

Pyramidal Ownership and SOE Innovation

Joyce C. Wang^a , Jingtao Yi^b, Xiuping Zhang^c and Mike W. Peng^d 

^a*St. Cloud State University*; ^b*Renmin University of China*; ^c*University of International Business and Economics*; ^d*University of Texas at Dallas*

ABSTRACT How can state-owned enterprises (SOEs) become more innovative in emerging economies where market competition emerges and state socialism remains? Rooted in a state socialism logic that traditionally prioritizes central planning, SOEs are increasingly challenged by a market competition logic espousing efficiency and innovation. We posit that the challenge, stemming from the grip of the state as the ultimate owner, may be mitigated for some SOEs under pyramidal ownership. A pyramid features SOEs being organized into chains of firms, creating indirect ownership and control through pyramidal layers. Such layers insulate state intervention in lower-tier SOEs, loosening the grip of the state socialism logic and facilitating corresponding SOEs' acceptance of the market competition logic, as reflected in more innovation. Leveraging a sample of SOEs in China, we find that SOEs innovate more when the number of pyramidal layers between them and the state increases. In addition, the innovation-facilitating role of pyramidal ownership hinges on industry regulations and institutional development. Overall, this paper integrates research on institutional logics and pyramidal ownership to deepen our understanding of SOE innovation.

Keywords: emerging economy, institutional logics, market competition logic, pyramidal ownership, SOE innovation, state socialism logic

INTRODUCTION

State-owned enterprises (SOEs), in which the state is the largest ultimate shareholder, are an important organizational form in many emerging economies, such as China and Russia, where market competition emerges and state socialism remains (Greve and Zhang, 2017; Musacchio et al., 2015; Peng and Heath, 1996). Traditionally, SOEs prioritize political and social goals at the expense of market efficiency (Inoue et al., 2013;

Address for reprints: Jingtao Yi, Renmin Business School, Renmin University of China, 59 Zhongguancun Street, Haidian, Beijing 100872, China (yjingtao@rmbs.ruc.edu.cn).

Tihanyi et al., 2019). Over time, while some SOEs continue to lack efficiency and competitiveness (Ayyagari et al., 2011; Megginson and Netter, 2001; Xu et al., 2014), other SOEs have joined market competition and become innovative (Lazzarini et al., 2021; Li et al., 2014; Liang et al., 2015; Meyer et al., 2014). Overall, in emerging economies, SOEs contribute significantly to the economic growth in general (Bruton et al., 2015; Z. Huang et al., 2017b) and to innovation in particular (Choudhury and Khanna, 2014; Zhou et al., 2017). As a result, research on SOE innovation has emerged (Genin et al., 2021; Jia et al., 2019; Kogut and Zander, 2000; Li et al., 2018).

Significant research attention has been paid to state ownership underpinning SOEs, which is considered incompatible with market competition (Shleifer, 1998). An institutional logics perspective helps explain the incompatibility (Besharov and Smith, 2014; Dalpiaz et al., 2016; Greenwood et al., 2011; Thornton, 2004). State ownership represents support for a state socialism logic (hereafter 'state logic') that implies a political and social orientation, which pits against a market competition logic (hereafter 'market logic') that emphasizes efficiency, innovation, and profit maximization (Genin et al., 2021; Greve and Zhang, 2017). Building on the roots of such incompatibility, scholars deduce that a low level of (or minority) state ownership may suggest a less influential state logic, making it possible for the emergence of market logic within firms in emerging economies (Musacchio et al., 2015). Relative to firms with majority state ownership, firms with minority state ownership may be more market-oriented and thus more innovative—indicating a dominant market logic (Zhou et al., 2017).

However, even if the state may have less than a majority of ownership, a reduction in state ownership may not necessarily alleviate the dominant influence of state logic over SOEs (Fisman and Wang, 2010). Then in emerging economies where market logic garners increasing importance, why do some SOEs embrace innovation, and other SOEs do not? Particularly, with the presence of ownership support of an entrenched state logic, how can certain SOEs simultaneously accommodate market logic that drives more innovation?

Addressing these important yet underexplored questions, we investigate *how* SOEs are owned and controlled (Claessens et al., 2000; La Porta et al., 1999). SOEs, albeit ultimately owned by the state, differ in their ownership distance from the state. SOEs may be organized into chains of affiliated firms, forming corporate pyramids (Faccio and Lang, 2002). Under pyramidal ownership, ultimate owners control firms indirectly through layers of intermediate firms – known as pyramidal layers (or tiers) (Almeida and Wolfenzon, 2006; Kandel et al., 2019; Shleifer and Vishny, 1997).

We posit that the pyramidal ownership structure may hold a key to explaining how some SOEs, rooted in state logic, can incorporate market logic by being more innovative. Although state ownership represents institutional support for state logic (Greve and Zhang, 2017; Lazzarini et al., 2021), how the state controls SOEs (direct vis-à-vis indirect) may denote the centrality of state logic in guiding strategic choices. The hierarchical ownership and indirect control, stemming from pyramidal ownership, potentially increases the complexities of state intervention. This structural distance between the state and lower-tier SOEs credibly loosens the grip of state logic over such SOEs and leaves them with an institutional space to concurrently accommodate another logic (Belenson et al., 2019; Besharov and Smith, 2014). In emerging economies, lower-tier SOEs, relative to higher-tier ones, may have the flexibility to engage with market logic as manifested by innovating more (Fan et al., 2013).

Leveraging a sample of SOEs in pyramids in China, we argue that SOEs innovate more when the number of pyramidal layers between them and the state increases. Furthermore, in regulated industries, industrywide regulations may compensate for the indirect control over lower-tier SOEs in pyramids, thereby sustaining state logic and mitigating the effect of pyramidal layers on SOE innovation. In contrast, when market-supporting institutional development in a region is higher, lower-tier SOEs headquartered in such a region are more likely to leverage pyramidal layers and incorporate market logic by innovating more.

Overall, we endeavor to make three contributions. First, enriching research on how organizations manage institutional complexity, we identify one key characteristic – indirect control through hierarchical ownership chains – that enables firms to engage with multiple, even competing logics (Dunn and Jones, 2010; Lounsbury, 2007). Specifically, SOEs positioned lower along pyramidal chains may encapsulate the coexistence of competing logics featuring a receding yoke of state logic and an intensifying importance of market logic.

Second, by shedding light on an underexplored type of pyramids, in which the state is the ultimate owner (Chernykh, 2008; Wright et al., 2021), we extend the business group literature (Hu and Sun, 2019). Additionally, juxtaposing pyramidal ownership with SOE innovation, an intersection that has received limited scholarly attention, and contextualizing the relationship in China, the largest emerging economy (by GDP), enrich the pyramid studies set in emerging economies (Fan et al., 2013; Hu and Xu, 2022; Opie et al., 2019).

Third, this paper unpacks the heterogeneity in innovation among SOEs from a structural perspective of organizational control (Belenzon et al., 2019), deepening our knowledge on SOE innovation (Anand et al., 2021). Going beyond an emphasis on the level of state ownership (Inoue et al., 2013; Liang et al., 2015), we propose that the extent to which SOEs join market competition and embrace innovation depends on their ownership distance from the ultimate owner – the state – along pyramidal chains.

PYRAMIDAL OWNERSHIP

Fueled by research on the separation of ownership and control (Fama and Jensen, 1983; Jensen and Meckling, 1976), La Porta et al. (1999) contend that firms often have ultimate controlling owners. Such an arrangement may be exemplified by a hierarchical ownership structure – pyramids (Almeida et al., 2011; Ayyagari et al., 2015; Claessens et al., 2000; Kandel et al., 2019; Luo et al., 2021; Shleifer and Vishny, 1997). A pyramid arises when an ultimate owner arranges affiliated firms through chains of ownership, where the ultimate owner ‘directly controls a firm, which in turn controls another firm, which might itself control another firm, and so forth’ (Almeida and Wolfenzon, 2006, p. 2638). Shown in Figure 1, pyramidal ownership creates a tier system with firms at different pyramidal layers (or tiers).

Pyramids are often studied within the realm of (private) business groups, mostly with families (specifically, family firms or family members) at the top (Khanna and Yafeh, 2007). On the one hand, a body of literature portrays pyramids as devices of controlling owners to separate ownership from control, expropriate minority shareholders, and reap private benefits, painting pyramids in a negative light (Claessens et al., 2000; Hu and Sun, 2019; Morck et al., 2005). Another stream of work, on the other hand, characterizes pyramids as corporate designs facilitating the sharing of labor, capital, information, and technology among group affiliates, casting a positive light on pyramids (Belenzon

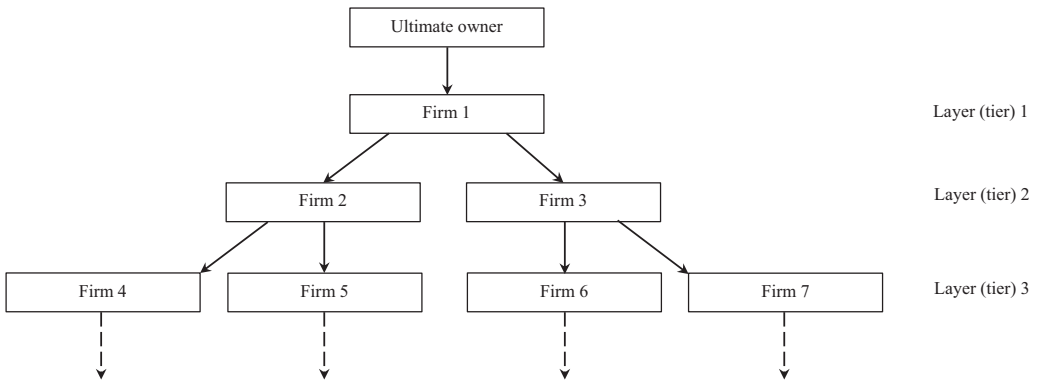


Figure 1. Conceptual illustration of a pyramidal structure

et al., 2019; Buchuk et al., 2014; Chacar and Vissa, 2005; He et al., 2013). Overall, debates rage on whether pyramids are good or bad (Aguilera et al., 2020; Almeida and Wolfenzon, 2006; Carney et al., 2018; Fisman and Wang, 2010; Hu et al., 2019; Jia et al., 2013; Khanna and Palepu, 2000; Young et al., 2008).

Despite the rich body of research covering divergent perspectives towards pyramids, two limitations stand out. First, pyramids are largely treated as synonymous with business groups of all stripes, eschewing the relative uniqueness of a pyramidal structure characterized by hierarchical ownership and indirect control (Bena and Ortiz-Molina, 2013; Bunkanwanicha et al., 2016; Chernykh, 2008). Second, the few studies that explicitly discuss pyramidal ownership have mostly studied the first major type of pyramids – families at the apex (Ayyagari et al., 2015; Belenzone et al., 2019; Lhuillery, 2011; Luo et al., 2021; Shleifer and Vishny, 1997). Pyramids in which the state is at the top represent the second major type (La Porta et al., 1999). Such state-owned pyramids call for separate scholarly research.

Although La Porta et al. (1999, p. 476) note that the state may control SOEs in the form of pyramids, research on such pyramids is scarce (see exceptions by Chernykh [2008], Fan et al. [2013], and Opie et al. [2019]). In response, this paper reorients research away from a focus on the debates over the merits or drawbacks of pyramiding towards a focus on the relatively unique feature of pyramiding. In summary, we highlight the *structural* dimension of organizational control (Belenzone et al., 2019), and propose that a hierarchical ownership structure has important institutional and strategic implications in the SOE context. Next, we sketch the contours of institutional complexity confronting SOEs in emerging economies and then elaborate on the innovation-facilitating role of pyramidal ownership for SOEs.

THE STATE AT THE APEX OF PYRAMIDS

Institutional Complexity Confronting SOEs

SOEs exist in many emerging economies where the prevailing institutional logic moves from state to market (Carney et al., 2018; Chernykh, 2008; Cuervo-Cazurra and Dau,

2009; Estrin et al., 2009; Hu and Xu, 2022; Musacchio and Lazzarini, 2014; Peng, 2003; Ralston et al., 2006; Raynard et al., 2020; Xu et al., 2014). The market logic, centered on competition, efficiency, and innovation, opposes the state logic that is based on central planning (see Table I). SOEs, rooted in state logic, are increasingly challenged to deal with institutional complexity, and are exposed to practices legitimized by market logic (Genin et al., 2021).

Institutional theory introduces logics as overarching belief systems that provide rationales for organizational goals, underpin identities, and shape behaviors (Dalpiaz et al., 2016; Friedland and Alford, 1991; Greenwood et al., 2014; Ocasio et al., 2017; Peng et al., 2018; Thornton, 2004; Tolbert and Zucker, 1983). This line of research has two implications that pertain to our paper. First, when institutions transition from old to new, often firms are expected to adapt to the new institutional logic (Kornai, 1992; Lin et al., 1998; Peng and Heath, 1996). Logic shifts imply that ‘the ascendance of a new logic results in the dismantling of the previously dominant logic because of their fundamental incompatibility’ (Greenwood et al., 2011, p. 332). Alternatively, firms can create an institutional *space* for the emerging logic, maintaining the old logic while attuning to the new one (Perkmann et al., 2019). Coexistence of old and new logics within organizations may be ideal in emerging economies (Genin et al., 2021). In essence, to meet the requirements of changing institutions, upon which organizations’ continued survival rests, organizations are expected to adapt their governing logics (Leblebici et al., 1991; Scott, 2001).

Second, also underlying this work is an emphasis on the prescriptive implications of institutional logics (Ahmadjian and Robinson, 2001; Ashraf et al., 2017; Besharov and Smith, 2014; Greenwood et al., 2010). For instance, Greve and Zhang (2017) contend that committed advocates of market logic consistently search for value creation opportunities (even risky ones), and often engage in market-oriented acquisitions. In contrast, supporters of state logic are less likely to do so. In emerging economies,

Table I. Two major institutional logics confronting SOEs in emerging economies

<i>Characteristics</i>	<i>State socialism logic</i>	<i>Market competition logic</i>
Supporting pillars	Controlling state ownership	Economic growth
	Government intervention	Private and foreign firms
Organizational goals	Social and market stability	Profit-maximizing
	Political objectives	Economic efficiency
Logics of investment	Employment	Competitive advantage
	Government plans	Customer demands
	Production quotas	Shareholder interests
Sources of growth	Central planning	Market allocation
	Political connections	Property rights
Strategy implications	Routine and responsive activities	Entrepreneurship and innovation
Innovation implications	Ineffective and inefficient	Effective and efficient

the shift of the prevailing logic from state to market may be manifested in changing emphases on firms' strategic choices such as innovation (Nee et al., 2010; Peng, 2003; Shleifer, 1998). Innovation, a risky strategy but a key driver of competitive advantages, embodies goals and behaviors oriented more towards market efficiency and reveals firms' capacity to commercialize market opportunities (Anand et al., 2021; Crossan and Apaydin, 2010; Duran et al., 2016). SOEs are increasingly pressed to innovate in emerging economies, a practice more effectively guided by market logic than by state logic.

Our traditional understanding of SOEs, anchored in their state ownership, likely leads to a view that SOEs are solely governed by state logic and thereby are less innovative (Kroll and Kou, 2019; Megginson and Netter, 2001; Peng and Heath, 1996; Raynard et al., 2020). That is because SOEs, controlled by the state, tend to prioritize public welfare and social imperatives, which de-emphasize firms' competitive advantages and which hinder firms from enhancing market efficiency. In turn, a lack of market emphases and capabilities may stymie innovation (Fleming et al., 2007; Nee et al., 2010). Even if SOEs pursue an innovation strategy, deficiency in their ability to recognize, assimilate, and apply market information to commercial ends may hinder innovation (Kogut and Zander, 2000). As a result, among early studies on SOEs, research on their innovation is often left at the margin (Belloc, 2014; Estrin et al., 2009; Musacchio and Lazzarini, 2014). Even within the limited research on SOE innovation, most scholars contend that SOEs can hardly innovate (Ayyagari et al., 2011; Li et al., 2018; Zhou et al., 2017).

A blanket view of less innovative and less competitive SOEs (*vis-à-vis* non-SOEs), nevertheless, obscures the *heterogeneity* among SOEs (Bruton et al., 2015; Genin et al., 2021; Hu and Sun, 2019; Musacchio et al., 2015; Peng et al., 2016). In many emerging economies, while some SOEs indeed cling to the entrenched state logic and remain less innovative, other SOEs have exemplified the coexistence of state and market logics and become more innovative (Jia et al., 2019; Liang et al., 2015; Okhmatovskiy, 2010; Ralston et al., 2006; Stan et al., 2014). Yet, reasons for these variations are underexplored. Rooted in state logic, can SOEs simultaneously engage with market logic? How will SOEs address the tension between an emphasis on political and social goals stemming from state logic and the growing importance of market efficiency and innovation propelled by market logic? Why do certain SOEs innovate more than other SOEs, despite all being ultimately owned by the state?

Recognizing the remnant institutional support for the state logic implied by state ownership, we address these questions by channeling our attention to *how* the state owns and controls SOEs. Drawing from research on the separation of ownership and control in general (Claessens et al., 2000; Faccio and Lang, 2002; Fama and Jensen, 1983; Jensen and Meckling, 1976; Shleifer and Vishny, 1997) and on pyramidal ownership in particular (Almeida and Wolfenzon, 2006; Belenzon et al., 2019; Chernykh, 2008; Kandel et al., 2019; Lhuillery, 2011), we identify the organization of SOEs into pyramids as a possible explanation for some SOEs' acceptance of market logic. This may be manifested in the corresponding SOEs' increase in innovation. Next, we turn to this perspective.

Pyramids as a Facilitator of SOE Innovation

SOEs, positioned at different tiers along hierarchical ownership chains, experience varied grip of state influence (Fan et al., 2013). We posit that pyramids, featuring cascading chains of ownership, may stave off the institutional grip of state logic over lower-tier SOEs. Confronting an arising market logic, lower-tier SOEs have the flexibility to respond to institutional complexity by creating an institutional space for market logic, thus innovating more.

For two reasons, lower-tier SOEs likely experience a loosened yoke of state logic. First, a pyramidal structure potentially increases the complexities and difficulties of ultimate owners' control, curtails the extent to which the state intervenes in lower-tier SOEs, and thereby tempers what the state can impose on them. To illustrate the diminishing influence over lower-tier firms from the ultimate owner, Belenon et al. (2019) describe pyramidal layers as an indication of 'organizational distance'. As a result, the further apart – the more pyramidal layers – between the state and affiliated SOEs, the less state intervention, due to 'communication and governance frictions' stemming from organizational distance (Belenon et al., 2019, p. 1617). In turn, reduced state intervention may translate into a receding influence of state logic governing these SOEs (Genin et al., 2021; Greve and Zhang, 2017). Second, even if the state exerts similar institutional pressures across SOEs, the impact tends to weaken along ownership chains, because the cascading ownership structure is associated with information asymmetries and subsequent deviation in enforcement and implementation (Z. Huang et al., 2017b; Liu and Li, 2015). Paralleling this argument, Lhuillery (2011) contends that a pyramid effectively helps firms positioned in lower tiers deviate from guidelines prescribed by the controlling owners. Likewise, we argue that lower-tier SOEs may be less influenced by state logic.

A loosened grip of the state reduces the centrality of state logic and leaves room for lower-tier SOEs to incorporate market logic, which is increasingly institutionalized in emerging economies (Kornai, 1992; Lin et al., 1998; Nee et al., 2010; Peng, 2003). Incorporation of market logic may be mirrored in firm practices (Ashraf et al., 2017; Thornton and Ocasio, 1999). Specifically, these SOEs, under the receding influence of state logic, are likely to heed the market, embark on risky projects, and innovate (Crossan and Apaydin, 2010; Duran et al., 2016; Kogut and Zander, 2000). Corroborating this view, Lazzarini et al. (2021) submit that SOE autonomy, mirroring receding state intervention, is a key ingredient in inducing SOE innovation.

Overall, lower-tier SOEs in pyramids – compared with higher-tier SOEs – may be less influenced by state logic, more responsive to market logic, and hence more innovative. This echoes Okhmatovskiy's (2010) view that keeping some distance from the state and avoiding political over-embeddedness is conducive to improving firm performance. Further, ample evidence has indicated that reducing or removing policy burdens prescribed by state logic is a key to successful SOE transformation (Goldeng et al., 2008; Lin et al., 1998; Liu and Li, 2015). In a similar vein, we argue that diminishing state intervention along pyramids, which thwarts the prevailing state logic, may encourage SOE innovation. Our argument attests to the perspective that pyramidal ownership is a

corporate design that calibrates organizational autonomy and that supports high-risk, capital-intensive projects, specifically in lower-tier firms (Jia et al., 2013).

The depiction that pyramidal ownership catalyzes certain SOEs' concurrent accommodation of market logic echoes the findings on the adoption of a competing logic at the field level. Institutional scholars have argued that organizations at the periphery of a field tend to be pioneers of new, competing institutional logics (Durand and Jourdan, 2012; Greenwood et al., 2011; Leblebici et al., 1991). In research on corporate pyramids and business groups, the distinction between core and periphery firms is also salient (Ayyagari et al., 2015). Lower-tier SOEs in pyramids may be considered as *peripheral*, relative to higher-tier SOEs closely controlled by the state. Recasting the institutional arguments in our context, we conjecture that peripheral (lower-tier) SOEs may be more receptive to the new market logic. Peripheral SOEs encounter less-intensive demands from the old state logic. Such SOEs are more likely to respond to the demands from market logic (Choudhury and Khanna, 2014; Peng, 2003). Thus, a pyramidal structure paves the way for some SOEs, specifically those at lower tiers, to incorporate market logic – as manifested in such SOEs engaging in more innovation.

To summarize, we argue that an increase in the number of pyramidal layers between SOEs and the state may (1) lessen the institutional grip of state logic over certain SOEs, and (2) facilitate such SOEs' incorporation of market logic. Under pyramidal ownership, lower-tier SOEs may be more responsive to market demands, more empowered to search for market opportunities, and more likely to engage in market-driven actions embodied in innovation. The further down the pyramidal chain, the more insulating the pyramidal layers, the less influence of state logic, and the more innovative the SOEs. Therefore:

Hypothesis 1: The number of pyramidal layers between the state and SOEs is positively related to the corresponding SOEs' innovation.

In this paper, the ease of accepting market logic rests on the extent to which the state interferes with SOEs, maintaining and supporting the prescriptive roles of state logic. On the one hand, SOEs directly controlled and owned by the state may be locked in state logic and hence have low propensity to incorporate market logic (Huang et al., 2017a). On the other hand, SOEs insulated from the state through pyramidal layers are less likely to be predominantly guided by state logic and more likely to embrace the increasingly important market logic (Greve and Zhang, 2017). Acceptance of market logic may help such SOEs focus on market opportunities and accumulate capabilities to innovate (Genin et al., 2021; Kogut and Zander, 2000; Lin et al., 1998). Therefore, the innovation implications of pyramids are premised on the coexistence of competing logics governing lower-tier SOEs, showcasing a *receding* influence of state logic and an *intensifying* importance of market logic. External factors that alter the relative prominence of state vis-à-vis market logics may serve as boundary conditions of the innovation-facilitating role of pyramids. In the next two sections, we argue that the effect of pyramid ownership on SOE innovation is likely to be (1) less salient when state logic retains strong influence in regulated industries, but (2) more potent when market logic becomes well-established in regions with higher levels of institutional development.

Industry Regulations

In many emerging economies, the speed with which the state relinquishes its control diverges across industries (Li et al., 2018; Oppen et al., 2017). Some industries are key segments of the economy, and thus are heavily regulated with limited exposure to market reforms because of ‘national interest’ concerns (Huang et al., 2017b). For two reasons, such industrial characteristics are likely to obstruct the innovation-facilitating role of pyramidal ownership.

First, heavy industrywide government regulations compensate for the indirect state control over lower-tier SOEs in pyramids. In regulated industries, the state prioritizes the benefits of government control (Ralston et al., 2006). The state can alter the size of markets, change the cost structure of firms through various types of regulations, and shift the demand for products and services by manipulating taxes (Chacar and Vissa, 2005; Goldeng et al., 2008). In general, SOEs in regulated industries may experience reduced autonomy and heed more government regulations, rather than changes in market demand that potentially spur innovation (Kogut and Zander, 2000). Consequently, the effect of pyramidal layers staving off state interference may be tempered, and state logic may prevail among SOEs in regulated industries. As accepting market logic is less imminent, SOE innovation may be hindered.

Second, in regulated industries, challenges from market logic are less pronounced. Such industries are often characterized by high entry/exit barriers, high market concentration, and less developed market mechanisms (Musacchio et al., 2015; Sun et al., 2016; Tihanyi et al., 2019). To survive and succeed, firms typically seek political and social resources, such as favorable regulatory treatment and guaranteed contracts, which are more likely to be channeled to SOEs (Kroll and Kou, 2019; Lazzarini et al., 2021; Oppen et al., 2017; Peng and Heath, 1996; Sun et al., 2021). As a result, SOEs in such industries, albeit at lower tiers of pyramids, may be insufficiently incentivized to respond to market logic and to focus on innovation. Since adherence to the dominant logic is inversely correlated with organizations’ awareness of and willingness to conform to an alternative logic (Durand and Jourdan, 2012), SOEs in regulated industries are more likely to cling to state logic and less likely to take advantage of a pyramidal structure to accommodate market logic. Therefore, lower-tier SOEs in regulated industries may not necessarily engage in more innovation.

In summary, in regulated industries, both the intense state interference and a lack of sufficient incentive to respond to market logic combine to reinforce the dominance of state logic in guiding SOEs’ practices. Consequently, the facilitating role of pyramidal ownership in incorporating market logic, expressed through more SOE innovation, may be less effective.

Hypothesis 2: The positive relationship between pyramidal layers and SOE innovation is weakened in regulated industries.

Institutional Development

Prevailing institutional logics may differ geographically (Hu and Sun, 2019; Lounsbury, 2007). Market reforms unfold over time at varying speeds across geographical regions

in emerging economies (He et al., 2013; Shi et al., 2012; Sun et al., 2021; Wang et al., 2016). The uneven pace reflects the degree of *market-supporting* institutional development (hereafter ‘institutional development’) across regions, defined as the extent to which market fundamentals support economic activities (Cuervo-Cazurra and Dau, 2009; Doh et al., 2017; Peng, 2003). In well-developed regions, markets govern more business transactions, and the state matters less. Therefore, compared with poorly-developed regions, well-developed regions are more likely to propel market logic to attain primacy over state logic (Sun et al., 2015). For two reasons, we hypothesize that institutional development in a region is likely to magnify the innovation-facilitating role of pyramids for some SOEs headquartered there.

First, the credibility and saliency of market logic increases as market-supporting institutions develop. In well-developed regions, open markets increase market pressures (Peng, 2003; Sun et al., 2015). Thornton (2004) contends that market competition leads to the institutionalization of market logic in the higher education publishing industry, undermining the preexisting editorial logic. Similarly, institutional development is likely to elevate market logic in well-developed regions, eroding the influence of state logic. In other words, in well-developed regions, market logic garners more institutional legitimacy, which characterizes a surge of market competition and an ebb of central planning (Cuervo-Cazurra and Dau, 2009). Institutional voids – typical of many regions in emerging economies – become less problematic (Doh et al., 2017). Consequently, when the rule of markets permeates economic life, the practice of turning to markets for resources and growth becomes more important (Doh et al., 2017; Opper et al., 2017; Peng and Heath, 1996; Zhou et al., 2017). In short, by adopting market logic in regions where the logic is well established, firms benefit more. Therefore, when headquartered in regions with higher levels of institutional development, lower-tier SOEs are more likely to leverage the pyramidal structure, embrace market logic, and innovate more.

Second, as market-supporting institutions develop within a region, failing to adapt to the emerging logic becomes costly (Peng, 2003). Ascendency of market logic implies that the state holds a receding amount of control over markets, and that the state’s umbrella of protection may become insufficient for SOEs to survive or grow. In well-developed regions, markets are more open to private firms (and often to foreign entrants), intensifying the competition for resources and customers (Carney et al., 2018; Sun et al., 2015). SOEs that passively take on government orders are unlikely to heed the growing market economy or respond to emerging competitive pressures, and eventually may have their survival at stake (Belloc, 2014; Estrin et al., 2009; Megginson and Netter, 2001; Xu et al., 2014). In contrast, endorsing market logic in well-developed regions, SOEs may attain a better fit with the regional development. In addition, as markets become more sophisticated and alternative routes to attain resources emerge, solely (or mostly) dependent on the state to access critical resources, such as capital and talents, may be less optimal (Chang et al., 2006; Hu et al., 2019; Inoue et al., 2013; Jia et al., 2013; Musacchio and Lazzarini, 2014). Overall, seeing the high cost associated with inattention to market logic in well-developed regions, SOEs headquartered in such regions are more likely to leverage pyramidal ownership, engage with market logic, and embark on more innovation.

In summary, enabling dynamics in well-developed regions increase the odds of SOEs leveraging pyramidal structures and incorporating market logic, as manifested in more innovation. Overall, institutional development may accelerate the receding influence of state logic and the acceptance of market logic in lower-tier SOEs in pyramids by further propelling them to be more innovative.

Hypothesis 3: The positive relationship between pyramidal layers and SOE innovation is strengthened when SOEs are headquartered in regions with higher levels of institutional development.

METHODOLOGY

Research Context

SOEs are an important organizational form with a significant global presence (Bruton et al., 2015; Jia et al., 2019; Meyer et al., 2014; Peng et al., 2016; Raynard et al., 2020; Tihanyi et al., 2019; Xu et al., 2014). Our empirical tests are set in China, the largest emerging economy that boasts a sizable SOE population. In the 2010s, SOEs represented approximately 80 per cent of China's stock market capitalization (Stan et al., 2014). In 2015, the state-owned equity capital of nonfinancial SOEs alone was equivalent to 52 per cent of China's GDP (World Bank, 2019). In 2018, SOEs accounted for a third of China's bank loans and investment (Economist, 2018; Hsu, 2018). The ultimate owner of these SOEs is the Chinese government, which broadly consists of central and local (provincial, municipal, and county) government authorities, as well as government agencies (such as state-owned asset management bureaus and local finance bureaus) – in short, 'the state'. Any level of these government entities may control SOEs through pyramidal ownership (Hu and Xu, 2022; Liu and Li, 2015; Liu and Sun, 2005; Opie et al., 2019).

Similar to the depiction in Chernykh (2008) and La Porta et al. (1999) on the emergence of pyramids in general, state-owned pyramids in China emerge from the evolution of the state sector (Fan et al., 2013). The formation of state-owned pyramids originated with market reforms (He et al., 2013; Jia et al., 2013; Jiang, 2016). Since the 1980s, China has witnessed economic transitions from central planning to market competition. The tension intensified in the 1990s, during which the stock markets in Shanghai and Shenzhen were created. The commitment to economic reforms and to the rejuvenation of SOEs led the state to float part of the SOEs' equity on the stock markets (Estrin et al., 2009; Hu and Sun, 2019).

Although SOEs are allowed to seek equity financing on the stock markets, the state has avoided mass privatization, and sales of corporate shareholding are closely regulated (Liu and Sun, 2005). Generally, state assets and state ownership are not freely transferable across firm boundaries. One example of such restrictions is that SOEs are 'unable to use outright sales as a means to transfer decision rights' to third parties (non-state owners) (Fan et al., 2013, p. 1218). More often, state assets spun off from some SOEs are injected into other SOEs, forming SOE affiliates and driving a wave of pyramid formation (Liu and Li, 2015; Zhou et al., 2017). Overall, due to the intention to retain the status of being the ultimate controlling owner of SOEs, the state

ends up with forming pyramids to organize its ownership and control of SOEs (He et al., 2013).

We postulate that pyramids with the state at the top may be regarded as a product of economic reforms. At least initially, the emergence of state-owned pyramids is heavily driven by the state, which primarily aims to promote economic growth. Over time, some higher-tier firms in pyramids may on their initiative set up new independent firms in lower tiers through the creation of additional pyramidal ownership links (Bena and Ortiz-Molina, 2013). In other words, some SOEs may take advantage of pyramidal structures to reduce government intervention, and create additional layers of affiliated firms (Fan et al., 2013). In general, both the state and (high-tier) SOEs may be behind the establishment and development of state-owned pyramids.

In addition to the presence of state-owned pyramids in China, recent government policies to promote innovation also make our inquiry on SOE innovation relevant. As an important dimension of economic transitions towards a market economy, the state, albeit holding onto state logic, has actively advocated an economywide enhancement of firm innovation capabilities since 2006 (Jia et al., 2019; Wang et al., 2017; World Bank, 2019). SOEs are expected to be more responsive to the innovation-promoting policies. As we have argued, SOEs innovate more when their internal governing logic incorporates market logic (Huang et al., 2017a; Kogut and Zander, 2000). While all SOEs may endeavor to respond to the innovation-promoting policies, only those that are capable of recognizing, assimilating, and applying market information to commercial ends can become more innovative. In sum, the fact that the state remains the ultimate owner of SOEs through pyramidal ownership and that economic policies promote more innovation makes China an ideal research setting to test our hypotheses.

Sample

We collect financial and ownership data from China Stock Market and Accounting Research (CSMAR) and Wind, two leading data sources that compile information disclosed by publicly listed firms in China (Greve and Zhang, 2017; Liang et al., 2015; Shi et al., 2012; Sun et al., 2015). To trace the hierarchical ownership chains of SOEs, we additionally hand collect data from company annual reports, which not only identify owners but also map the relationships among owners. Data on SOE innovation – patents – are obtained from the State Intellectual Property Office (SIPO), an equivalent to the United States Patent and Trademark Office (USPTO) (Huang et al., 2017a; Wang et al., 2017; Xu et al., 2022).

Essentially, pyramids are a specific type of business groups and necessarily encompass publicly-listed affiliated firms (Almeida et al., 2011; Bena and Ortiz-Molina, 2013; Fisman and Wang, 2010; Jia et al., 2013; La Porta et al., 1999). Consistent with Almeida and Wolfenzon (2006) and Khanna and Yafeh (2007), we first identify publicly listed SOEs on the Shanghai and Shenzhen Stock Exchanges between 2008 and 2013 (inclusive). The time span captures a major period of China's institutional transitions from state to market, during which indigenous innovation has been promoted by the government since 2006 (Huang, 2010; Jia et al., 2019). We exclude SOEs in the financial services industry given their idiosyncrasies (Opie et al., 2019).

The identification of a pyramidal structure follows La Porta et al. (1999, p. 472) by finding whenever possible the identities of the *ultimate* owners of capital and of voting rights in SOEs, ‘so when shares in a firm are owned by another company, we examine the ownership of that company, and so on’. Guided by this process, we map the hierarchical ownership chains among SOEs and the controlling state (central, provincial, municipal, and/or county governments) or its agencies (such as state-owned asset management bureaus and local finance bureaus). He et al. (2013, p. 168) point out that in China each publicly listed group-affiliated firm is ‘a distinct legal entity that publishes its own financial statements’. Therefore, we can trace the group affiliation of each SOE by their ownership structure. We track our sampled SOEs’ ownership profiles and pyramidal layer information from company annual reports. Overall, our sample is an unbalanced panel that includes 486 unique, publicly-listed SOEs belonging to 128 corporate pyramids, and that in the aggregate consists of 1,946 firm-year observations between 2008 and 2013 (inclusive).^[1]

Dependent Variable

Innovation. Following Ahuja and Katila (2001) and Duran et al. (2016), we measure the dependent variable as a count of patents *granted* to each SOE by SIPO in a year, which is considered as one of the most appropriate indicators of firm innovativeness. The practice of taking patent counts as an innovation measure is widely used (Chang et al., 2006; Sun et al., 2021; Zhou et al., 2019). The use of patent counts is especially appropriate in our context, because the measure not only reflects SOEs’ effectiveness in generating innovation outputs, but also captures their intention to seek firm-specific benefits based on market practices (Ayyagari et al., 2011; Crossan and Apaydin, 2010). In general, granted patents have potential strategic value by proactively fending off competitors and securing competitive advantages in generating firm-specific cash flows, which is aligned with market logic whereas at cross-purposes with state logic (Xu et al., 2022). Given the imperfections associated with patent counts, we also adopt four alternative measures that are commonly employed in the literature as robustness checks.

Independent Variables

Pyramidal layers. We count the number of pyramidal layers for each SOE in state-owned pyramids by referring to company annual reports. Following Belenzon et al. (2019), Buchuk et al. (2014), Bunkanwanicha et al. (2016), and Fan et al. (2013), we start with individual SOEs and back track their owners until the ultimate owner – the state – is identified. Next we identify the *longest* pyramidal chain, in the case of multiple chains connecting the state and the corresponding SOE, and then count the number of intermediate SOEs, including those publicly listed and not listed, along the longest pyramidal chain.^[2] This count number plus one is taken as the number of pyramidal layers. We take the logarithmic number of pyramidal layers in regressions.

For example, Figure 2 illustrates how we count pyramidal layers. Figure 2a and 2b show two sets of SOEs ultimately owned by the State Assets Supervision and Administration Commission (SASAC) of the State Council – a central government agency, and by the

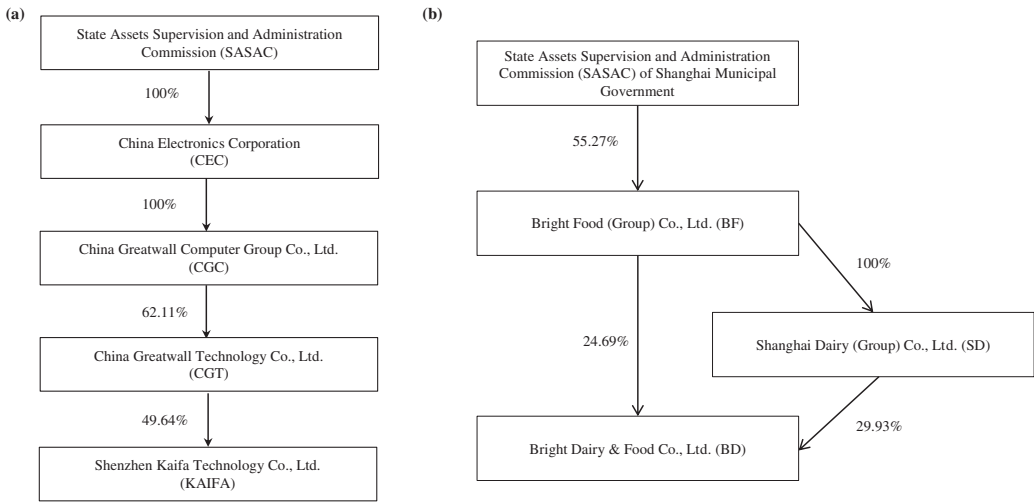


Figure 2. Example of a pyramidal ownership structure. (a) The 2009 annual report of Shenzhen Kaifa Technology Co., Ltd. *Note:* Shenzhen Kaifa Technology Co., Ltd. (KAIFA) is owned by China Greatwall Technology Co., Ltd. (CGT). CGT in turn is owned by China Greatwall Computer Group Co., Ltd. (CGC), which is owned by China Electronics Corporation (CEC). CEC is a state-owned producer of telecom equipment, directly owned by the SASAC of the State Council. Figure 2a shows that the extent of the pyramidal structure is four layers for KAIFA, counting the longest pyramidal chain. In the case of CGT, the layer is three. In the case of CGC, the layer is two. CEC has one pyramidal layer because the government agency, SASAC, directly owns and controls CEC. (b) The 2013 annual report of Bright Dairy & Food Co., Ltd. *Note:* Bright Dairy & Food Co., Ltd. (BD) is owned by Shanghai Dairy (Group) Co., Ltd. (SD) and Bright Food (Group) Co., Ltd. (BF). SD is wholly owned by BF. BF is in turn owned by SASAC of Shanghai Municipal Government. In Figure 2b, the extent of the pyramidal structure is three layers for BD, counting the longest pyramidal chain. In the case of SD, the layer is two, counting the only pyramidal chain. In the case of BF, the layer is one because the local government agency, SASAC of Shanghai Municipal Government, directly owns and controls BF

SASAC of Shanghai Municipal Government, respectively. To further illustrate a pyramidal structure, two additional examples are exhibited in Appendix. Overall, in our sample, the number of pyramidal layers ranges from 1 to 11.

Moderators

Industry regulations. We use a binary variable—regulated industry—to denote the significance of government regulations over specific industries. Such industries are typically characterized by (1) their foundational role in national economic development, (2) high concentration (often monopoly or oligopoly), and (3) government control of pricing (Huang et al., 2017b). In China, capital-intensive, energy-related, and/or heavy industries are subject to stronger influence from the state (Genin et al., 2021; Sun et al., 2016). Accordingly, we code a regulated industry as 1 if it belongs to sectors in which the state wields more influence, such as energy, natural resources, and pharmaceuticals, and 0 otherwise.

Institutional development. In China, institutional development varies in pace across provinces (Huang, 2010; Jiang, 2016; Sun et al., 2015). The degree of institutional development

captures the establishment of the market logic confronting SOEs headquartered in the corresponding regions. Building on Fan et al. (2013), Shi et al. (2012), and Wang et al. (2016), we leverage the National Economic Research Institute (NERI) marketization index on a province-by-province basis to measure the uneven degree of institutional development across regions in China. The NERI marketization index is widely used (Jia et al., 2019; Zhou et al., 2017). It includes five sub-indexes: (1) relationship between the government and the market, (2) development of the non-state sectors, (3) development of the product market, (4) development of the factor market, and (5) development of market intermediaries and the legal environment.

Controls

Following prior innovation studies, we include a vector of control variables that may affect firm innovation. Firm size is measured as the annual revenue, logged to normalize the distribution. We also control for firm financial performance, return on assets (ROA). Firm leverage is total debt divided by total assets. As our sample is composed of publicly listed SOEs, initial public offering (IPO) age, calculated as the current year minus the year of IPO, is controlled for. We also control R&D expenses as innovation inputs, computed as R&D investment scaled by firm sales. We control for SOEs' innovative capabilities as indicated in their prior innovation, and use the cumulative number of patents scaled by R&D expenses as a proxy. The cumulative number of patents is the total number of patents that a SOE has generated between the year of its establishment and an observation year. Ownership composition is a crucial factor in affecting SOE innovation (Sun et al., 2021; Zhou et al., 2017). We include state ownership, computed as the percentage of shareholding of the state.

At the industry level, we control for concentration, growth, and innovativeness of the sector in which a SOE competes. Industry concentration, which captures the level of market competition, is calculated using the Herfindahl-Hirschman index as the sum of the square of the market shares of all firms in an industry for each year. Industry growth, measured as the revenue growth rate in an industry, reflects the market potential for firms to innovate. In addition, we include industry innovation, calculated as the logarithm of the average number of patents by all peers in the same sector, to control for the possibility of spillover effects within a sector. Lastly, we also include pyramidal layer, group, year, industry, and province dummies as controls. Key continuous variables are mean centered, and time variant variables are lagged one year.

Analytical Strategy

Given that our dependent variable – patent count – is a discrete, non-negative integer, the assumption of homoscedastic, normally distributed errors in linear regressions is thus violated. Moreover, this variable exhibits over-dispersion, with the variance exceeding the mean, as observations range from zero to thousands. Therefore, the appropriate model for estimating such a count variable is the negative binomial model (Hausman et al., 1984). Since SOEs may have unobservable differences that affect their innovation within a pyramid, it may be appropriate to include a random effect that differs for each SOE but stays

the same over time within each pyramid (Fleming et al., 2007). The random-effects models provide more efficient estimates than the fixed-effects models when time-invariant unobservable heterogeneity exists, and the regressors have no significant correlation (Xu et al., 2022). Moreover, the random-effects models can estimate the effect of the time-invariant variable – regulated industries – whereas the fixed-effects models will remove the effect of this key variable. Overall, we estimate negative binomial models for random effects. We also incorporate Huber-Whites' robust standard errors to account for potential heteroskedasticity and a lack of normality in error terms (White, 1980).

RESULTS

Table II presents descriptive statistics and correlations. Correlations are not high enough to raise major concerns about multicollinearity. This is supported by the variance of inflation factor (VIF) statistics, ranging from 1.02 to 1.54, significantly lower than the threshold value of 10.

Table III contains estimation results of the effect of pyramidal layers on SOE innovation. Model 1 only contains control variables. Model 2 adds pyramidal layers and shows a significant and positive effect ($\beta = 0.161$, $p < 0.05$), which indicates that an increase in pyramidal layers indeed enhances SOE innovation, supporting Hypothesis 1. The effect is quite large. A one-standard-deviation increase in pyramidal layers in log (holding all other variables at their mean value) results in an 11.74 per cent increase in the number of patents assigned to the corresponding SOEs. Model 5 ($\beta = 0.291$, $p < 0.01$) of Table III also corroborates this positive relationship between pyramidal layers and SOE innovation.

We next turn to the moderating effect of industry regulations. Both Models 3 and 5 include the interaction between pyramidal layers and regulated industries. Model 3 shows that the coefficient for the interaction term is negative and significant ($\beta = -0.417$, $p < 0.01$), indicating that the main relationship is weakened in regulated industries. In regulated industries, a one-standard-deviation increase in pyramidal layers in log (holding all other variables at their mean value) tends to reduce patents assigned to SOEs by approximately 7.38 per cent. But a similar increase in pyramidal layers in log in non-regulated industries is associated with a 23.37 per cent increase in patents assigned to the corresponding SOEs. The interaction of pyramidal layers and regulated industries shows a similar pattern in Model 5 ($\beta = -0.394$, $p < 0.01$). These results cumulatively support Hypothesis 2.

The test of the moderating effect of institutional development is presented in Models 4 and 5 in Table III. Both models report that the interaction of pyramidal layers and institutional development is positive and significant. In Model 4 ($\beta = 0.112$, $p < 0.01$), a one-standard-deviation increase in pyramidal layers in log (holding other variables at their mean value) results in a 24.85 per cent increase in SOE innovation when the level of institutional development is high (one standard deviation above the mean). In contrast, a similar increase in pyramidal layers in log leads to a 0.74 per cent decrease in SOE innovation when the level of institutional development is low (one standard deviation below the mean). Model 5 ($\beta = 0.100$, $p < 0.01$) shows a qualitatively similar pattern. Overall, Models 4 and 5 support Hypothesis 3.

Table II. Summary statistics and correlations (N = 1,946)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 SOE innovation	1.000													
2 Pyramidal layer	0.052	1.000												
3 Regulated industries	0.070	0.013	1.000											
4 Institutional development	0.085	0.116	-0.066	1.000										
5 Firm size	0.416	0.012	0.096	0.054	1.000									
6 ROA	0.040	0.012	0.019	0.056	0.148	1.000								
7 Leverage	0.046	-0.048	-0.004	-0.049	0.329	-0.432	1.000							
8 IPO age	0.034	0.082	-0.011	0.139	0.099	-0.066	0.111	1.000						
9 R&D expenses	-0.012	0.078	-0.024	0.103	-0.213	0.061	-0.270	-0.189	1.000					
10 State ownership	0.109	0.019	0.123	0.062	0.308	0.084	0.066	-0.202	-0.030	1.000				
11 Prior innovation	-0.002	-0.006	-0.046	-0.032	-0.063	-0.042	0.024	0.040	-0.082	-0.038	1.000			
12 Industry concentration	0.111	-0.044	-0.217	0.068	0.140	-0.012	0.095	-0.011	-0.064	0.055	0.011	1.000		
13 Industry growth	-0.036	-0.008	-0.050	-0.003	0.041	0.066	0.049	-0.027	-0.071	0.042	0.006	0.147	1.000	
14 Industry innovation	0.290	0.121	0.131	0.039	0.192	-0.075	-0.019	0.041	0.204	0.115	-0.017	0.040	-0.142	1.000
Mean	130.405	2.922	0.342	6.875	21.968	0.037	0.524	11.252	0.020	0.441	0.028	0.170	0.267	4.034
S.D.	497.015	1.173	0.474	1.578	1.549	0.067	0.200	4.686	0.030	0.158	0.189	0.151	0.460	0.998

Table III. Negative binomial regressions of SOE innovation in pyramids (N = 1,946)

<i>Variables</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Pyramidal layers (H1)		0.161** (2.161)	0.305*** (3.591)	0.156** (2.091)	0.291*** (3.445)
Pyramidal layers × Regulated industries (H2)			-0.417*** (-4.850)		-0.394*** (-4.643)
Pyramidal layers × Institutional development (H3)				0.112*** (3.511)	0.100*** (3.215)
Regulated industries	0.099 (1.342)	0.107 (1.452)	0.105 (1.472)	0.112 (1.532)	0.108 (1.518)
Institutional development	0.007 (0.062)	0.005 (0.040)	-0.002 (-0.017)	-0.006 (-0.055)	-0.009 (-0.084)
Firm size	0.573*** (21.305)	0.570*** (21.432)	0.562*** (21.199)	0.570*** (21.485)	0.562*** (21.236)
ROA	0.395 (0.775)	0.364 (0.721)	0.340 (0.683)	0.140 (0.277)	0.137 (0.274)
Leverage	-0.415*** (-2.258)	-0.402*** (-2.189)	-0.438** (-2.413)	-0.446** (-2.418)	-0.475*** (-2.604)
IPO age	-0.009 (-1.123)	-0.009 (-1.109)	-0.009 (-1.118)	-0.008 (-0.985)	-0.008 (-1.022)
R&D expenses	7.191*** (3.854)	7.272*** (3.922)	6.621*** (3.596)	7.843*** (4.181)	7.129*** (3.827)
State ownership	-0.787*** (-3.234)	-0.773*** (-3.197)	-0.713*** (-3.032)	-0.753*** (-3.155)	-0.696*** (-2.981)
Prior innovation	0.419 (1.293)	0.423 (1.304)	0.418 (1.325)	0.424 (1.334)	0.419 (1.350)

Table III. (Continued)

<i>Variables</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Industry concentration	0.469* (1.797)	0.484* (1.862)	0.513** (2.005)	0.521** (2.006)	0.546** (2.132)
Industry growth	0.055 (0.866)	0.052 (0.845)	0.053 (0.838)	0.053 (0.865)	0.054 (0.862)
Industry innovation	0.335*** (8.948)	0.332*** (8.934)	0.333*** (9.257)	0.338*** (9.310)	0.339*** (9.593)
Pyramidal layer dummy	Included	Included	Included	Included	Included
Group dummy	Included	Included	Included	Included	Included
Year dummy	Included	Included	Included	Included	Included
Industry dummy	Included	Included	Included	Included	Included
Province dummy	Included	Included	Included	Included	Included
Constant	-9.694*** (-13.728)	-9.688*** (-13.656)	-9.486*** (-13.270)	-9.621*** (-13.734)	-9.440*** (-13.363)
Log Likelihood	-9741.57	-9738.65	-9726.28	-9731.48	-9720.47
Pseudo R ²	0.090	0.090	0.091	0.091	0.092

Note: Robust z-statistics in parentheses.

***p < 0.01; **p < 0.05; *p < 0.1 (two-tailed statistics tests).

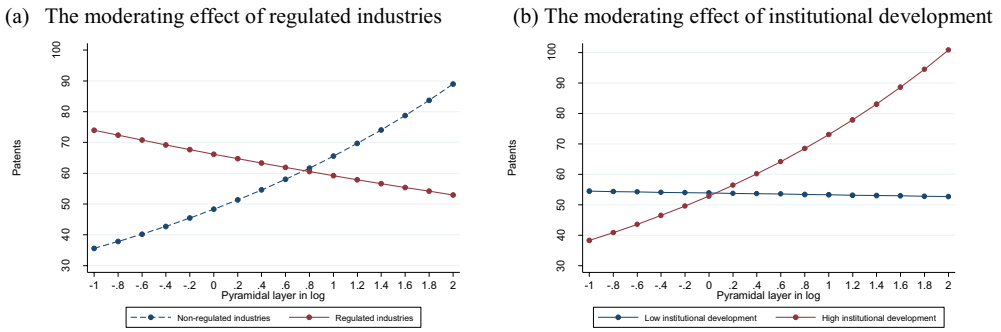


Figure 3. Graphic illustration of interaction effects. (a) The moderating effect of regulated industries. (b) The moderating effect of institutional development. *Note:* The variables of pyramidal layer in log and institutional development are mean-centered

To facilitate the interpretation of moderating effects, we illustrate the results visually in Figure 3a and 3b. In Figure 3a, the slope of the relationship between pyramidal layers and SOE innovation decreases in regulated industries, whereas it increases in non-regulated ones. This indicates that the innovation-facilitating role of pyramids is less pronounced in regulated industries. In Figure 3b, the slope of the relationship between pyramidal layers and SOE innovation is steeper in regions with high levels of institutional development (one standard deviation above the mean) than that in regions with low levels of institutional development (one standard deviation below the mean). This implies that the innovation-facilitating effect of pyramids is more salient when SOEs are headquartered in well-developed regions than they are in poorly-developed regions. Overall, both figures yield conclusions consistent with our Hypotheses 2 and 3.

Robustness Checks

We conduct five sets of supplementary tests to substantiate the robustness of our findings (see Appendix). First, we employ alternative operationalization of SOE innovation. Given that our dependent variable is *granted* patent counts, we also adopt the count of *applied* patents as another dependent variable. In addition, we assess whether our findings are sensitive to the nature of patents. SIPO classifies three major types of patents: invention, design, and utility model patents (Huang et al., 2017a; Sun et al., 2021). Compared with the other two types, invention patent is often regarded as the strongest form to reflect firm innovativeness (Jia et al., 2019; Kroll and Kou, 2019; Wang et al., 2017; Zhou et al., 2019). Therefore, we use invention patent counts (applied and granted) to replace overall patent counts as the dependent variable, and re-estimate our models. Moreover, going beyond absolute count measures, we adopt the ratio of patent counts to the number of employees as a relative measure of SOE innovation. Using all four alternative measures, we find consistent support for our hypotheses as shown in Table IA.

Second, we perform a series of additional analyses with alternative lag structures of model specifications. In Table IA, we use different time lags (two and three years) for our time-varying explanatory variables, to account for the lag nature of patents from application date to granting date (Chang et al., 2006). We also obtain support for our hypotheses.

Third, we rule out state ownership as an alternative mechanism driving our findings. A potential conjecture is that as the number of pyramidal layers increases, state ownership may decrease in the corresponding SOEs, thus boosting SOE innovation (Zhou et al., 2017). As a result, we empirically test the relationship between state ownership and pyramidal layers. In Table IIA, the results of a generalized linear model (GLM) with a logit link show no evidence that an increase in pyramidal layers is associated with a decrease in state ownership, thereby weakening the plausibility of less state ownership as an explanation.

Fourth, among SOE studies, those SOEs owned and controlled by the local government are mostly studied (Fan et al., 2013; Li et al., 2014; Liu and Li, 2015; Opie et al., 2019). Consistent with prior practice, we rerun all the regressions using the subsample of SOEs under the oversight of local governments, and find that the number of pyramidal layers is robustly and positively associated with innovation in lower-tier SOEs. Results in Table IIIA again lend support to our hypotheses.

Finally, there are potential endogeneity concerns. For example, both the number of pyramidal layers and SOE innovation may be correlated with some omitted variables. Moreover, SOEs that are more innovative may choose or be chosen to be organized farther down in pyramidal chains, staving off direct control of the state (Almeida et al., 2011; Bunkanwanicha et al., 2016; Fan et al., 2013). To rule out endogeneity issues, we implement the technique of instrumental variables with a two-stage least squares (2SLS) approach. An effective instrumental variable needs to correlate with a focal SOE's pyramidal layer but not with the ultimate outcome of the corresponding SOE's innovation. Following Fan et al. (2013), Liu and Li (2015), and Opie et al. (2019), we choose two instrumental variables: (1) the industry average of pyramidal layers across SOEs in the prior year, and (2) the regional unemployment rate in 1995. First, the lag of the industry average of pyramidal layers is likely to be positively correlated with the focal SOE's pyramidal layer in the current year, but is less likely to directly affect firm-level strategic choices such as innovation in the current year. In support of this argument, a regression of innovation on the industry average of pyramidal layers does not demonstrate a significant correlation. Second, deeply-lagged unemployment data – 13 years before the start of our sample – significantly reduce the possibility that the innovation strategies of our sampled SOEs are directly affected by the regional unemployment data in 1995. Nevertheless, the regional unemployment rate may be an early economic force to determine how likely the state decentralizes SOEs' decision rights and thus sets up corporate pyramids (Opie et al., 2019). Consequently, the regional unemployment data in 1995 potentially affect the extensiveness of pyramidal structures and hence pyramidal layers of SOEs. Table IVA shows results of 2SLS regressions with both instrumental variables. In summary, we find consistent and robust evidence that as the number of pyramidal layers between them and the ultimate state owner increases, SOEs innovate more.

Alternative Explanations

Did the state orchestrate the structure of state-owned pyramids and designate certain SOEs to lower tiers to unleash their innovativeness? A point of conjecture is that as the ultimate owner, the

state may simply decentralize its control over certain SOEs, expect them to be more innovative, and thus designate them to lower tiers in a pyramid. In other words, there may be unobservable factors that drive pyramidal structures as well as SOE innovation. We cannot entirely rule this out. Consistent with similar studies on corporate pyramids (Belenzon et al., 2019), we do not claim causal relationships between pyramidal layers and SOE innovation. Empirically we endeavor to rule out endogeneity issues through rigorous 2SLS regressions. Overall, similar to Belenzon et al. (2019, p. 1640), we can ‘document a robust correlation’ pointing out that lower-tier SOEs are indeed more innovative than higher-tier ones.

*Is it managerial autonomy that drives lower-tier SOEs’ innovation?*² Our framework relies on organizational autonomy granted to lower-tier SOEs, stemming from reduced state intervention along pyramidal chains, without delving further into the role of top managers in such SOEs. Top managers as dominant coalitions determine whether market logic can prevail and whether accumulation of innovation capabilities is prioritized (Greve and Zhang, 2017; Xu et al., 2022). Lazzarini et al. (2021, p. 564) contend that autonomy is ‘as potent an ingredient in inducing managers to produce complex knowledge-based outputs as monetary compensation or any other perk that self-interested managers typically pursue’. Echoing this view, we conjecture that organizational autonomy in SOEs may encourage managers’ productive and innovative pursuits. In addition, we do not consider agency cost associated with organizational autonomy as potential drag to innovation (Hu and Xu, 2022; Jia et al., 2019). While agency cost exists in most organizations with a separation of ownership and control (Jensen and Meckling, 1976; Luo et al., 2021), it is the extent of state intervention, or alternatively organizational autonomy, that demarcates innovative SOEs from less innovative SOEs. Building upon Belenzon et al. (2019), we believe that a link between pyramidal layers and organizational autonomy can sufficiently explain the heterogeneity in innovation among SOEs.

DISCUSSION

This paper draws from the institutional logics perspective and builds on research at the intersection of pyramidal ownership and SOE innovation. By examining how a hierarchical ownership structure facilitates SOEs in pyramids to deal with institutional complexity, we have leveraged and integrated research on (1) institutional logics, (2) pyramidal ownership, and (3) SOE innovation. Overall, triangulating the three streams of literature, we endeavor to sharpen our understanding in three ways.

Contribution 1: The Institutional Logics Literature

To further advance research on institutional logics, this paper examines how organizations manage institutional complexity (Ashraf et al., 2017; Dalpiaz et al., 2016; Dunn and Jones, 2010; Greenwood et al., 2010; Peng et al., 2018; Perkmann et al., 2019; Scott, 2001; Tolbert and Zucker, 1983). We propose that organizations differ in their potential to accommodate multiple, sometimes competing logics, and the diverging potentials

can be traced to the ownership and control link between organizations and their ultimate owners. In so doing, we resonate with Greenwood et al.'s (2014) statement that an overarching logic should be examined at the organizational level, and organizations – specifically, how they are owned and controlled – should be put back at the center of institutional logics research.

In addition, we enrich research on institutional logics by bringing in an underexplored empirical context (corporate pyramids) and an understudied organizational form (SOEs). The institutional logics perspective has mostly been applied to private firms in an impressive variety of contexts, such as higher education publishing (Thornton and Ocasio, 1999), mutual funds (Lounsbury, 2007), and film studios (Durand and Jourdan, 2012). Yet, few studies invoke a lens of institutional logics to understand pyramids or to make sense of SOEs, both of which have significant presence in today's global economy (Belenzon et al., 2019; Bruton et al., 2015; Peng et al., 2016). To this end, our paper deepens and broadens research on institutional logics.

Contribution 2: The Pyramidal Ownership and Business Group Literature

Joining the debate on the implications of pyramidal ownership (Aguilera et al., 2020; Almeida and Wolfenzon, 2006; Carney et al., 2018; Fisman and Wang, 2010; Inoue et al., 2013; Khanna and Palepu, 2000), this paper sheds a *positive* light on a pyramidal structure of separating ownership and control. Departing from the existing literature that often emphasizes pyramids' negative implications such as exacerbating agency problems and expropriating minority shareholders (Buchuk et al., 2014; Jensen and Meckling, 1976; Morck et al., 2005), we identify an encouraging notion – pyramids as a mechanism to propel the innovativeness and competitiveness of some SOEs in a leading emerging economy, China. To this end, this paper also adds to the literature on business groups in China by bringing the hierarchical ownership structure to the forefront in the context of SOE innovation.

Furthermore, echoing Khanna and Yafeh's (2007) proposition that business groups vary on many dimensions, we have elaborated the unique features of vertically controlled groups—specifically, corporate pyramids. Pyramidal layers insulate affiliated firms from the ultimate owner at the top, and the effect increases for affiliated firms lower along pyramidal chains (Bunkanwanicha et al., 2016; Fan et al., 2013). This feature may be less salient in other types of business groups. Our empirical inquiry thus cautions against the coarse-grained approach that bundles together different types of business groups.

Contribution 3: The SOE Innovation Literature

We complement and extend existing studies on SOE innovation (Anand et al., 2021; Genin et al., 2021; Lazzarini et al., 2021). Our investigation elaborates on Li et al.'s (2014, p. 981) statement that 'organizational diversity among SOEs can emerge through various means'. We make and substantiate the case that ownership distance from the state may embody one important source of SOE heterogeneity. Delving into the structural dimension of organizational control, we shed light on a pathway that has potentially turned some SOEs into dynamic dynamos (Ralston et al., 2006).

Recognition of the varied extent of state grip over SOEs also tentatively resolves some empirical inconsistencies examining firms with government affiliations as innovators (Belloc, 2014; Li et al., 2018; Sun et al., 2021; Tihanyi et al., 2019; Zhou et al., 2017). We contend that it is not necessarily state ownership (majority versus minority) *per se* that affects the innovativeness of SOEs. Rather, it is SOEs' positions within corporate pyramids that make a difference in their innovativeness. Our findings suggest that SOEs positioned lower along pyramidal chains, controlling for their state ownership, innovate more than those higher-tier SOEs. We attribute such innovation heterogeneity among SOEs to an overlooked cause: hierarchical ownership chains featuring state-owned pyramids.

In addition, our inquiry corroborates with Wright et al. (2021) that state ownership is only one dimension to understand how market and state logics coexist. Our research adds a structural dimension – pyramidal ownership – on the mechanisms of the emerging market logic in parallel with the remaining state logic. Propelled by Megginson and Netter's (2001, p. 382) call for research on alternative reforms to substitute for SOE privatization, scholars have turned to different methods, such as government decentralization, to revitalize the economy without eliminating the role of the state in businesses (Huang et al., 2017b; Liu and Li, 2015; Peng et al., 2016; Raynard et al., 2020). This paper highlights a novel option – hierarchical ownership structures in which pyramidal layers are meaningful to gauge market-oriented practices in SOEs (Belenson et al., 2019). Whereas decentralization alone does not guarantee a reduced burden of government mandates on SOEs, pyramids likely do. Echoing Fan et al. (2013), we reveal that pyramids featuring indirect ownership and control credibly mitigate state intervention over certain (especially lower-tier) SOEs.

Limitations and Future Research Directions

This paper has limitations that also suggest future research opportunities. First, our empirical testing is set in a single emerging economy – China – within a relatively short time span, and the results may be idiosyncratic to this context. As both corporate pyramids and SOEs have a wide presence, more work is needed to verify the generalizability of our proposed mechanisms to other emerging economies, such as Brazil (Inoue et al., 2013), Chile (Khanna and Palepu, 2000), India (Choudhury and Khanna, 2014), and Russia (Chernykh, 2008). Do state-owned pyramids in other emerging economies facilitate lower-tier SOEs' acceptance of the emerging market logic in a similar manner as shown in China? Overall, a cross-country investigation also merits research (Lazzarini et al., 2021; Musacchio et al., 2015). Additionally, future work can compare SOEs in pyramids (especially lower-tier SOEs) with privately-owned firms, as well as enrich the institutional and strategic implications of privately-owned pyramids (Bena and Ortiz-Molina, 2013; Carney et al., 2018; Hu et al., 2019; Khanna and Yafeh, 2007).

Second, we rely on ownership profiles to categorize SOEs into corporate pyramids. Aguilera et al. (2020) point out that the configuration of business groups in general depends on how business groups are defined. For example, ownership links and board interlocks represent two different boundaries on the identification of business groups.

In addition, consistent with a common practice in the business group studies, this paper assumes independence among affiliated SOEs in state-owned pyramids (Belzon et al., 2019; Chang et al., 2006). Future studies may examine whether our theoretical frameworks still hold in business groups linked by board interlocks. Building on a variety of links among firms in business groups, scholars may examine ‘peer’ or ‘spillover’ effects on affiliated firms’ institutional logics and innovation strategies. In addition, researchers may broaden the applicability of our frameworks by investigating whether market logic can be embodied in other strategic behaviors, such as acquisitions (Greve and Zhang, 2017) and downsizing (Ahmadjian and Robinson, 2001).

Third, we show that SOEs innovate more as the number of pyramidal layers between them and the state increases, indicating that such SOEs engage with market logic. How would such SOEs manage coexistence of state and market logics in the long run (Perkmann et al., 2019)? Whether incorporation of market logic in these SOEs precedes their transformation into hybrid or privatized firms is beyond the scope of this paper. Additionally, we turn to the institutional background in emerging economies as the potential driver of some SOEs’ acceptance of market logic (Peng, 2003; Scott, 2001), without explicating a direct representation of the logic. Future studies can follow Greve and Zhang (2017) and delve into the representatives of state and market logics in SOEs. Moreover, we have emphasized two overarching, society-level institutional logics that elicit organizational responses. Often organizations are governed by multiple – conflicting or complementary – logics (Thornton, 2004). We do not map the full array of logics influencing SOEs, and thus do not capture the entire complexity of relationships between institutional logics and organizational behaviors (Raynard et al., 2020). More work on the constellation of other logics – such as religion, profession, and/or political ideology – and the interplay of these logics will further deepen our understanding on strategic choices of SOEs (Greenwood et al., 2010; Peng and Heath, 1996; Xu et al., 2022).

CONCLUSION

Leveraging an institutional logics lens, we make and substantiate the case that SOEs organized into pyramids experience a diminishing institutional grip of state logic and thus have more institutional space for market logic along hierarchical ownership chains. Lower-tier SOEs may take advantage of pyramidal structures, incorporate market logic, and innovate more in an emerging economy. Our fine-grained probe into *how* the state owns and controls SOEs sheds considerable light on the progression of the state sector and the emergence of SOE innovation. In conclusion, despite the state being the ultimate owner, some SOEs under pyramidal ownership, especially those at lower tiers, may be enthusiastic about embracing the emerging market logic with a focus on innovation.

ACKNOWLEDGMENTS

We are grateful for the feedback from Editor Jonathan Doh and two anonymous reviewers who provided helpful suggestions throughout the review process.

FUNDING INFORMATION

Yi thanks the National Natural Science Foundation of China (grant no. 71873136) and Digital Ecosystem Competition Platform, Major Innovation & Planning Interdisciplinary Platform for the ‘Double-First Class’ Initiative, Renmin University of China. Zhang thanks financial support from the Beijing Social Science Foundation of China (project no. 19YJC041). Peng is grateful to the Jindal Chair at UT Dallas.

NOTES

[1] Data are available upon request.

[2] Empirical analyses of SOE innovation only include SOEs that are publicly listed.

REFERENCES

- Aguilera, R. V., Crespi-Cladera, R., Infantes, P. M. and Pascual-Fuster, B. (2020). ‘Business groups and internationalization: Effective identification and future agenda’. *Journal of World Business*, **55**, 101050.
- Ahmadjian, C. L. and Robinson, P. (2001). ‘Safety in numbers: Downsizing and the deinstitutionalization of permanent employment in Japan’. *Administrative Science Quarterly*, **46**, 622–54.
- Ahuja, G. and Katila, R. (2001). ‘Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study’. *Strategic Management Journal*, **22**, 197–220.
- Almeida, H. V., Park, Y., Subrahmanyam, M. G. and Wolfenzon, D. (2011). ‘The structure and formation of business groups: Evidence from Korean chaebols’. *Journal of Financial Economics*, **99**, 447–75.
- Almeida, H. V. and Wolfenzon, D. (2006). ‘A theory of pyramidal ownership and family business groups’. *Journal of Finance*, **61**, 2637–80.
- Anand, J., McDermott, G., Mudambi, R. and Narula, R. (2021). ‘Innovation in and from emerging economies: New insights and lessons for international business research’. *Journal of International Business Studies*, **52**, 545–59.
- Ashraf, N., Ahmadsimab, A. and Pinkse, J. (2017). ‘From animosity to affinity: The interplay of competing logics and interdependence in cross-sector partnerships’. *Journal of Management Studies*, **54**, 793–822.
- Ayyagari, M., Dau, L. A. and Spencer, J. (2015). ‘Strategic responses to FDI in emerging markets: Are core members more responsive than peripheral members of business groups?’ *Academy of Management Journal*, **58**, 1869–94.
- Ayyagari, M., Demircuc-Kunt, A. and Maksimovic, V. (2011). ‘Firm innovation in emerging markets: The role of finance, governance, and competition’. *Journal of Financial and Quantitative Analysis*, **46**, 1545–80.
- Belenzon, S., Hashai, N. and Pataconi, A. (2019). ‘The architecture of attention: Group structure and subsidiary autonomy’. *Strategic Management Journal*, **40**, 1610–43.
- Bello, F. (2014). ‘Innovation in state-owned enterprises: Reconsidering the conventional wisdom’. *Journal of Economic Issues*, **48**, 821–48.
- Bena, J. and Ortiz-Molina, H. (2013). ‘Pyramidal ownership and the creation of new firms’. *Journal of Financial Economics*, **108**, 798–821.
- Besharov, M. L. and Smith, W. K. (2014). ‘Multiple institutional logics in organizations: Explaining their varied nature and implications’. *Academy of Management Review*, **39**, 364–81.
- Bruton, G. D., Peng, M. W., Ahlstrom, D., Stan, C. and Xu, K. (2015). ‘State-owned enterprises as hybrid organizations around the world’. *Academy of Management Perspectives*, **29**, 92–114.
- Buchuk, D., Larrain, B., Munoz, F. and Urzúa, F. (2014). ‘The internal capital markets of business groups: Evidence from intra-group loans’. *Journal of Financial Economics*, **112**, 190–212.
- Bunkanwanicha, P., Gupta, J. and Wiwattanakantang, Y. (2016). ‘Pyramidal group structure and bank risk in Thailand’. *Journal of Comparative Economics*, **44**, 272–88.
- Carney, M., van Essen, M., Estrin, S. and Shapiro, D. (2018). ‘Business groups reconsidered: Beyond parasites and parasites’. *Academy of Management Perspectives*, **32**, 493–516.
- Chacar, A. and Vissa, B. (2005). ‘Are emerging economies less efficient? Performance persistence and the impact of business group affiliation’. *Strategic Management Journal*, **26**, 933–46.
- Chang, S., Chung, C. and Mahmood, I. P. (2006). ‘When and how does business group affiliation promote firm innovation? A tale of two emerging economies’. *Organization Science*, **17**, 637–56.
- Chernykh, L. (2008). ‘Ultimate ownership and control in Russia’. *Journal of Financial Economics*, **88**, 169–92.

- Choudhury, P. and Khanna, T. (2014). 'Toward resource independence—why state-owned entities become multinationals: An empirical study of India's public R&D laboratories'. *Journal of International Business Studies*, **45**, 943–60.
- Claessens, S., Djankov, S. and Lang, L. H. P. (2000). 'The separation of ownership and control in East Asian corporations'. *Journal of Financial Economics*, **58**, 81–112.
- Crossan, M. M. and Apaydin, M. (2010). 'A multi-dimensional framework of organizational innovation: A systematic review of the literature'. *Journal of Management Studies*, **47**, 1154–91.
- Cuervo-Cazurra, A. and Dau, L. A. (2009). 'Promarket reforms and firm profitability in developing countries'. *Academy of Management Journal*, **52**, 1348–68.
- Dalpiatz, E., Rindova, V. and Ravasi, D. (2016). 'Combining logics to transform organizational agency: Blending industry and art at Alessi'. *Administrative Science Quarterly*, **61**, 347–92.
- Doh, J., Rodrigues, S., Saka-Helmhout, A. and Makhija, M. (2017). 'International business responses to institutional voids'. *Journal of International Business Studies*, **48**, 293–307.
- Dunn, B. and Jones, C. (2010). 'Institutional logics and institutional pluralism: The contestation of care and science logics in medical education, 1967–2005'. *Administrative Science Quarterly*, **55**, 114–49.
- Duran, P., Kammerlander, N., van Essen, M. and Zellweger, T. (2016). 'Doing more with less: Innovation input and output in family firms'. *Academy of Management Journal*, **59**, 1224–64.
- Durand, R. and Jourdan, J. (2012). 'Jules or Jim: Alternative conformity to minority logics'. *Academy of Management Journal*, **55**, 1295–315.
- Economist. (2018). *Are China's State Giants Reformable?* London: The Economist. <https://www.economist.com/business/2018/03/01/are-chinas-state-giants-reformable>
- Estrin, S., Hanousek, J., Kocenda, E. and Svejnar, J. (2009). 'The effect of privatization and ownership in transition economies'. *Journal of Economic Literature*, **47**, 1–30.
- Faccio, M. and Lang, L. H. P. (2002). 'The ultimate ownership of Western European corporations'. *Journal of Financial Economics*, **65**, 365–95.
- Fama, E. F. and Jensen, M. C. (1983). 'Separation of ownership and control'. *Journal of Law and Economics*, **26**, 301–25.
- Fan, J. P. H., Wong, T. J. and Zhang, T. (2013). 'Institutions and organizational structure: The case of state-owned corporate pyramids'. *Journal of Law, Economics, and Organization*, **29**, 1217–52.
- Fisman, R. and Wang, Y. (2010). 'Trading favors within Chinese business groups'. *American Economic Review: Papers Proceedings*, **100**, 251–73.
- Fleming, L., Mingo, S. and Chen, D. (2007). 'Collaborative brokerage, generative creativity, and creative success'. *Administrative Science Quarterly*, **52**, 443–75.
- Friedland, R. and Alford, R. R. (1991). 'Bring society back: Symbols, practices, and institutional contradictions'. In Powell, W. W. and DiMaggio, P. J. (Eds), *The New Institutionalism in Organizational Analysis*. Chicago, IL: University of Chicago Press, 232–66.
- Genin, A. L., Tan, J. and Song, J. (2021). 'State governance and technological innovation in emerging economies: State-owned enterprise restructuring and institutional logic dissonance in China's high-speed train sector'. *Journal of International Business Studies*, **52**, 621–45.
- Goldeng, E., Grunfeld, L. A. and Benito, G. R. G. (2008). 'The performance differential between private and state owned enterprises: The roles of ownership, management and market structure'. *Journal of Management Studies*, **45**, 1244–73.
- Greenwood, R., Diaz, A. M., Li, S. X. and Lorente, J. C. (2010). 'The multiplicity of institutional logics and the heterogeneity of organizational responses'. *Organization Science*, **21**, 521–39.
- Greenwood, R., Hinings, C. R. and Whetten, D. (2014). 'Rethinking institutions and organizations'. *Journal of Management Studies*, **51**, 1206–20.
- Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. R. and Lounsbury, M. (2011). 'Institutional complexity and organizational responses'. *Academy of Management Annals*, **5**, 317–71.
- Greve, H. R. and Zhang, C. M. (2017). 'Institutional logics and power sources: Merger and acquisition decisions'. *Academy of Management Journal*, **60**, 671–94.
- Hausman, J., Hall, B. H. and Griliches, Z. (1984). 'Econometric models for count data with an application to the patents—R&D relationship'. *Econometrica*, **52**, 909–37.
- He, J., Mao, X., Rui, O. M. and Zha, X. (2013). 'Business groups in China'. *Journal of Corporate Finance*, **22**, 166–92.
- Hsu, S. (2018). 'Why 'strong government' is expected to be key to China's economy in 2018'. *Forbes*. Available at <https://www.forbes.com/sites/sarahsu/2018/01/07/continued-strong-government-expected-in-chinas-economy-this-year/#25ac244f351b>

- Hu, H. W., Cui, L. and Aulakh, P. S. (2019). 'State capitalism and performance persistence of business group-affiliated firms: A comparative study of China and India'. *Journal of International Business Studies*, **50**, 193–222.
- Hu, H. W. and Sun, P. (2019). 'What determines the severity of tunneling in China?'. *Asia Pacific Journal of Management*, **36**, 161–84.
- Hu, H. W. and Xu, D. (2022). 'Manager or politician? Effects of CEO pay on the performance of state-controlled Chinese listed firms'. *Journal of Management*, Forthcoming.
- Huang, K. G. (2010). 'China's innovation landscape'. *Science*, **329**, 632–33.
- Huang, K. G., Geng, X. and Wang, H. (2017a). 'Institutional regime shift in intellectual property rights and innovation strategies of firms in China'. *Organization Science*, **28**, 355–77.
- Huang, Z., Li, L., Ma, G. and Xu, L. C. (2017b). 'Hayek, local information, and commanding heights: Decentralizing state-owned enterprises in China'. *American Economic Review*, **107**, 2455–78.
- Inoue, C. F. K. V., Lazzarini, S. G. and Musacchio, A. (2013). 'Leviathan as a minority shareholder: Firm-level implications of state equity purchases'. *Academy of Management Journal*, **56**, 1775–801.
- Jensen, M. C. and Meckling, W. H. (1976). 'Theory of the firm: Managerial behavior, agency costs and ownership structure'. *Journal of Financial Economics*, **3**, 305–60.
- Jia, N., Huang, K. G. and Zhang, C. M. (2019). 'Public governance, corporate governance, and firm innovation: An examination of state-owned enterprises'. *Academy of Management Journal*, **62**, 220–47.
- Jia, N., Shi, J. and Wang, Y. (2013). 'Coinsurance within business groups: Evidence from related party transactions in an emerging market'. *Management Science*, **59**, 2295–313.
- Jiang, X. (2016). 'Government decentralization and innovation of state-owned enterprises'. *Management World*, **9**, 120–35. (in Chinese).
- Kandel, E., Kosenko, K., Morck, R. and Yafeh, Y. (2019). 'The great pyramids of America: A revised history of U.S. business groups, corporate ownership, and regulation, 1926–1950'. *Strategic Management Journal*, **40**, 781–808.
- Khanna, T. and Palepu, K. (2000). 'The future of business groups in emerging markets: Long-run evidence from Chile'. *Academy of Management Journal*, **43**, 268–85.
- Khanna, T. and Yafeh, Y. (2007). 'Business group in emerging markets: Paragons or parasites?'. *Journal of Economic Literature*, **45**, 331–72.
- Kogut, B. and Zander, U. (2000). 'Did socialism fail to innovate? A natural experiment of the two Zeiss companies'. *American Sociology Review*, **65**, 169–90.
- Kornai, J. (1992). *The Socialist System*. Princeton, NJ: Princeton University Press.
- Kroll, H. and Kou, K. (2019). 'Innovation output and state ownership: Empirical evidence from China's listed firms'. *Industry and Innovation*, **26**, 176–98.
- La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (1999). 'Corporate ownership around the world'. *Journal of Finance*, **54**, 471–517.
- Lazzarini, S. G., Mesquita, L., Monteiro, F. and Musacchio, A. (2021). 'Leviathan as an inventor: An extended agency model of state-owned versus private firm invention in emerging and developed economies'. *Journal of International Business Studies*, **52**, 560–94.
- Leblebici, H., Salancik, G. R., Copay, A. and King, T. (1991). 'Institutional change and the transformation of interorganizational fields: An organizational history of the U.S. radio broadcasting industry'. *Administrative Science Quarterly*, **36**, 333–63.
- Lhuillery, S. (2011). 'The impact of corporate governance practices on R&D efforts: A look at shareholders' rights, cross-listing, and control pyramid'. *Industrial and Corporate Change*, **20**, 1475–513.
- Li, J., Xia, J. and Zajac, E. J. (2018). 'On the duality of political and economic stakeholder influence on firm innovation performance: Theory and evidence from Chinese firms'. *Strategic Management Journal*, **39**, 193–216.
- Li, M. H., Cui, L. and Lu, J. (2014). 'Varieties in state capitalism: Outward FDI strategies of central and local state-owned enterprises from emerging economy countries'. *Journal of International Business Studies*, **45**, 980–1004.
- Liang, H., Ren, B. and Sun, S. L. (2015). 'An anatomy of state control in the globalization of state-owned enterprises'. *Journal of International Business Studies*, **46**, 223–40.
- Lin, J. Y., Cai, F. and Li, Z. (1998). 'Competition, policy burdens, and state-owned enterprise reform'. *American Economic Review*, **88**, 422–27.
- Liu, G. S. and Sun, P. (2005). 'The class of shareholdings and its impacts on corporate performance: A case of state shareholding composition in Chinese public corporations'. *Corporate Governance: An International Review*, **13**, 46–59.

- Liu, H. and Li, X. (2015). 'Government decentralization and corporate fraud: Evidence from listed state-owned enterprises in China'. *China Journal of Accounting Studies*, **3**, 320–47.
- Lounsbury, M. (2007). 'A tale of two cities: Competing logics and practice variation in the professionalizing of mutual funds'. *Academy of Management Journal*, **50**, 289–307.
- Luo, J., Li, X., Wang, L. C. and Liu, Y. (2021). 'Owner type, pyramidal structure, and R&D investment in China's family firms'. *Asia Pacific Journal of Management*, **38**, 1085–111.
- Meggison, W. L. and Netter, J. M. (2001). 'From state to market: A survey of empirical studies on privatization'. *Journal of Economic Literature*, **39**, 321–89.
- Meyer, K. E., Ding, Y., Li, J. and Zhang, H. (2014). 'Overcoming distrust: How state-owned enterprises adapt their foreign entries to institutional pressures abroad'. *Journal of International Business Studies*, **45**, 1005–28.
- Morck, R., Wolfenzon, D. and Yeung, B. (2005). 'Corporate governance, economic entrenchment and growth'. *Journal of Economic Literature*, **43**, 657–722.
- Musacchio, A. and Lazzarini, S. G. (2014). *Reinventing State Capitalism: Leviathan in Business, Brazil and Beyond*. Cambridge, MA: Harvard University Press.
- Musacchio, A., Lazzarini, S. G. and Aguilera, R. V. (2015). 'New varieties of state capitalism: Strategic and governance implications'. *Academy of Management Perspectives*, **29**, 115–31.
- Nee, V., Kang, J. and Opper, S. (2010). 'A theory of innovation: Market transition, property rights, and innovation activity'. *Journal of Institutional and Theoretical Economics*, **166**, 397–425.
- Ocasio, W., Thornton, P. H. and Lounsbury, M. (2017). 'Advances to the institutional logics perspective'. In Greenwood, R., Oliver, C., Lawrence, T. B. and Meyer, R. E. (Eds), *The SAGE Handbook of Organizational Institutionalism*. Thousand Oaks, CA: Sage, 509–31.
- Okhmatovskiy, I. (2010). 'Performance implications of ties to the government and SOEs: A political embeddedness perspective'. *Journal of Management Studies*, **47**, 1020–47.
- Opic, W., Tian, G. G. and Zhang, H. F. (2019). 'Corporate pyramids, geographical distance, and investment efficiency of Chinese state-owned enterprises'. *Journal of Banking and Finance*, **99**, 95–120.
- Opper, S., Nee, V. and Holm, H. J. (2017). 'Risk aversion and guanxi activities: A behavioral analysis of CEOs in China'. *Academy of Management Journal*, **60**, 1504–30.
- Peng, M. W. (2003). 'Institutional transitions and strategic choices'. *Academy of Management Review*, **28**, 275–96.
- Peng, M. W., Bruton, G. D., Stan, C. and Huang, Y. (2016). 'Theories of the (state-owned) firm'. *Asia Pacific Journal of Management*, **33**, 293–317.
- Peng, M. W. and Heath, P. S. (1996). 'The growth of the firm in planned economies in transition: Institutions, organizations, and strategic choice'. *Academy of Management Review*, **21**, 492–528.
- Peng, M. W., Nguyen, H. W., Wang, J. C., Hasenhuettl, M. and Shay, J. (2018). 'Bringing institutions into strategy teaching'. *Academy of Management Learning and Education*, **17**, 259–78.
- Perkmann, M., McKelvey, M. and Phillips, N. (2019). 'Protecting scientists from Gordon Gekko: How organizations use hybrid spaces to engage with multiple institutional logics'. *Organization Science*, **30**, 298–18.
- Ralston, D. A., Terpstra-Tong, J., Terpstra, R. H., Wang, X. and Egri, C. (2006). 'Today's state-owned enterprises of China: Are they dying dinosaurs or dynamic dynamos?' *Strategic Management Journal*, **27**, 825–43.
- Raynard, M., Lu, F. and Jing, R. (2020). 'Reinventing the state-owned enterprises? Negotiating change during profound environmental upheaval'. *Academy of Management Journal*, **63**, 1300–35.
- Scott, W. R. (2001). *Institutions and Organizations*. Thousand Oaks, CA: Sage.
- Shi, W. S., Sun, S. L. and Peng, M. W. (2012). 'Sub-national institutional contingencies, network positions, and IJV partner selection'. *Journal of Management Studies*, **49**, 1221–45.
- Shleifer, A. (1998). 'State versus private ownership'. *Journal of Economic Perspective*, **12**, 133–50.
- Shleifer, A. and Vishny, R. W. (1997). 'A survey of corporate governance'. *Journal of Finance*, **52**, 737–83.
- Stan, C. V., Peng, M. W. and Bruton, G. D. (2014). 'Slack and the performance of state-owned enterprises'. *Asia Pacific Journal of Management*, **31**, 473–95.
- Sun, P., Deng, Z. and Wright, M. (2021). 'Partnering with Leviathan: The politics of innovation in foreign-host-state joint ventures'. *Journal of International Business Studies*, **52**, 595–620.
- Sun, P., Hu, H. W. and Hillman, A. J. (2016). 'The dark side of board political capital: Enabling blockholder rent appropriation'. *Academy of Management Journal*, **59**, 1801–22.
- Sun, S. L., Peng, M. W., Lee, R. and Tan, W. (2015). 'Institutional open access at home and outward internationalization'. *Journal of World Business*, **50**, 651–62.
- Thornton, P. H. (2004). *Markets from Culture: Institutional Logics and Organizational Decisions in Higher Education Publishing*. Stanford, CA: Stanford University Press.

- Thornton, P. H. and Ocasio, W. (1999). 'Institutional logics and the historical contingency of power in organizations: Executive succession in the higher education publication industry, 1958–1990'. *American Journal of Sociology*, **105**, 801–43.
- Tihanyi, L., Aguilera, R. V., Heugens, P., van Essen, M., Sauerwald, S., Duran, P. and Turturea, R. (2019). 'State ownership and political connections'. *Journal of Management*, **45**, 2293–321.
- Tolbert, S. and Zucker, L. G. (1983). 'Institutional sources of change in the formal structure of organizations: The diffusion of civil service reform, 1880–1953'. *Administrative Science Quarterly*, **28**, 22–39.
- Wang, X., Fan, G. and Yu, J. (2016). *Marketization Index of China's Provinces: NBEI Report 2016*. Beijing: Economic Science Press, (in Chinese).
- Wang, Y., Li, J. and Furman, J. L. (2017). 'Firm performance and state innovation funding: Evidence from China's Innofund program'. *Research Policy*, **46**, 1142–61.
- White, H. (1980). 'A heteroscedasticity consistent covariance matrix estimator and a direct test for heteroscedasticity'. *Econometrica*, **48**, 817–38.
- World Bank. (2019). *Innovative China: New Drivers of Growth*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1335-1>
- Wright, M., Wood, G., Musacchio, A., Okahmatovskiy, I., Grosman, A. and Doh, J. P. (2021). 'State capitalism in international context: Varieties and variations'. *Journal of World Business*, **56**, 101160.
- Xu, D., Lu, J. W. and Gu, Q. (2014). 'Organizational forms and multi-population dynamics: Economic transition in China'. *Administrative Science Quarterly*, **59**, 517–47.
- Xu, D., Zhou, K. Z. and Chen, S. (2022). 'The impact of Maoist communist ideology on patent applications and infringement'. *Academy of Management Journal*, forthcoming.
- Young, M. N., Peng, M. W., Ahlstrom, D., Bruton, G. D. and Jiang, Y. (2008). 'Corporate governance in emerging economies: A review of the principal-principal perspective'. *Journal of Management Studies*, **45**, 196–220.
- Zhou, J., Wu, R. and Li, J. (2019). 'More ties the merrier? Different social ties and firm innovation performance'. *Asia Pacific Journal of Management*, **36**, 445–71.
- Zhou, K. Z., Gao, G. Y. and Zhao, H. (2017). 'State ownership and firm innovation in China: An integrated view of institutional and efficiency logics'. *Administrative Science Quarterly*, **62**, 375–404.

SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article at the publisher's web site: