's industries in 2013. For this set of firms, we specified a five-year window to create a longitudinal panel by retaining those firms that were also present, i.e., publicly reported sales data, in 2009. Dropping firm-years with missing data on our focal variables led to a final sample of 401 firms

[8] We test H7 with total, related, and unrelated diversification but expect the latter to be more relevant for the rationales proposed here because business units are more disconnected in unrelated (vs. related) diversifiers, making it harder for CMOs to effectively perform their roles. Because total diversification is the sum of these two measures, we similarly expect the arguments to be less relevant to it compared to unrelated diversification.

[9] We sampled from the following two-digit SICs: 20 (Food & Kindred Products), 25 (Furniture & Fixtures), 26 (Paper & Allied Products), 28 (Chemicals & Allied Products), 35 (Industrial & Commercial Machinery & Computer Equipment), 36 (Electronic & Other Electrical Equipment & Components), and 37 (Transportation Equipment).

observed over a five-year period from 2009 to 2013, resulting in 1958 firm-year observations.

Measures

Dependent variable We used Tobin's Q to measure firm performance because it captures "both immediate and future firm performance" and is "organizational goal agnostic" (Germann et al. 2015, p. 12), making it suitable for studying the impact of other CXOs on the CMO. It was computed using Chung and Pruitt's (1995) approximation, i.e., the ratio of the sum of the market value of the firm and the book value of its debt to its total assets.

Independent and moderator variables To measure the focal independent variables of CMO/CXO presence in the TMT, we first operationalized the TMT as the *Executive Officers of the Registrant,* whom the Securities and Exchange Commission (SEC) defines as policy-making executives and requires public firms to report (cf. Nath and Mahajan 2008; also see Appendix).[10] CMO, CSO, CTO, and CSCO presence in each firm-year was a dichotomous variable that equaled 1 if the TMT had executives with titles related to their respective functions. Trained assistants searched for titles of *marketing* or *brand/branding* for CMO presence and *sales* for CSO presence (Nath and Mahajan (2011).[11] We also included *customer* following Feng et al. (2015) and *commercial* given the prevalence of this title in (primarily pharmaceutical) firms in our sample; executives with such titles were classified as CMOs or CSOs based on researching their responsibilities using appointment announcements, LinkedIn, and Internet searches. CTO presence was coded using *technical/technology* (excluding information technology), *research & development*, *scientific*, or *innovation* (cf. Adler and Ferdows 1990; Hartley 2011). For CSCO presence, we used *supply chain*, *operations*, *manufacturing*, *production*, *logistics*, *distribution*, *sourcing*, *procurement*, *product supply*, or *purchasing* (cf. Wagner and Kemmerling 2014).

The environmental-level moderators were calculated yearly, at the industry, or two-digit SIC level, using firms in the sample belonging to each industry while excluding the focal firm (although results are similar if it is included). Industry sales (cost) volatility was computed as the industry-year average of the standard deviations across five lagged years, of the sales growth (logged ratio of cost of goods sold to assets) of firms in the industry, and industry innovation was similarly the industry-year average of firms' R&D expenses divided by total assets.

The strategic contingencies were also computed for each firm-year. Firm differentiation is typically proxied by advertising intensity. Since more than half our observations had missing values of advertising, which we assumed to be 0 following McAlister et al. (2016), we measured differentiation as a dummy equal to 1 if advertising was greater than 0, and 0 otherwise. For measuring firm cost leadership, we followed Modi and Mishra's (2011) approach. We first calculated a raw cost leadership measure as the ratio of sales to the cost of goods sold for each firm so that higher values represented a greater emphasis on lower costs. We logged this measure because it was highly skewed. Then we computed our measure as the difference in this ratio between the focal firm and its industry's average, divided by the industry's standard deviation to account for differences across the industry. Both the industry average and the standard deviation were calculated excluding the focal firm. Lastly, firm diversification was calculated with the well-established entropy measure that uses segment-level sales at the two-digit SIC level. As mentioned in Footnote 8, we tested the related hypothesis using total, related, and unrelated diversification. Because at least half the observations for these measures had a value of 0 for the raw measure, we dichotomized them so that the value was equal to 1 for diversified firms.

Control variables We controlled for the industry average of Tobin's Q, the dependent variable. Additionally, we included firm and industry profitability using net income divided by assets. We also controlled for firm sales growth and industry sales growth with the latter being averaged over a five-year period. Another industry-level control was the eight-firm concentration ratio, the sum of the sales of the eight largest firms in the focal firm's industry, excluding the focal firm. At the firm-level, we also controlled for the logged (since it was skewed) ratio of SGA or selling, general, and administrative expenses to assets, adjusted for industry differences by subtracting the average industry values.[12] Additionally, we included firm size as the logged number of employees; firm leverage, computed as the ratio of liabilities to assets; and firm innovation, captured as R&D expenses divided by total assets. Furthermore, we included the following TMT-level controls:

[10] TMT operationalizations have varied in extant research. Given the increasing importance of research on TMT functional heads within and outside marketing, we clarify this issue of operationalizing the TMT separately, in an Appendix, to serve as a primer for future research in the area; we also justify our TMT operationalization in it. We thank an anonymous reviewer, the associate editor, and the editor for their inputs that led to creating this Appendix.

[11] We also observed executives with marketing and sales titles (or responsibilities in the case of the *customer* and *commercial* titles discussed subsequently in the paper). Our focal analyses classified such executives as CMOs, but we subsequently conducted robustness checks of our results classifying them as only CSOs and as CMOs and CSOs.

[12] Our focal results are substantively similar whether we used the raw measure of SGA or excluded R&D from it (cf. Ptok et al. 2018). We used the latter operationalization to report findings in this paper.

the CEO's tenure (logged); a dummy called CEO M/S/T/SC for whether the CEO had a background in marketing, sales, technology, or supply chain management; and a dummy for Chief Operating Officer (COO) presence. Lastly, we included year dummies.

All of the firm- and industry-level controls were measured for each firm-year by using COMPUSTAT and following well-established procedures in extant research. The TMT-level controls were collected using 10-Ks/proxies, much like the focal variables of functional executive presence in the TMT. Tenure and background data were also obtained from these filings and were augmented, where required, by manually searching the Internet. Most of our controls have been established in prior research as being relevant to Tobin's Q as an outcome. We also considered their inclusion based on their potential to affect the appointment of the CMO and the CXOs we studied in this research, while being possibly related to firm performance.

Analysis

While we included an exhaustive set of controls, unobservable variables may still be unaccounted for in our model, leading to the possibility of endogeneity biasing our results. Thus, we used fixed effects (FE) estimation, which was possible given our data's panel nature.

Our model was estimated as follows:

$$Y_{it} = X_{it}^{'}\beta + \alpha_i + \nu_{it},$$

where, Y is firm performance for firm i in year t. X includes the independent variables, controls, and interactions along with all their lower-order terms; β represents their respective coefficients; and, α_i and ν_{it} are the fixed and time-varying error components, respectively.

The FE model assumes that endogeneity from unobservable variables is time-invariant or fixed, i.e., the variables in X_{it} are considered to be independent of ν_{it} (but not of α_i) in our specified model, a reasonable assumption given our sample's five-year observation window (Germann et al. 2015). Consequently, the fixed error term α_i represents the unobservable between-firm effects that are eliminated by within-firm differencing, leading to estimates free of endogeneity. We note that a Hausman test suggests that the FE model is appropriate for our data.

Results

To reduce the effect of outliers, we winsorized all continuous variables by equating 1% of values at the upper and lower ends of the sorted variables to the value just before and after the chosen proportion, respectively. Table 2 shows the summary statistics and correlations. Notably, CMO prevalence, as indicated by its mean, is in line with extant CMO research (Germann et al. 2015; Nath and Mahajan 2008) as are the proportions of other CXOs we studied to the extent that there are academic studies exploring that position (cf. Wagner and Kemmerling 2014). We hypothesized only one main effect. The raw correlation associated with it (i.e., between CMO presence and Tobin's Q) is significantly positive ($p < .01$), providing model-free evidence for it. Almost all other correlations are under 0.6, and the average (highest) variance inflation factor without interactions and year dummies is under 2 (5.2). Thus, multicollinearity does not seem to be an issue. Nevertheless, we mean-centered our interacting continuous variables.

Table 3 shows results with only controls and moderators (Model M0); the hypothesized main effect (Model M1); and the three-way interactions involving CMO presence, CXO presence, and each of the environmental and strategic moderators testing the related hypotheses, entered separately (Models M2–M4 for H2–H4 and M5–M7 for H5–H7, respectively) and together in a full model (Model M8). As shown in this Table, H1 is supported in Model M1 ($p = .004$), replicating the finding in Germann et al. (2015) that CMO presence is positively related to firm performance. Notably, none of the other functional executives we studied have a similar significant positive impact on Tobin's Q in Model M1, which demonstrates the relative value of marketing's functional representation in the C-suite to the firm's overall performance.

We also find support for H2 since the interaction involving CMO presence, CSO presence, and industry sales volatility is significant in the expected, positive direction in both Model M2 ($p = .021$) and the full Model M8, albeit weakly in the latter ($p = .053$).[13] We plot this three-way interaction, as well as those reported subsequently, using marginal effects computed from the full model. The marginal effect is the differential, or dY/dX, which for our interactions is the change in Tobin's Q derived with respect to CMO presence (vs. absence), such that the graphed plots represent the relationship between CMO presence and firm performance. Moderate and low/high levels of the hypothesized contingencies, which for H2 is industry sales volatility, are respectively represented by their means and 1 standard deviation below/above the mean.

As shown in Fig. 2a, the CMO presence–firm performance relationship, represented by each of the three plots or lines, becomes increasingly positive with CSO presence as industry

[13] We consider a moderation hypothesis as being supported if its related three-way interaction is strongly significant ($p < .05$) in at least one of the two models that includes it, i.e., the model in which it is entered separately or the full model, and at least weakly significant ($p < .10$) in the other model. We claim *partial* support when the interaction is significant in only one of these models, and *weak* support if this interaction is weakly significant ($p < .10$). Cases with both models showing weak interactions would also be *weakly* supported, but our focal results preclude such cases.

Table 2 Descriptive statistics and correlation coefficients

		Mean	(S.D)	1	2	3	4	5	6	7	8	9	10	11
1.	Firm Tobin's Q	1.274	(.942)											
2.	CMO Presence[a]	.242	(.428)	.091***										
3.	CSO Presence[a]	.166	(.372)	.028	.091***									
4.	CTO Presence[a]	.311	(.463)	.212***	.147***	.098***								
5.	CSCO Presence[a]	.393	(.488)	.108***	.228***	.195***	.247***							
6.	Industry Sales Volatility	.205	(.039)	−.133***	−.122***	−.026	.044*	−.144***						
7.	Industry Innovation	.041	(.020)	−.105***	−.054**	.106***	.045**	−.133***	.615***					
8.	Industry Cost Volatility	.161	(.020)	.059***	.004	−.023	.112***	.005	.304***	.298***				
9.	Firm Differentiation	.425	(.495)	.165***	.118***	.071***	.059***	.105***	−.140***	−.098***	.008			
10.	Firm Cost Leadership	.025	(1.065)	.544***	.108***	.127***	.244***	.109***	.004	−.026	−.009	.222***		
11.	Firm Diversification[b]	.370	(.483)	−.121***	−.143***	−.106***	−.070***	−.102***	.148***	.022	−.030	−.103***	−.076***	
12.	Industry Tobin's Q	1.274	(.261)	.216***	.036	−.018	.063***	.102***	−.461***	−.344***	.226***	.139***	−.040*	−.076***
13.	Firm Profitability	.056	(.085)	.390***	−.027	−.016	.052**	.108***	−.043*	−.080***	.059***	.072***	.276***	−.007
14.	Industry Profitability	.056	(.024)	.141***	.038*	−.014	.032	.110***	−.185***	−.288***	.169***	.081***	−.020	−.070***
15.	Firm Sales Growth	.077	(.220)	.219***	.023	.022	.041*	−.009	.143***	.009	.056**	.010	.094***	−.083***
16.	Industry Sales Growth	.105	(.036)	.027	−.006	−.050**	.095***	−.020	.440***	.296***	.740***	−.018	−.015	−.017
17.	Industry Concentration	.650	(.093)	−.058**	−.006	−.046**	−.104***	.058**	−.327***	−.622***	−.610***	−.011	.008	.059***
18.	Firm SGA	−.000	(.655)	.371***	.056**	.059***	.066***	.107***	.009	−.014	.011	.299***	.469***	−.124***
19.	Firm Size	8.822	(1.333)	−.132***	−.058**	−.140***	.083***	.039*	−.020	−.076***	−.112***	−.006	−.074***	.251***
20.	Firm Leverage	.539	(.224)	−.148***	−.009	−.118***	−.004	−.006	−.027	−.208***	−.057**	.001	−.223***	.097***
21.	Firm Innovation	.041	(.052)	.226***	.073***	.281***	.218***	.026	.234***	.369***	.107***	.056**	.400***	−.150***
22.	CEO Tenure	1.735	(.881)	.071***	.048**	−.014	−.019	.016	−.062***	.018	.017	.020	.039*	.002
23.	CEO M/S/T/SC Background	.549	(.498)	.066***	.032	.079***	.063***	.091***	−.009	.001	.013	.075***	.142***	−.051**
24.	COO Presence	.272	(.445)	.025	−.036	.018	−.080***	−.122***	−.062***	−.029	−.022	−.031	.001	−.014

	12	13	14	15	16	17	18	19	20	21	22	23
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.	.145***											
14.	.059***	.226***										
15.	.178***	.237***	.325***									
16.	−.204***	.085***	.298***	.102***								
17.	−.027	−.057**	−.189***	−.088***	−.714***							
18.	−.035	.068***	−.007	.004	−.001	.005						
19.	.016	.042*	−.023	−.154***	−.110***	.125***	−.160***					
20.	−.149***	−.285***	.017	−.147***	−.035	.175***	−.013	.284***				
21.	.063***	−.082***	−.112***	.085***	.101***	−.247***	.411***	−.203***	−.225***			
22.	.040*	.126***	.041*	.098***	−.028	−.005	−.008	−.138***	−.204***	.003		
23.	.007	−.033	.011	.047**	.026	−.044*	.097***	−.041*	−.013	.138***	−.129***	
24.	.059***	.034	.002	.058**	−.051**	.044*	−.011	−.036	−.010	−.085***	.185***	−.085***

*$p < .10$; **$p < .05$; ***$p < .01$; $N = 1958$ firm-years from 401 firms

[a] Of the 473 (170) firm-years (firms) that have a CMO, 107 (38) also have a CSO, 204 (71) also have a CTO, and 279 (94) also have a CSCO

[b] As discussed in footnotes 8 and 14 of the paper, we estimate models with unrelated, related, and total diversification, but report results with only the unrelated measure that has the strongest results

sales volatility increases, in line with H2. In other words, the CMO–CSO interface improves the CMO's impact on Tobin's Q under this environmental contingency.

H3 is also supported since the interaction involving CMO presence, CTO presence, and industry innovation is positive as expected, being strongly significant in Model M3 ($p = .042$) and weakly significant in Model M8, the full model ($p = .069$). We plot this interaction in Fig. 2b. As shown in the plots, the CMO presence–firm performance relationship becomes increasingly positive with CTO presence (i.e., the CMO–CTO interface amplifies the CMO's contribution to Tobin's Q) as industry innovation increases, in line with H3. However, H4 is not supported since the interaction of CMO presence with CSCO presence and industry cost volatility, while being positive as expected, is not significant in either Model M4 ($p = .211$) or Model M8 ($p = .218$).

We had competing hypotheses for the respective firm differentiation-contingent moderations by CSO and CTO presence, such that H5a and H5b posited negative three-way interactions, while $H5a_{alt}$ and $H5b_{alt}$ predicted positive ones. We find support for neither H5a nor $H5a_{alt}$ since the interaction involving CMO presence, CSO presence, and firm differentiation is not significant in either Model M5a ($p = .974$) or the full Model M8 ($p = .883$), although its positive sign is in line with $H5a_{alt}$. However, since the commensurate interaction with CTO presence is significant and positive in Model M8, we are able to claim support for $H5b_{alt}$, albeit only weakly, given the interaction's significance level in this model ($p = .060$) and the result of non-significance in Model M5b, where it is entered separately ($p = .509$). As shown in Fig. 2c, where this interaction is plotted using Model M8's results, the CMO presence–firm performance relationship becomes increasingly positive with CTO presence as firms emphasize differentiation, in line with $H5b_{alt}$. Thus, our expectation that the CMO–CTO dyad strengthens the CMO's impact on Tobin's Q when firms pursue differentiation is weakly supported.

H5c is also supported, albeit only partially, since the interaction of differentiation with CMO and CSCO presence is strongly significant ($p = .039$) in the expected direction in Model M5c, but is not significant in Model M8 ($p = .102$). Fig. 2d demonstrates this effect, i.e., the waning of the positive CMO presence–firm performance relationship with CSCO presence as firms pursue differentiation. Thus, our arguments for an attenuation of the CMO's impact by the CMO–CSCO interface when differentiation is high are partially supported.

We similarly find partial support for H6b since the interaction involving CMO presence, CTO presence, and firm cost leadership is strongly significant in the expected, negative direction in the full Model M8 ($p = .029$), while not significant in Model M6b ($p = .137$). However, similar interactions with CSO presence in Model M6a ($p = .590$) and CSCO presence in Model M6c ($p = .869$) as well as in the full model M8 ($p = .924$ and $p = .828$, respectively) are not significant, indicating lack of support for H6a and H6c, respectively. The significant interaction for H6b is plotted in Fig. 2e, showing that the positive relationship between the CMO and the firm's performance is weakened with CTO presence, i.e., the CMO–CTO interface attenuates the CMO's impact on Tobin's Q as firm cost leadership increases, in line with H6b.

Lastly, the hypothesized positive moderations when a firm is highly diversified is supported only for the CMO–CSCO interface (H7c), as reflected in the strongly significant interactions in both Model M7c ($p = .012$) and the full Model M8 ($p = .005$). The comparable three-way interaction terms with CSO presence for H7a and CTO presence for H7b in Models M7a ($p = .860$) and M7b ($p = .644$), respectively, as well as Model M8 ($p = .464$ and $p = .711$, respectively), are not significant. Fig. 2f shows that the CMO–CSCO interface strengthens the CMO's positive impact at high levels of diversification, in line with H7c.[14]

Robustness checks

While the FE models in Table 3 assume time-invariant endogeneity because of unobservables, we also checked if the results are robust to the possibility that it is time-variant by using the control function approach (cf. Germann et al. 2015). We assumed that only the CMO and CXO presence variables are potentially endogenous. For instruments, we used the respective year-wise prevalence (excluding the focal firm) of these executives in the same industry or two-digit SIC as the focal firm, either in its raw form or as a weighted measure using firm diversification (cf. Germann et al. 2015) or firm sales (cf. Wiedeck and Engelen 2018), or both. For CMO presence, we found strong evidence for entering both the linear and squared terms of the raw measure (cf. Dieterle and Snell 2016). Together, these instruments satisfied the condition of relevance [F-statistic

[14] As mentioned in Footnote 8, we tested H7 with total, related, and unrelated diversification. While results for H7a and H7b were similarly non-significant across all these measures and Models M7a, M7b, and M8, with H7c, Model M7c's results reported in the body of this paper hold only with unrelated diversification and not with total or related diversification (these latter measures are identical when dichotomized). Similarly, the strong support for H7c in the full Model M8 was observed only with the former measure; we found only weak support ($p > .10$) with the latter. Furthermore, when we used continuous measures, H7c was again supported, albeit weakly, with only unrelated diversification. Thus, the arguments we proposed for this hypothesis are more relevant to this latter measure, in line with the expectation mentioned in Footnote 8. We, therefore, only report results with unrelated diversification.

Table 3 CMO presence main effect and environment and strategy-contingent moderations by CXO presence

	M0	M1	M2	M3	M4
CMO (Presence = 1 vs. 0) (H1)		.202 (.070)***	.184 (.084)**	.215 (.075)***	.269 (.102)***
CMO x CSO x Industry Sales Volatility (H2)			5.359 (2.314)**		
CMO x CTO x Industry Innovation (H3)				7.794 (3.818)**	
CMO x CSCO x Industry Cost Volatility (H4)					4.353 (3.473)
CMO x CSO x Firm Differentiation (H5a/H5a_{alt})					
CMO x CTO x Firm Differentiation (H5b/H5b_{alt})					
CMO x CSCO x Firm Differentiation (H5c)					
CMO x CSO x Firm Cost Leadership (H6a)					
CMO x CTO x Firm Cost Leadership (H6b)					
CMO x CSCO x Firm Cost Leadership (H6c)					
CMO x CSO x Firm Diversification (H7a)					
CMO x CTO x Firm Diversification (H7b)					
CMO x CSCO x Firm Diversification (H7c)					
CMO x CSO			.113 (.130)		
CMO x CTO				–.089 (.109)	
CMO x CSCO					–.121 (.095)
CMO x Industry Sales Volatility			.304 (1.319)		
CSO x Industry Sales Volatility			–1.553 (1.429)		
CMO x Industry Innovation				2.531 (2.431)	
CTO x Industry Innovation				1.596 (3.337)	
CMO x Industry Cost Volatility					–1.248 (3.077)
CSCO x Industry Cost Volatility					–1.242 (1.716)
CMO x Firm Differentiation					
CSO x Firm Differentiation					
CTO x Firm Differentiation					
CSCO x Firm Differentiation					
CMO x Firm Cost Leadership					
CSO x Firm Cost Leadership					
CTO x Firm Cost Leadership					
CSCO x Firm Cost Leadership					
CMO x Firm Diversification					
CSO x Firm Diversification					
CTO x Firm Diversification					
CSCO x Firm Diversification					
CSO (Presence = 1 vs. 0)	–.073 (.080)	–.040 (.082)	–.074 (.086)	–.032 (.083)	–.046 (.081)
CTO (Presence = 1 vs. 0)	.006 (.076)	–.001 (.075)	–.006 (.074)	.013 (.079)	–.003 (.074)
CSCO (Presence = 1 vs. 0)	–.084 (.042)**	–.094 (.043)**	–.092 (.043)**	–.091 (.043)**	–.062 (.051)
Industry Sales Volatility	2.088 (1.445)	1.996 (1.472)	1.753 (1.479)	1.913 (1.409)	1.993 (1.450)
Industry Innovation	–1.022 (8.183)	–1.888 (8.272)	–1.586 (8.278)	–3.904 (8.154)	–1.709 (8.228)
Industry Cost Volatility	7.162 (1.902)***	6.921 (1.897)***	6.665 (1.882)***	6.823 (1.854)***	6.827 (1.991)***
Firm Differentiation	.037 (.124)	.029 (.124)	.033 (.125)	.053 (.121)	.027 (.123)
Firm Cost Leadership	.161 (.090)*	.148 (.087)*	.153 (.086)*	.139 (.085)	.145 (.086)*
Firm Diversification	–.017 (.060)	–.005 (.061)	–.007 (.061)	–.010 (.061)	–.011 (.062)
Industry Tobin's Q	–.052 (.162)	–.017 (.159)	–.003 (.157)	–.013 (.161)	–.008 (.158)
Firm Profitability	.419 (.269)	.424 (.264)	.412 (.259)	.390 (.264)	.423 (.264)
Industry Profitability	–.864 (1.231)	–.888 (1.243)	–.987 (1.222)	–.988 (1.239)	–.923 (1.223)
Firm Sales Growth	.405 (.086)***	.389 (.084)***	.396 (.083)***	.385 (.083)***	.389 (.083)***
Industry Sales Growth	–1.099 (1.171)	–1.021 (1.179)	–.916 (1.174)	–.991 (1.162)	–.966 (1.156)
Industry Concentration	–.662 (.448)	–.619 (.450)	–.635 (.450)	–.668 (.447)	–.650 (.444)
Firm SGA	.381 (.132)***	.386 (.132)***	.385 (.132)***	.375 (.132)***	.386 (.132)***
Firm Size	–.103 (.070)	–.084 (.073)	–.082 (.074)	–.088 (.073)	–.087 (.072)
Firm Leverage	–.372 (.187)**	–.370 (.182)**	–.396 (.178)**	–.382 (.182)**	–.355 (.181)*
Firm Innovation	.257 (1.460)	.131 (1.428)	.165 (1.415)	.083 (1.421)	.155 (1.438)
CEO Tenure	.003 (.018)	.002 (.018)	.000 (.018)	.003 (.018)	–.001 (.018)
CEO M/S/T/SC Background	.033 (.048)	.030 (.048)	.035 (.048)	.028 (.046)	.028 (.048)
COO Presence	–.021 (.042)	–.011 (.042)	–.014 (.041)	–.006 (.040)	–.012 (.042)
2010	–.008 (.057)	–.009 (.058)	–.003 (.057)	–.000 (.057)	–.008 (.057)
2011	–.115 (.054)**	–.107 (.053)**	–.100 (.054)*	–.098 (.053)*	–.105 (.053)**
2012	–.002 (.052)	.002 (.053)	.006 (.053)	.004 (.052)	.002 (.052)
2013	.423 (.100)***	.415 (.101)***	.408 (.100)***	.414 (.100)***	.410 (.100)***
Constant	1.391 (.796)*	1.194 (.817)	1.623 (.829)*	1.214 (.779)	2.320 (.772)***
R^2	.195	.206	.212	.215	.210

Table 3 (continued)

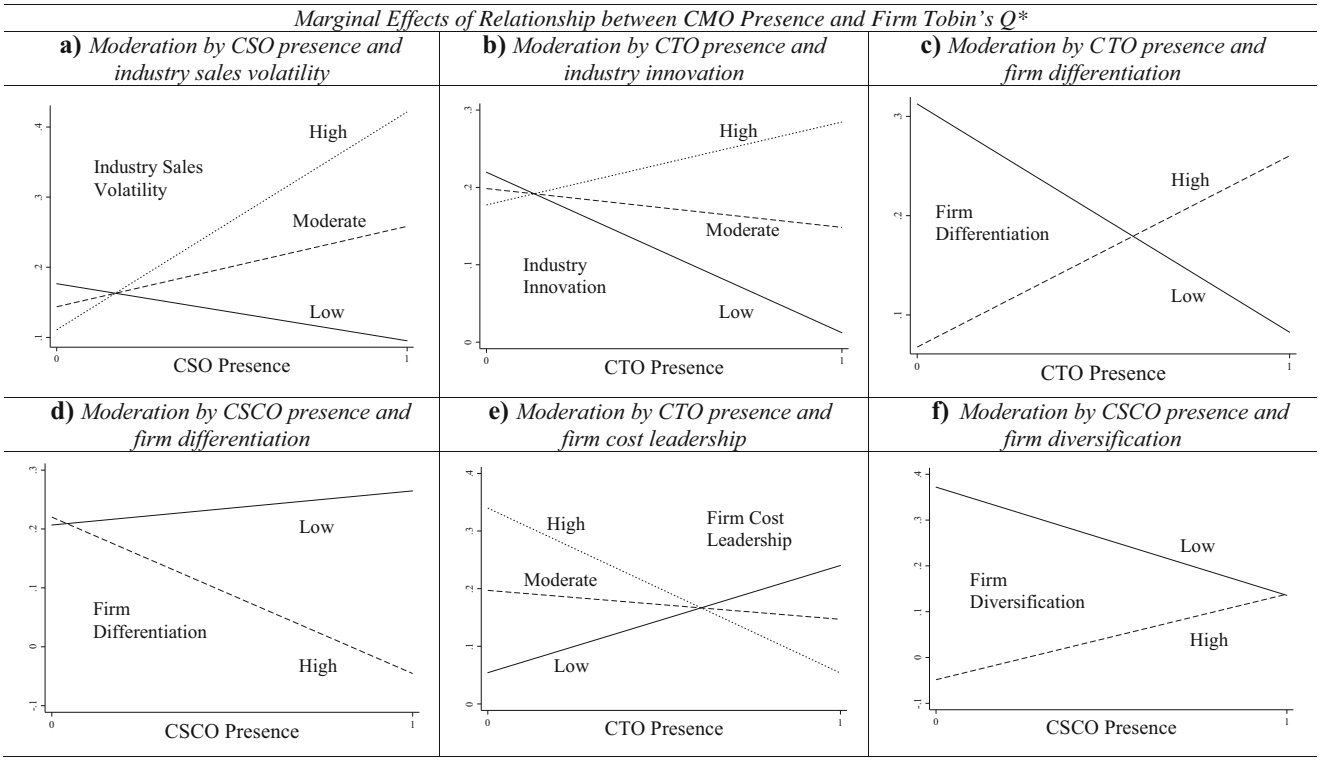
	M5a	M5b	M5c	M6a	M6b
CMO (Presence = 1 vs. 0) (H1)	.252 (.108)**	.330 (.113)***	.240 (.096)**	.183 (.076)**	.183 (.064)***
CMO x CSO x Industry Sales Volatility (H2)					
CMO x CTO x Industry Innovation (H3)					
CMO x CSCO x Industry Cost Volatility (H4)					
CMO x CSO x Firm Differentiation (H5a/H5a$_{alt}$)	.008 (.232)				
CMO x CTO x Firm Differentiation (H5b/H5b$_{alt}$)		.136 (.205)			
CMO x CSCO x Firm Differentiation (H5c)			–.406 (.196)**		
CMO x CSO x Firm Cost Leadership (H6a)				.057 (.105)	
CMO x CTO x Firm Cost Leadership (H6b)					–.160 (.107)
CMO x CSCO x Firm Cost Leadership (H6c)					
CMO x CSO x Firm Diversification (H7a)					
CMO x CTO x Firm Diversification (H7b)					
CMO x CSCO x Firm Diversification (H7c)					
CMO x CSO	.057 (.166)			.055 (.114)	
CMO x CTO		–.121 (.128)			–.006 (.100)
CMO x CSCO			.092 (.093)		
CMO x Industry Sales Volatility					
CSO x Industry Sales Volatility					
CMO x Industry Innovation					
CTO x Industry Innovation					
CMO x Industry Cost Volatility					
CSCO x Industry Cost Volatility					
CMO x Firm Differentiation	–.127 (.155)	–.191 (.141)	.072 (.195)		
CSO x Firm Differentiation	.133 (.164)				
CTO x Firm Differentiation		–.122 (.134)			
CSCO x Firm Differentiation			.181 (.108)*		
CMO x Firm Cost Leadership				.031 (.080)	.159 (.086)*
CSO x Firm Cost Leadership				–.156 (.116)	
CTO x Firm Cost Leadership					.078 (.082)
CSCO x Firm Cost Leadership					
CMO x Firm Diversification					
CSO x Firm Diversification					
CTO x Firm Diversification					
CSCO x Firm Diversification					
CSO (Presence = 1 vs. 0)	–.117 (.138)	–.035 (.083)	–.037 (.081)	–.034 (.067)	–.047 (.083)
CTO (Presence = 1 vs. 0)	–.003 (.074)	.074 (.084)	–.005 (.074)	–.004 (.075)	.005 (.072)
CSCO (Presence = 1 vs. 0)	–.094 (.043)**	–.097 (.043)**	–.144 (.050)***	–.096 (.043)**	–.097 (.042)**
Industry Sales Volatility	2.038 (1.471)	2.011 (1.483)	2.118 (1.470)	2.106 (1.431)	1.865 (1.446)
Industry Innovation	–2.029 (8.367)	–2.528 (8.246)	–2.537 (8.249)	–2.948 (7.981)	–1.537 (8.295)
Industry Cost Volatility	6.775 (1.913)***	6.676 (1.908)***	6.581 (1.888)***	6.761 (1.884)***	6.686 (1.878)***
Firm Differentiation	.035 (.131)	.096 (.116)	–.006 (.121)	.010 (.129)	.036 (.120)
Firm Cost Leadership	.156 (.083)*	.152 (.085)*	.142 (.085)*	.189 (.094)**	.082 (.092)
Firm Diversification	–.007 (.062)	–.008 (.061)	–.008 (.061)	–.007 (.061)	–.000 (.061)
Industry Tobin's Q	.001 (.163)	.001 (.163)	.003 (.160)	–.030 (.157)	.001 (.161)
Firm Profitability	.416 (.261)	.424 (.265)	.436 (.261)*	.368 (.262)	.447 (.261)*
Industry Profitability	–.855 (1.261)	–.907 (1.244)	–.881 (1.240)	–1.018 (1.215)	–.871 (1.278)
Firm Sales Growth	.392 (.085)***	.392 (.084)***	.387 (.083)***	.391 (.084)***	.385 (.084)***
Industry Sales Growth	–1.062 (1.175)	–1.019 (1.180)	–1.199 (1.179)	–1.080 (1.182)	–.911 (1.178)
Industry Concentration	–.628 (.449)	–.612 (.453)	–.654 (.445)	–.646 (.445)	–.586 (.453)
Firm SGA	.390 (.132)***	.390 (.132)***	.387 (.130)***	.385 (.130)***	.389 (.131)***
Firm Size	–.083 (.075)	–.087 (.074)	–.081 (.073)	– .076 (.073)	–.076 (.074)
Firm Leverage	–.375 (.184)**	–.366 (.184)**	–.333 (.179)*	–.413 (.177)**	–.401 (.181)**
Firm Innovation	.030 (1.430)	–.024 (1.422)	.213 (1.428)	–.052 (1.385)	.055 (1.384)
CEO Tenure	.003 (.018)	.004 (.018)	.000 (.018)	.001 (.018)	.006 (.018)
CEO M/S/T/SC Background	.035 (.048)	.034 (.048)	.036 (.046)	.028 (.048)	.022 (.048)
COO Presence	–.013 (.041)	–.010 (.041)	–.013 (.042)	–.016 (.039)	–.007 (.041)
2010	–.017 (.059)	–.011 (.058)	–.012 (.058)	–.004 (.057)	–.009 (.059)
2011	–.113 (.054)**	–.110 (.054)**	–.109 (.053)**	–.103 (.054)*	–.106 (.054)**
2012	–.006 (.054)	–.003 (.053)	–.008 (.053)	.004 (.052)	–.004 (.053)
2013	.401 (.102)***	.404 (.102)***	.395 (.100)***	.418 (.100)***	.400 (.100)***
Constant	1.204 (.827)	1.226 (.828)	1.227 (.833)	1.276 (.818)	1.130 (.820)
R^2	.209	.209	.214	.214	.212

Table 3 (continued)

	M6c	M7a	M7b	M7c	M8 (Full Model)
CMO (Presence = 1 vs. 0) (H1)	.251 (.094)***	.219 (.102)**	.261 (.088)***	.385 (.132)***	.435 (.136)***
CMO x CSO x Industry Sales Volatility (H2)					4.902 (2.524)*
CMO x CTO x Industry Innovation (H3)					7.865 (4.306)*
CMO x CSCO x Industry Cost Volatility (H4)					4.260 (3.453)
CMO x CSO x Firm Differentiation (H5a/H5a$_{alt}$)					.039 (.263)
CMO x CTO x Firm Differentiation (H5b/H5b$_{alt}$)					.423 (.224)*
CMO x CSCO x Firm Differentiation (H5c)					–.324 (.198)
CMO x CSO x Firm Cost Leadership (H6a)					.012 (.123)
CMO x CTO x Firm Cost Leadership (H6b)					–.215 (.098)**
CMO x CSCO x Firm Cost Leadership (H6c)	–.013 (.081)				.017 (.078)
CMO x CSO x Firm Diversification (H7a)		–.043 (.246)			–.169 (.231)
CMO x CTO x Firm Diversification (H7b)			.074 (.161)		.059 (.158)
CMO x CSCO x Firm Diversification (H7c)				.405 (.161)**	.423 (.149)***
CMO x CSO		.075 (.160)			.161 (.216)
CMO x CTO			–.056 (.143)		–.252 (.143)*
CMO x CSCO	–.127 (.088)			–.255 (.129)**	–.098 (.114)
CMO x Industry Sales Volatility					–.823 (1.590)
CSO x Industry Sales Volatility					–.894 (1.448)
CMO x Industry Innovation					–1.056 (3.784)
CTO x Industry Innovation					1.576 (3.289)
CMO x Industry Cost Volatility					–2.022 (3.448)
CSCO x Industry Cost Volatility					–.712 (1.642)
CMO x Firm Differentiation					–.124 (.200)
CSO x Firm Differentiation					.202 (.192)
CTO x Firm Differentiation					–.159 (.135)
CSCO x Firm Differentiation					.215 (.113)*
CMO x Firm Cost Leadership	.079 (.072)				.121 (.092)
CSO x Firm Cost Leadership					–.175 (.125)
CTO x Firm Cost Leadership					.093 (.082)
CSCO x Firm Cost Leadership	.012 (.061)				.000 (.064)
CMO x Firm Diversification		–.129 (.097)	–.173 (.107)	–.364 (.128)***	–.410 (.134)***
CSO x Firm Diversification		–.054 (.185)			–.031 (.175)
CTO x Firm Diversification			.036 (.106)		.050 (.121)
CSCO x Firm Diversification				–.017 (.102)	.007 (.100)
CSO (Presence = 1 vs. 0)	–.056 (.081)	–.041 (.104)	–.036 (.083)	–.036 (.082)	–.135 (.143)
CTO (Presence = 1 vs. 0)	–.001 (.074)	.001 (.075)	.006 (.097)	–.001 (.074)	.054 (.100)
CSCO (Presence = 1 vs. 0)	–.062 (.052)	–.099 (.043)**	–.099 (.043)**	–.058 (.074)	–.173 (.068)**
Industry Sales Volatility	2.035 (1.455)	2.067 (1.473)	2.084 (1.481)	1.991 (1.450)	2.138 (1.431)
Industry Innovation	–1.404 (8.219)	–2.135 (8.305)	–2.545 (8.219)	–2.161 (8.242)	–4.971 (7.903)
Industry Cost Volatility	6.851 (1.894)***	6.919 (1.902)***	6.841 (1.888)***	6.946 (1.882)***	6.093 (1.904)***
Firm Differentiation	.022 (.125)	.029 (.124)	.031 (.124)	.032 (.123)	.005 (.129)
Firm Cost Leadership	.116 (.090)	.150 (.086)*	.145 (.087)*	.149 (.086)*	.141 (.090)
Firm Diversification	–.007 (.063)	.041 (.065)	.021 (.086)	.028 (.070)	.020 (.075)
Industry Tobin's Q	–.012 (.159)	–.013 (.158)	–.013 (.161)	–.023 (.158)	.008 (.163)
Firm Profitability	.409 (.261)	.424 (.259)	.426 (.263)	.457 (.259)*	.435 (.254)*
Industry Profitability	–.902 (1.261)	–.891 (1.258)	–.941 (1.246)	–.969 (1.245)	–1.054 (1.213)
Firm Sales Growth	.382 (.083)***	.389 (.083)***	.389 (.082)***	.372 (.082)***	.380 (.083)***
Industry Sales Growth	–1.015 (1.178)	–1.134 (1.186)	–1.154 (1.180)	–1.004 (1.158)	–1.124 (1.142)
Industry Concentration	–.664 (.449)	–.588 (.448)	–.595 (.450)	–.615 (.440)	–.622 (.425)
Firm SGA	.390 (.130)***	.387 (.130)***	.384 (.132)***	.390 (.131)***	.387 (.127)***
Firm Size	–.077 (.074)	–.087 (.073)	–.085 (.072)	–.080 (.072)	–.072 (.072)
Firm Leverage	– .382 (.180)**	–.375 (.180)**	–.378 (.182)**	–.323 (.178)*	–.333 (.173)*
Firm Innovation	.093 (1.400)	.189 (1.411)	.176 (1.425)	.286 (1.438)	.119 (1.360)
CEO Tenure	.002 (.018)	.002 (.018)	.002 (.018)	.000 (.018)	.004 (.017)
CEO M/S/T/SC Background	.028 (.047)	.030 (.048)	.028 (.048)	.030 (.047)	.029 (.046)
COO Presence	–.012 (.041)	–.011 (.042)	–.008 (.041)	–.014 (.041)	–.020 (.037)
2010	–.007 (.059)	–.010 (.058)	–.008 (.058)	–.000 (.057)	–.003 (.058)
2011	–.103 (.053)*	–.108 (.054)**	–.108 (.053)**	–.097 (.052)*	–.104 (.054)*
2012	.000 (.053)	.000 (.053)	–.001 (.052)	.012 (.052)	–.013 (.052)
2013	.411 (.101)***	.411 (.101)***	.409 (.101)***	.429 (.101)***	.379 (.099)***
Constant	1.151 (.839)	1.193 (.812)	1.208 (.812)	1.116 (.820)	2.513 (.763)***
R^2	.210	.208	.208	.214	.246

*p<.10; **p<.05; ***p<.01

Notes. Fixed effects regressions on 1958 firm-years from 401 firms with robust standard errors (shown in parentheses)



* Y-axes show marginal effects, i.e., the *change* in Tobin's Q derived with respect to CMO Presence (vs. Absence), based on results of Model M8 in Table 3; firm differentiation and diversification are dichotomous.

Fig. 2 Relationship between CMO presence and firm performance: Environment and strategy-contingent moderation by CXO presence

of 10.6 ($p < .001$), with significant negative and positive coefficients on the linear and squared terms ($p < .01$ and $p < .10$), respectively]. The Sargan-Hansen test was also not rejected ($p > .10$), suggesting that using multiple instruments does not cause overidentification. For CSO presence, the best instrument was the diversification-weighted peer-prevalence measure [F-statistic of 10.9 ($p < .01$)]. For CSCO and CTO presence, the peer-prevalence measure weighted by both diversification and sales served a similar purpose, albeit relatively weakly [F-statistics of 4.3 ($p < .05$) and 6.5 ($p < .05$), respectively].

In line with the control function approach and to account for two-stage estimation, we estimated a bootstrapped model, with the residuals from the first-stage probits for CMO, CSO, CTO, and CSCO presence using these instruments, as additional variables. We found that compared to Model M8's results reported in Table 3, only H2 is not supported in the full model with these residuals. However, we also found that the residuals for CMO, CSO, and CSCO presence are non-significant. Overall, these results, which we also do not report in the interest of space, suggest that endogeneity due to time-variant unobservables is not a concern; and to the extent that it does exist, our results are robust after controlling for it.

Notably, this model with the control function residuals is a random effects specification (cf. Germann et al. 2015). The fixed effects specification used for the results reported in Table 3 is more reliable if there is sufficient within-firm variation in the focal variables. Thus, our results with this random effects specification also demonstrate the robustness of our findings to the possibility of low levels of within-firm variation in the measures of CMO and CXO presence. As an aside, we note that results from a random effects model without control function residuals were also substantively similar to those with the residuals reported earlier in this section.

Additionally, we checked the robustness of our results with respect to our CMO classification. Of the 473 firm-years with CMO presence, CMOs also had the responsibility of sales in 225 cases. In the results reported in Table 3, these firm-years were classified as having only a CMO (in these firm-years, there was no additional marketing or sales executive in the TMT). Therefore, we checked our results using two alternative classifications (again, details are not reported in the interest of space); we reclassified these 225 firm-years as having only a CSO or having a CMO and a CSO. We found that our full model results are similar to those reported for Model M8 in Table 3 with the following

changes: H3 and H5c ($H5b_{alt}$ and H6b) [H7c] are strongly (weakly) [not] supported in the former case, and $H5b_{alt}$ and H5c (H2) are weakly (not) supported in the latter. Thus, while some results become weaker, others become stronger, suggesting that overall, our results are also robust to alternative classifications of CMO presence.

Discussion

This manuscript extends research on CMOs by studying the value relevance of CMO presence in conjunction with the presence of other key functional heads or CXOs—namely, the chief sales officer (CSO), chief technology officer (CTO), and chief supply chain officer (CSCO)—under various environmental (industry-level) and strategic (firm-level) contingencies. Specifically, our research addresses the following question: Under what conditions does the presence of the CSO, CTO, and CSCO amplify or attenuate the relationship between CMO presence and firm performance? Below, we describe the contributions to theory and implications for practice.

Theoretical contributions

Broadening TMT research to make the unit of analysis an executive dyad (exemplified by CMO–CXO dyads) Our first contribution stems from being responsive to the call to broaden TMT research beyond the emphasis on the entire TMT or a single functional head (Menz 2012; Simsek et al. 2018). While the TMT literature has typically been concerned with the entire TMT as a group (Carpenter et al. 2004), the discipline-specific literature on CXOs espouses a singular focus on a given representative, such as the CMO (Boyd et al. 2010; Germann et al. 2015; Nath and Mahajan 2008), CSCO (Hendricks et al. 2015; Roh et al. 2016; Wagner and Kemmerling 2014), CTO (Cetindamar and Pala 2011; Medcof 2008), and CIO (Chatterjee et al. 2001).

However, the prevalence of CXOs heading different functional areas has been increasing in TMTs, making TMT interactions increasingly inter-functional (Guadalupe et al. 2014). To that end, marketing scholars have only recently begun investigating interfaces, such as those between the CMO and the CIO (cf. Sleep and Hulland 2019; Whitler et al. 2017). In progressing beyond a siloed view of a given CXO, our study represents a pioneering empirical effort in TMT research that focuses on executive dyads (between CMOs and other CXOs in our research). Specifically, based on the organizationally embedded view of marketing (Srivastava et al. 1999), we explore dyadic interfaces formed by the CSO, CTO, and CSCO with the CMO. As further detailed later, our findings regarding these CMO–CXO dyads' moderating effects on the impact of CMO presence (that are albeit contingent on environmental and strategic contexts) underscore the importance of studying executive dyads in TMTs.

Delineating the roles and orientations of the CMO and the CXOs in the CMO–CXO dyads A second contribution of our research is explicating the theoretical foundations for why dyadic interfaces between functional heads or CXOs matter to a particular CXO. Our focal executive is the CMO, and we are concerned with the dyads formed by the CMO with the CSO, CTO, and CSCO. To that end, we first delineate the roles and orientations of these executives in Table 1. Specifically, we build on CMO/CXO and functional-level research (a) to detail informational, relational, and decisional roles that confer these executives with unique resources they bring to each dyad and (b) to highlight their unique orientations determining their world view (cf. Boyd et al. 2010). We then draw on the inter-functional interfaces literature in marketing (cf. Ruekert and Walker 1987) to propose baseline levels of the following three rationales that cause these CMO–CXO interfaces to either enhance or dampen the CMO presence–firm performance relationship: *instrumental* (i.e., function-specific resources determined by other CXOs' roles complementing those of the CMO); *political* (i.e., power struggles due to this resource dependence that prevent successful integration); and *cognitive* (i.e., distinct CMO–CXO orientations leading to diverse interpretations of information and communication challenges). This theorizing provides the foundation for future research on executive dyads.

Evaluating environment- and strategy-contingent performance implications of CMO–CXO dyads The third contribution of this research arises from responding to calls in the marketing organization and CMO literature streams to examine moderators of the CMO–firm performance relationship (Moorman and Day 2016; Nath and Mahajan 2008). Specifically, we hypothesize interactive (three-way) effects between each CMO–CXO dyad—i.e., the two-way interactions between CMO presence and CXO presence—and various industry and firm-level contexts that make the three previously explicated rationales become more or less salient compared to the baseline. In turn, we discuss how the tests of these hypotheses regarding environment- and strategy-contingent moderations extend the current knowledge base (see Table 3 and Fig. 2).

As shown in Fig. 2a and b (and models M2, M3, and full Model M8), we find that the CMO–CSO and CMO–CTO interfaces improve the CMO's impact when industry sales volatility and innovation, respectively, are high. We expected these environmental moderators to not only make these CXOs' resources instrumental to the CMO's informational and decisional roles but also reduce political and cognitive differences since they, respectively, increase the usefulness of the CMO's resources to the CSO and CTO. The results are noteworthy given that prior research reports few environmental moderators of the CMO presence–firm performance relationship (cf. Germann et al. 2015; Nath and Mahajan 2008). We show that the environment, as measured by these variables, does matter when the presence of other CXOs is considered.

However, CSCO presence does not similarly benefit the CMO when industry cost volatility is high because the related interaction is not significant (Model M4 or M8). It is possible that either the instrumental rationale is not strong enough because supply-side constraints are less relevant to the CMO's various roles or such an environment increases the importance of the CSCO relative to the CMO, giving rise to political conflict. The possibility of increased political conflict can also make the disparate orientations of the CMO and the CSCO more prominent as these executives try to hinder each other's efforts, leading to greater cognitive conflict. Notably, however, the interaction is not negative in sign, suggesting that there may still be some instrumental benefits. In this regard, we note research has found positive effects for cooperation between the marketing and supply chain (cf. Bharadwaj et al. 2007; Hausman et al. 2002); however, these studies have not captured these interfaces' political and/or cognitive dimensions, a point to which we return when proposing suggestions for future research.

Overall, the preceding discussion suggests that the impacts of the three rationales underlying any CMO–CXO dyad are intertwined with the firm's environmental contexts and must, therefore, be considered holistically. Instrumental benefits accrue for the CMO under external contingencies that enable a particular CXO's resources to increase the effectiveness of the CMO's roles. Since a CMO may similarly be instrumental to these other CXOs under such conditions, it is also likely that these executives try to reduce their political and cognitive differences. However, when external contexts are far removed from the CMO's roles and/or favor other CXOs, the resulting political imbalance (and its fallout in terms of increasing the prominence of distinct cognitive orientations) can lead to conflict, offsetting any instrumental benefits (as in the case of the CMO–CSCO dyad and industry cost volatility).

With the strategic (firm-level) contingencies of differentiation and cost leadership, our expectation was that they would make the political rationale stronger by increasing the relative importance of the resources of either the CMO or the CXO in a dyad, in turn also heightening the odds of cognitive conflict resulting from these executives' distinct orientations. Additionally, with differentiation, we also offered a competing rationale for the CMO–CSO and CMO–CTO dyads, whereby these CXOs' resources are instrumental to the CMO given the relevance and complementarity of their output-oriented functions, which in turn also reduces conflict.

Our results show mixed support for both these logics. Under high firm differentiation, we find that CTO presence strengthens the impact of CMO presence (see Fig. 2c and full Model M8). We only claim weak support for this hypothesized effect, given the related interaction's low level of statistical significance and its non-significance when entered separately (Model M5b). Thus, we find some evidence for one of our lines of argumentation, namely, that differentiation makes the CTO's resources instrumental to the CMO due to synergies between marketing and R&D under this strategy, in turn reducing conflict (Homburg et al. 2017). The competing logic of conflict because of an emphasis on value appropriation (vs. creation) that emphasizes the CMO's resources (vs. the CTO's) is not supported, perhaps because of the context of manufacturing firms in our research in which both marketing and R&D inputs are required for differentiators (Gupta et al. 1986; Hutt and Speh 1984). However, neither of these logics are borne out with the CMO–CSO dyad, since CSO presence neither strengthens nor weakens the CMO's impact under firm differentiation (Models M5a or M8). Thus, in contrast to the CMO–CTO dyad, with the CMO–CSO dyad, any increase in instrumental benefits under differentiation seems to be offset by increased political conflict because of the emphasis on a pull (vs. push) orientation that increases the CMO's relative importance (vs. the CSO's).

Nevertheless, we did find that CSCO presence weakens the positive effect of CMO presence on performance under firm differentiation (see Fig. 2d and Model M5c). Here, we only claim partial support since this effect becomes non-significant in full Model M8. Thus, for a dyadic interface to significantly weaken the impact of CMO presence because of political and cognitive conflict, there seemingly must also be a weak case for any instrumental benefits from the dyad, as is the case for the CMO–CSCO dyad, under firm differentiation.

This line of reasoning also explains why under a cost leadership strategy, only CTO presence weakens the

main effect of CMO presence (Fig. 2e; full Model M8). Here again, we only claim partial support because this effect is non-significant when entered separately (Model M6b). Thus, our theorizing for this effect—i.e., heightened political, and ensuing cognitive conflict, stemming from a greater reliance on the resources and orientation of the CTO under this strategy—is supported. CMO impact is not similarly weakened by CSCO presence when this strategy is emphasized (Model M6c or M8). In line with the aforementioned reasoning, a possible explanation is that CMO–CSCO conflict is offset by increased instrumentality of the CSCO's resources to the CMO, more so than the CTO's resources, given the CSCO's focus on efficiency and the strategic emphasis of cost leadership that values such a focus. We also did not find the CMO presence–firm performance relationship to be strengthened by CSO presence under this strategy, based on our expectation of these executives becoming allies and lowering their political differences (Model M6a or M8). In the face of tighter budgets under a cost leadership strategy, these executives possibly also experience increased levels of political conflict as they strive for acquiring marketing vs. selling resources.

Under high firm diversification, CMO impact is positively moderated by CSCO presence (Fig. 2f; Model M7c or M8), but not by CSO and CTO presence (Models M7a and M7b, or Model M8). We had expected these effects due to both lower political conflict in the face of powerful business units and greater instrumentality of these CXOs' resources for CMOs seeking to integrate marketing efforts across these units. These mixed results seem to suggest a relatively greater prominence of the instrumental logic only when the CMO and the CXO oversee distinct output- and throughput-related resources, respectively, as is the case with the CMO–CSCO dyad; in the CMO–CSO and CMO–CTO dyads, both executives oversee output-related resources.

Overall, our results with the firm-level moderators demonstrate that the salience of our theoretical rationales across the dyads under the strategic contingencies is nuanced. Firm-level contexts emphasizing one function over another can increase conflict—e.g., between the CMO and CSCO (CMO and CTO) under firm differentiation (cost leadership)—weakening the CMO's impact, especially when the case for the instrumental logic weak. Yet, when the instrumental reasons are prominent—e.g., CMO–CTO (CMO–CSCO) dyad under differentiation (diversification)—the former logics can be overruled, strengthening the CMO presence–firm performance relationship. Interestingly, none of the strategy-contingent moderations with CSO presence are significant, pointing to the possibility that the relatedness of the CMO and CSO's roles causes the instrumental and political rationales to offset each other.

Reaffirming the positive CMO presence–firm performance link Our study's fourth theoretical contribution is to the CMO literature, which has reported either positive or null performance effects of CMO presence (Nath and Mahajan 2017; Wiedeck and Engelen 2018). Our results for the main effect of CMO presence (see Model M1's results in Table 3) replicate the positive CMO presence–firm performance relationship (Germann et al. 2015). In fact, our estimate of the impact of CMO presence on Tobin's Q at .202 corroborates the "approximately 15%" effect reported by Germann et al. (2015). We thereby further establish the CMO position's importance in the TMT and, more broadly, substantiate marketing's elevated role in the firm.

Managerial implications

When present in the TMT, the CMO's unique, informational, relational, and decisional roles (see Table 1) enable superior customer-led, corporate-level strategies. Thus, because fewer than 40% of all firms employ a CMO—and those which do outperform firms that do not (Germann et al. 2015; Whitler et al. 2018), the majority of firms are missing out on the benefits of marketing representation in the TMT. Our results reaffirm the CMO's pivotal role. Notably, among the CXOs we studied, only the CMO's presence was positively related to Tobin's Q, supporting prior findings regarding the relatively stronger impact of marketing's capabilities on a firm's financial performance compared to the other functions (Krasnikov and Jayachandran 2008).

The appointment of functional heads in the TMT is a recognition of their roles, resources, and orientations within the firm's strategic decision-making (Guadalupe et al. 2014). In that regard, our research informs CEOs that the CMO's impact on firm performance depends on the interplay between the rest of the TMT's functional configuration, i.e., the presence of other CXOs, and contingencies facing the firm. Specifically, our results suggest that the appointment of a CSO (CTO) along with a CMO provides instrumental benefits to the CMO that improves performance when industry sales volatility (industry innovation and firm differentiation) is high. CEOs who pursue cost leadership (differentiation) also need to address potential CMO–CTO (CMO–CSCO) conflicts arising from political and cognitive differences between the CMO and these CXOs. More research is needed in this regard, but studies in the inter-functional interfaces and TMT literature point to market-based reward systems as well as

alignment on orientations, goals, accountability, and structure as ways to unite diverse functions (Hutt 1995; Menon et al. 1997; Sleep and Hulland 2019; Whitler et al. 2017). Lastly, CEOs in charge of diversified firms may want to consider appointing other CXOs (particularly the CSCO, given the significance of only this related interaction in our models) to aid CMOs in improving firm performance.

Our results also suggest that CMOs must pay closer attention to their dyadic interfaces with other CXOs, given the importance of spanning functional silos (Aaker 2008; Kohli and Deshpandé 2005). The distinct roles of the CSO, CTO, and CSCO provide them with resources that can be instrumental to the CMO in performing his/her informational, relational, and decisional roles, thus increasing the CMO's impact on performance. Although these CMO–CXO executive dyads may be subject to conflict resulting from political and cognitive differences, CMOs need to find common ground to enable them to better understand the external environment and more optimally manage internal contexts.

Limitations and future research directions

This study investigates specific CMO–CXO dyads among manufacturers. Future research can explore settings with other dyads, such as the CMO–CIO dyad in firms selling digital goods and services (Sleep and Hulland 2019) and the CMO–COO dyad. Furthermore, given our use of secondary data, we have not measured the three rationales. Since our results suggest that these rationales operate simultaneously, primary research can be undertaken to capture all three to get a holistic picture of how dyadic interfaces affect firm performance. Consider, for instance, the negative moderation by the CMO–CTO dyad under cost leadership, a finding that seemingly contradicts Homburg et al.'s (2017) result of marketing-R&D cooperation's positive effect under the same contingency. Cooperation, however, captures only the instrumental dimension of this interface. Therefore, future research should also consider measuring the political (cf. Hulland et al. 2012) and cognitive (cf. Homburg and Jensen 2007) dimensions that lead to conflict (cf. Maltz and Kohli 2000) to further our understanding of how they collectively affect performance outcomes (cf. Luo et al. 2006; Menon et al. 1997). Lastly, we also call for investigations into structural/personnel-related factors, such as power and gender, to shed light on how these dimensions of CMO–CXO dyads—in settings when both executives are present—interact with various contingencies to impact the CMO–firm performance relationship.

Appendix: Operationalizing the TMT in the context of CXO research

As noted in the body of the paper while discussing our focal measures of CMO, CSO, CTO, and CSCO presence in the TMT, the operationalization of TMTs has varied in extant research. In this appendix, we elaborate on this issue, with a view to aiding future research that studies functional heads (or CXOs) and TMTs, while also justifying our measure. To that end, we include a table below that first defines three operationalizations—Executive Officers (EOs) of the Registrant; Named Executive Officers (NEOs); and Management/Leadership—in extant TMT research that has used secondary data, and then lists the pertinent issues for each of them in subsequent rows (we preclude commenting on survey-based, CEO-defined TMTs, given that such research is rare, which is not surprising given the difficulty of obtaining CEOs as respondents).

As shown in this table, EOs are the policy making executives that publicly listed US firms are required to report for the purpose of various disclosures. Notably, firms have discretion in determining what constitutes policy making, however, it is a non-trivial matter determined by the board of each firm annually, and the SEC does not question the board's decision in this matter. NEOs are "named" in the context of compensation disclosures that are required for the CEO, the CFO, and three other most highly compensated EOs (although, firms don't always report exactly five NEOs). Thus, to be a NEO, an executive must be an EO in the first place, making NEOs a subset of EOs, although the two lists can be identical. In addition, firms often report other significant executives in the management/leadership section (found at the beginning or end) of their glossy annual reports to shareholders, or on their websites. However, these additional executives are not EOs, and since these glossy reports are not required (firms can send the 10-K instead), they are not consistently observed; in addition, the issue with websites is that they are dynamic and not historical. Yet another approach to construe the domain of the TMT construct has been to restrict the hierarchical levels used within these lists (e.g., Senior Vice President or SVP and above); notably however, this is a judgment made by the researcher(s).

Part of the reason for different TMT operationalizations is the absence of a formal conceptual definition (Carpenter et al. 2004). As such, TMTs are part of firms' strategic leadership, i.e., "the executives who have overall responsibility for an organization [with] substantive decision-making responsibilities" (Finkelstein and Hambrick 1996, p. 2). The common thread of research in this area is that a dominant coalition of senior executives in the firm's upper echelons has greater influence compared to those at lower levels (as an aside therefore, this focus also covers the board of directors). In the absence of formal criteria for determining the boundary of this

dominant coalition, one assumption that has resulted, is that pay equates with influence, making the highest paid executives, i.e., the NEOs for whom pay is disclosed, the most influential and equivalent to the TMT. However, we know of no conceptual basis for the SEC's specification of five NEOs and as mentioned previously, NEOs exclude EOs who may be paid relatively less but are still policy-making executives, a problem that is likely exacerbated in the context of CXOs who may get paid less than divisional heads. Another assumption is that titles (e.g., SVP and above), which indicate hierarchy and therefore influence, confer the status of strategic leadership. However, such an assumption ignores that equating titles across firms and industries in particular, may not be accurate (Finkelstein and Hambrick 1996).

In light of the preceding discussion, we operationalize the TMT as the list of EOs since it is consistently reported, inclusive (of CXOs), and objectively measured, and recommend that future CXO-focused research follow a similar approach. Notably, such an effort needs far more manual data collection than using NEOs, who are more readily determined with the Execucomp database. However, this latter operationalization, which results in selecting a relatively smaller number of CXOs is likely to bias estimates of CXO presence or other CXO characteristics. To the extent that CXO presence is a mere control, the TMT operationalization of NEOs may be reasonable; it would of course need to be what is used for compensation-focused research as this data is available only for NEOs (see Bansal et al. 2017 who account for sample selection since NEOs are a subset of EOs). For event-type studies using CXO appointment announcements, we recommend that researchers check if the CXOs are part of the TMT, operationalized as EOs in that year's annual filings. In these studies, if sample size is an issue and all CXOs need to be included, presence in TMT should be used as a control, an approach that can also be used if the scope of the TMT is broadened to include the additional executives reported in the glossy annual reports or websites (see last column of the table). Lastly, we note that our recommendations are limited to public firms, which are required to disclose information on their key senior executives.

Top management team (TMT) operationalizations using secondary data

Characteristics of TMT Operationalizations	Executive Officers (EOs) of the Registrant[a,b]	Named Executive Officers (NEOs)[b]	Management/Leadership[b]
Definition under Exchange Act	CEO and vice presidents in charge of a principal business unit, division or function and any other officer who performs a policy making function	CEO, the CFO, and (typically) three other most highly compensated EOs, i.e., a subset of EOs but can be same as the EO list	No formal definition but is either the same as the list of EOs or has additional executives or senior officers[c] who are not EOs
Source for collecting data	Firms can choose to report EOs in 10-K or definitive proxy (DEF 14A); 10-Ks are usually filed earlier than proxies; needs manual data collection	Typically in proxy; available as downloadable data in the Execucomp database	Glossy annual reports sent to shareholders, or websites, but the latter source is not historical; needs manual data collection
Legally required to be reported and consistently available for firm-years	Yes	Yes	No for executives who are not EOs; glossy reports are also not required (firms can send 10-Ks instead)
Inclusion determination	Annually, by board of directors	Based on total pay of (typically) five highest paid EOs	Unknown for executives who are not EOs
Purpose	Disclosure (to SEC and shareholders) of EOs' (a) beneficial holdings, purchases, and sales of employing firm's equity securities to shareholders, (b) biographical information such as age, tenure as EO, current and previous titles in firm, and prior business experience, and (c) appointment, termination, resignation or retirement filed in 8-Ks	Disclosure (to SEC and shareholders), of NEO's compensation details; recent say-on-pay ruling also requires advisory vote by shareholders on compensation at least once every three years	None formally indicated but likely purpose is to communicate leadership information on EOs (and other significant executives) to broader investor community, general public, and other stakeholders

[a] For all practical purposes, Section 16 officers are the same as EOs, but are not reported publicly as a list like the EOs are

[b] Studies have also limited TMTs to specific hierarchical levels within these lists (e.g., Senior Vice President and above)

[c] Senior officers are defined under the Exchange Act as officers who are not EOs, but make or are expected to make significant contributions to the business. While they may be listed separately in the SEC filings (10-K/proxy), below the list of EOs, we found few instances of this

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