

1 Introduction

China's remarkable economic development experience distinguishes it from other emerging economies like Brazil or Mexico, and has seen it embark on a path that appears to resemble that of successful late developers such as Japan or South Korea. More recently, the People's Republic of China (PRC) has strongly emphasized the idea of "innovation-driven development," a strategy that has attracted much attention in the West. From the 2000s, and especially in the 2010s, this strategy was substantially strengthened. Several very large programs were launched, pushing for innovation-driven development, huge investments in science and technology (S & T), and targeted industrial policies in existing and emerging sectors, such as semiconductors and electric vehicles. The following statement from the Outline of the National Innovation-Driven Development Strategy (State Council, 2016a) summarizes the overarching rationale: "It is the nation's destiny to be innovation-driven. The core support of national strength is technological innovation capability. National prosperity follows from strength in innovation, and national misfortune follows from weakness in innovation."

This Element scrutinizes the attempts by the Chinese bureaucracy to foster technological upgrading and improve the innovation capacities of domestic businesses.¹ More specifically, we consider how the party-state bureaucracy has been reorganized since the 2000s and ask whether this has created sufficient leverage to achieve these ambitious aims. To evaluate the capabilities of the bureaucracy, we examine two crucial theoretical insights from the developmental state debate – the need for a bureaucracy to achieve internal coherence and the capacity of that bureaucracy both to forge coalitions between bureaucrats, businessmen, and scientists, and to discipline domestic companies. Moreover, we use evidence from China studies on how bureaucrats have impacted the country's development, and we draw on innovation studies focused on China. We complement this with findings from offline and

¹ We define innovation as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices" (OECD, 2005: 46). Innovation policies overlap with the notion of industrial policy, which can be divided into three types: economy-wide (e.g., macroeconomic policies), multi-sectoral (e.g., infrastructure and R & D policies), and sectoral industrial policies (the promotion of specific sectors) (Wade, 2005). Although the third type is typically the main focus of industrial policy debates, the three types are intertwined and mutually supportive. The term "industrial policy" can therefore also include innovation policies, and vice versa. Indeed, "much of what is called innovation policy today may previously have gone under labels such as industrial policy, science policy, research policy, or technology policy" (Edler & Fagerberg, 2017: 5). In this Element, we use the terms innovation and innovation policy in a broader sense, that is, including industrial policy. In the sections focused on targeted sector-specific industry promotion, we use "industrial policy."

online fieldwork (before and during the COVID-19 pandemic), national and local statistical data, and expert interviews (see the online supplementary materials for more information).²

In a nutshell, our analysis suggests that the bureaucracy has strong capabilities to promote innovation when compared with other emerging capitalist economies. Indeed, today the PRC is outperforming all other middle-income countries with regard to innovation capacities. We scrutinize this performance by analyzing, first, attempts from the 2000s onward to strengthen internal bureaucratic coherence at the horizontal and vertical levels. Second, we assess the bureaucracy's efforts to ease information exchange with businesses as well as to promote the science–industry collaboration pivotal to technology transfer, and to discipline firms so that they move beyond a narrow, short-term focus on output growth. We then demonstrate strengths and weaknesses of technological upgrading in two critical industries, semiconductors and electric vehicles.

At first glance, with its attempts to achieve internal coherence and partner with businesses, the Chinese bureaucracy resembles developmental states in Japan or South Korea. But there is significant deviation from this model, too. As we shall see later, the bureaucracy is not capable of fully meeting the standards of internal coherence, coordinating pilot agencies, and developing productive state–business ties – critical components of technological upgrading that are identified in the developmental state debate. Nonetheless, in the fields under scrutiny, trends toward a relatively effective model of governance can be identified, including forms of bureaucratic learning and adaptative regulatory capacities (for earlier works leaning toward this interpretation, see Tsai, 2006; Heilmann, 2017; Zhi & Pearson, 2017). Over time, in an iterative way, the bureaucracy has been adjusting its engagement with nonstate actors, employing rational–instrumental measures to channel investments to potentially innovative areas and pegging the allocation of fiscal benefits to the upgrading performance of firms. These measures have been layered onto prior, less effective ways of governing economic and technology affairs. In other words, China's “hybrid adaptive” bureaucracy (Zhi & Pearson, 2017) has evolved over time – and

² Our methodology follows the approach of in-depth qualitative national case studies. To this end, we triangulate different primary and secondary data sources to trace and critically assess China's development experience as effectively as possible. Triangulating data sources also helps to increase the validity of results in the context of biased statistics, nontransparent party-state institutions, and difficulties acquiring representative data through qualitative fieldwork. With our analytical discussion, we seek to foster academic understanding, and, linked to historical and configurational approaches to explanation, we are cautious about making strong causal claims. A list of semi-structured expert interviews conducted for this research, each lasting between one and three hours, can be found in the online supplementary materials.

probably more than many Western observers would be willing to accept.³ Characteristic strengths resulting from relative elite unity, such as a long-term orientation at national level, autonomy, flexibility to change course (if required), evolving forms of merit-based governance, and learning capacities, along with weaknesses, such as multiple and at times contradictory goals for local bureaucrats, persistent short-termism, and flawed discipline over business, have amalgamated into an alternative “real type” of bureaucracy that is nevertheless supportive of technological innovation.

Our findings suggest that the Chinese bureaucracy does not emulate Western “good governance” policy prescriptions nor does it resemble a Weberian ideal type of bureaucracy. This is puzzling, because China’s rise coincided precisely with the promotion of the “good governance” agenda – the call for strong enforcement of well-defined private property rights, transparent and accountable policymaking, and the rule of law more broadly in order to make markets work efficiently (World Bank, 1994; Mungiu-Pippidi, 2020). The Chinese experience has been more strongly characterized by blurred boundaries between the state and business, and deviations from the rule of law ideal. As Ang (2017a) argues, bureaucrats often act in an entrepreneurial fashion, seeking additional sources of income from outside the formal budgetary apparatus, a behavior commonly endorsed by the state (see also Painter, 2012).

Our research focuses on the period from the 2000s to 2022. It is here that we observe the emergence and consolidation of the “innovation-driven development” strategy. This is not to say that there are no inconsistencies and variations within this period, but rather that these can be understood as part of, and connected to, the same broadly defined innovation strategy. Hence, we depart from interpretations that perceive the rise of Xi Jinping in 2013 as a self-evident and unquestionable periodization criterion when studying China’s recent political economy. As Hsueh (2022: 13) argues, “the reinforcement of the central state’s role in strategic sectors, which contribute to the national technology base . . . predates the rise of Xi.”

Moreover, we do not perceive the reforms from the 2000s onward, including the post-2013 period, as an outright suppression of business, in general, or of the market’s allocative function. Guided by the innovation paradigm, the state has heavily invested in the creation of whole new industries, especially at the technological frontier, and thus engendered new spaces for capital accumulation and new profit opportunities for private companies. Furthermore, we observe state policies incentivizing business to invest in R & D and in sectors more

³ As “perhaps no issue more effectively unites policy-makers, executives, and the urban public in China than the need to propel China into a high-technology future” (Naughton, 2018: 363), bureaucratic coherence is stronger than in other policy fields, such as healthcare.

likely to generate technological upgrading, such as high-tech manufacturing, while disincentivizing or even penalizing business in sectors with poorer prospects for technological upgrading. The party-state is not promoting an indiscriminate assault on business, but rather selectively promotes some activities – those linked to innovation goals – to the detriment of others. The period under scrutiny thus does not represent the “end of the reform era” (Minzner, 2018), but rather a new stage of ever-changing state–market relations in which more state does not necessarily mean less market. In fact, the “reform and opening up” (*gaige kaifang*) strategy was never meant to generate a laissez-faire economy in the first place,⁴ and has always been closely associated with a conscious effort to (re)build the party-state in order to steer economic development (Shue, 1994).

In Section 1.1, we introduce assumptions from the literature, which structure the empirical parts of this Element – and, in line with our interest in de-exoticizing China, thereby place it in a broader comparative perspective. In Section 2, after briefly summarizing the legacies of the 1980s and 1990s, in which the bureaucracy was nowhere near the ideal of a developmental state, we focus on bureaucratic reorganization from the 2000s onward, our main period of analysis. This reorganization was driven by the assessment that the country should have more clearly defined long-term strategies for innovation, and could no longer rely on what was perceived as the dispersed and uncoordinated behavior of local governments, an underdeveloped S & T system, and the short-term orientation of many businesses and local bureaucrats. In the early 2000s, most domestic firms lacked innovative capabilities and exports were often low value-added, while foreign firms dominated high value-added segments. As we will demonstrate, while the PRC still wrestles with features of this earlier reform era, which we dub “growth by any means” – particularly the short-termism of business and local governments, and some of the worst effects of state capture – recent bureaucratic efforts should be seen as attempts to change the economy’s pattern of accumulation to one in which the bureaucracy seeks to steer investments toward domestic industries that are more prone to innovation, instead of supporting poorly coordinated investments into whatever generates GDP growth in the short run.⁵

⁴ The notion that “reform and opening up” should be seen as a progressive effort toward a free-market economy can be found in popular discourses and in academic literature. Gang & Woo (2009), for example, argue that the aim of economic reform in China and other transitional economies is to move from a centrally planned to a modern market economy. This is achieved when *all* the dimensions of the economy are *completely* reformed, that is, when “total coherence” is achieved (Gang & Woo, 2009: 361).

⁵ Coming from a critical normative perspective, it should be emphasized that even the most “successful” development process is ugly when examined close up. This holds for any such process and its dirty realities and paradoxes, of course, not just China’s.

Section 3 assesses the efforts to promote technological upgrading in two critical industries – semiconductors, an existing industry in which domestic businesses are trying to catch up with leading global players, and electric vehicles, a new industry, fraught with uncertainty, where Chinese firms are already attempting to become global technology leaders. We thereby engage with recent studies highlighting the challenges developmental bureaucracies face when promoting technologies at the global frontier (Wong, 2011; Kim, 2020). Despite higher technological uncertainty in the electric vehicles case, we find that China has advanced farther here than in semiconductors, due to an interplay of bureaucratic factors with industry characteristics. We argue that China's system of decentralized governance and experimentation – features that deviate from the canonical developmental state model – is more conducive to technological upgrading in emerging industries characterized by the absence of well-established global leaders, such as electric vehicles. In the case of semiconductors – a mature industry which is already highly consolidated worldwide with a few very large and well-established players – a more centralized system, capable of preventing a dispersion of state funds and promoting catch-up, would probably be more suitable. Moreover, practices from the “growth by any means” phase persist in both industries, creating weaknesses in disciplining business and incentives for local governments to attract investments without necessarily focusing on technological upgrading. Section 4 concludes the Element and outlines future research avenues.

1.1 Insights from the Developmental State Debate

Despite considerable regional heterogeneities, it is an inescapable fact that the PRC has achieved enormous economic development. This trajectory has been characterized by the constant involvement of the state in the economy and strong ties between bureaucrats and business (Oi, 1995; Blecher & Shue, 2001; Duckett, 2001; Kroeber, 2016; ten Brink, 2019; Chen & Rithmire, 2020), in a marked deviation from the assumptions of mainstream economics.

These deviations lead us to engage with the more heterodox developmental state tradition with its insights into the role played by a fundamental actor in *any* development process: the state bureaucracy. Originating from analyses on late industrialization in the second half of the twentieth century, namely in Japan, South Korea, and Taiwan, and later expanding the focus to examine other, unsuccessful development trajectories, this provides a fruitful avenue for assessing the role of China's bureaucracy (Johnson, 1982; Amsden, 1989; Wade, 1990; Evans, 1995; Haggard, 2018; for a critical perspective on this literature, see Kang, 2002). A core feature of developmental states, following

the original work of Johnson (1982), is its bureaucracy. While developmental states can be characterized by other significant features, such as the overriding priority placed on economic growth, the implementation of targeted industrial policies, the mobilization of funding for strategic industries, and policies that defy, rather than follow, a country's comparative advantages, bureaucrats play a crucial role in steering economic development in general, and innovation in particular. Both the internal organization of a bureaucracy and its ties with business are key variables for understanding economic development and, ultimately, innovation capacities and the potential to graduate to higher income levels. At first glance, China's experience since the 1980s resembles these earlier successful and frequently authoritarian developmentalisms. However, as we shall see, there are important differences (on the related scholarly debate, see White, 1993; Tsai & Cook, 2005; Howell, 2006; Beeson, 2009; Walter & Zhang, 2012; Knight, 2014; Ang, 2017b).

A starting point for understanding the importance of bureaucracies is the pervasiveness of market failures and the acknowledgment that the market is just one of many institutions that constitute capitalism (Chang, 2002; see also Polanyi, 2001). In the context, in particular, of the promotion of technological upgrading and innovation, the state may be required to take an active role and drive the direction of technological change by shaping and creating new markets (Mazzucato, 2016). Admittedly, neoclassical economists have developed an influential argument – linked to the “good governance” agenda introduced earlier – which challenges the idea of “governing the market” (Wade, 1990). It emphasizes the risk of “government failures” whenever the state interferes in the relative prices of the economy. As the state meddles in economic activity, the argument goes, problems related to state capture and rent-seeking come to the fore. Well-connected players become rent recipients and start to receive preferential treatment due to their political connections, regardless of their efficiency. Moreover, governments simply do not have the right information to decide which industry is the most promising, and thus deserving of support (Pack & Saggi, 2006). The result is ultimately misallocation of resources and corruption (Krueger, 1990).⁶ The neoclassical argument must be taken seriously, of course. Indeed, key thinkers in the developmental state debate have provided fine-grained answers (see Haggard, 2018). To start with, information problems, for instance, can be reduced through mechanisms of information exchange with business. Since, however, close connections with business invite rent-seeking and state

⁶ The way forward should be the establishment and enforcement of private property rights, rule-based institutions that regulate relations between the state and business, and a competitive electoral democracy (see Acemoglu & Robinson, 2012; for critical views, see Moore & Schmitz, 2008; Khan, 2012; Painter, 2012).

capture, these need to be mitigated as effectively as possible by a coherent bureaucracy capable of disciplining business, an ability which can only develop effectively in exceptional circumstances.

1.1.1 Horizontal and Vertical Bureaucratic Coherence

While a developmental bureaucracy can in principle promote the long-term goals of economic development and innovation, it cannot be assumed to always function in line with those overriding goals. Rather, the successes of East Asian economies were predicated on bureaucratic coherence, characterized by the existence of leading ministerial agencies (Johnson, 1982; Wade, 1990). “Pilot agencies,” such as the Ministry of International Trade and Industry (MITI) in Japan or the Economic Planning Board (EPB) in South Korea, gained particular importance and were positioned above specialized bureaucracies. Bureaucratic conflict between ministries is considered harmful, and hence there is a need to overcome the difficulties of *horizontal* coordination across ministries to achieve interministerial coherence (Evans, 1995). In order to maintain bureaucratic coherence over longer periods, these pilot and other state agencies must be staffed with bureaucrats recruited based more on technical competence than on patron–client relations or political ideology, allowing policies to be formulated by a professional technocracy (Migdal, 1988; Haggard, 2018; for further discussion on state capacity and performance, see Centeno et al., 2017).

Moreover, bureaucratic coherence is not limited to the central bureaucracy, but also applies to the *vertical* dimension of the state (see Evans, 1995: 54, 72). This is particularly important for large, heterogenous latecomer economies, such as China (or Brazil and India; see Montero, 2001; Sinha, 2003), where effective policy implementation depends on the behavior of lower-level bureaucracies. The more vertically fragmented bureaucracies are, the higher the chances of implementation failure.

In the case of China, the study of central–local relations has attracted much scholarly attention, highlighting both positive effects of the leeway that subnational governments enjoy when it comes to economic governance and negative effects such as noncompliance with central directives, which hamper policy implementation (Lieberthal & Lampton, 1992; Shirk, 1993; Chung, 2000, 2015; Yang, 2004; Heilmann, 2008; Mei & Pearson, 2014). The center uses two main tools to guarantee vertical coherence: a system of fiscal decentralization and the so-called cadre evaluation system. The first provides the fiscal incentives for local officials to behave in accordance with goals set by the center, and the second allows the central government to monitor local bureaucrats and then reward or punish them depending on their achievements.

As we will see, problems emerge when there is a fiscal mismatch between revenues and expenditures at the local level, when the cadre evaluation system does not reach the lower levels effectively, or when the center sets contradictory targets for local bureaucrats. Unsurprisingly, scholars who perceive China as yet another developmental state normally emphasize the effectiveness of these tools (Knight, 2014), while more skeptical scholars highlight the problems found in the vertical dimension of bureaucratic coherence (Howell, 2006; Beeson, 2009).

To evaluate bureaucratic coherence, we first analyze a horizontal dimension, namely, whether, and to what extent, something akin to a national pilot agency has been developed. Second, on the vertical dimension, we analyze whether the systems of fiscal decentralization and cadre evaluation make local bureaucrats work in tandem with central objectives.

1.1.2 Coalitions and Discipline

Developmental states have always been characterized by strong ties, or coalitions, with the business sector (Evans, 1995; Johnson, 1999; Woo-Cumings, 1999; Kohli, 2004; Haggard, 2018). For Johnson (1999: 60), “each side uses the other in a mutually beneficial relationship to achieve developmental goals and enterprise viability.” In the context of ambitious innovative efforts, in particular, it is important to provide information that feeds back into the industrial and innovation policymaking process in order to tackle the aforementioned information problems. Moreover, scientists and research organizations must be integrated to promote science–industry collaboration and technology transfer (Cao & Suttmeier, 2017; Appelbaum et al., 2018; Fu et al., 2022).

Both bureaucrats and business people may develop a common interest in collaborating (Schneider & Maxfield, 1997; Moore & Schmitz, 2008; Leftwich, 2010). A valuable literature focusing specifically on functional networks between businesses and bureaucrats has emerged (Doner, 1992; Schneider & Maxfield, 1997; Schneider, 1998; Chibber, 1999; Doner & Schneider, 2000), arguing that state–business ties and consultative bodies are critical, especially to address the technical and informational needs that become very specific as the economy diversifies.

Undoubtedly, however, these relations can also be disruptive and rife with conflict between state and business groups, which do not necessarily comply with state directives (Migdal, 1988; Chibber, 2003). Therefore, an important prerequisite for successful patterns of state–business ties is what Amsden (1989) called “discipline.” Her study on South Korea finds that in the context of industrial or innovation policies which distribute significant funds to business, the bureaucracy had to ensure that the latter would use those funds productively and

in accordance with the overriding priorities set by the state. As she explains, “repeated support by the government” to business was “exchanged, de facto, for good performance” (Amsden, 1989: 16). Notably, the allocation of resources was tied to export performance – a target that was easy to measure and monitor, and difficult for business to manipulate (see also Stiglitz, 1996; Chang, 2006). More recently, scholars have utilized the concept of discipline to understand the successes of former middle-income countries such as Israel in promoting high-tech sectors and commercializing R & D (Maggor, 2021). Here, the bureaucracy demanded that recipients of state R & D funds produce locally (i.e., they should not outsource their production) and refrain from selling the resulting intellectual property to foreigners.⁷

The ability of the bureaucracy to reward good performers and punish under-performers was what distinguished South Korea from less successful late developers. Yet, this very ability not only depends on bureaucratic coherence, but crucially on the distribution of power between the state and business (Amsden, 1989: 147). In South Korea, successful disciplining from the 1960s onward was based on the relative weakness of both the traditional ruling classes and private entrepreneurs (Kohli, 2004; Khan, 2010). This diminished class conflict and allowed the state to fill a political vacuum, thereby creating elite unity (see Kay, 2002 for a comparison with Latin America). Just as professional recruitment and pilot agencies are fundamental to a coherent bureaucracy, state power over business is essential for discipline to work.⁸

The existence or nonexistence of this particular distribution of power between the state and business, which allows the former to discipline the latter, is not the result of any special set of smart policies enacted by policymakers, but rather a result of distinct historical circumstances (see Haggard, 2018: 47–53). Kohli (2004), for example, emphasized different types of colonial legacies: while Japanese colonialism bequeathed relatively coherent bureaucracies in South Korea and Taiwan, British colonialism left West Africa with weak bureaucracies and fragmented states, which mostly ended up being dominated by patrimonial relations. Another key variable is the existence, or not, of “systemic vulnerabilities” (Doner et al., 2005) related to geopolitical competition and conflict, and the resulting mechanism of “collaborating to survive”

⁷ The example of Israel illustrates that export promotion is not the only feasible disciplining strategy for developing countries. In fact, Khan (2010: 74) remarks: “export promotion can also be done inefficiently, as Pakistan discovered in the 1960s” (at the time, the country was subsidizing low-quality exports). The key is to have a coherent bureaucracy capable of disciplining businesses in accordance with innovation goals.

⁸ In contrast, during twentieth-century catch-up processes in Brazil and Turkey, bureaucrats were often afraid of monitoring and punishing businesses for fear of alienating supporters (Evans, 1995; Schneider, 1998).

(Schneider & Maxfield, 1997: 25; also see Migdal, 1988; Johnson, 1999). National security concerns and fears of external threats have often led national elites to take additional risks to consolidate control over society and to organize resources more effectively, prioritizing strong economic growth to catch up with established powers. In reform-era China, concerns over national security have always been entangled with the promotion of technological development, and they have intensified from the 2000s onward (see Hsueh, 2022). This stands in sharp contrast with the much less tumultuous geopolitical environment faced by most Latin American countries in the same period.

In this Element, we therefore analyze, first, whether, and to what extent, the bureaucracy has been able to forge coalitions with business and promote science–industry collaboration and, second, whether it is able to discipline businesses.

However, besides differences in size and internal socioeconomic heterogeneity, one important complication makes China a potentially deviant case: the role of foreign capital.⁹ China’s (re)emergence takes place in a different era, characterized by the increasing dominance of multinational corporations (MNCs) (Baek, 2005; Pirie, 2013; Doner & Schneider, 2016). Indeed, foreign firms have been particularly strong in high-tech manufacturing – in stark contrast to earlier East Asian economies. While this has provided Chinese companies with multiple “entry points” to acquire international technology, it has also created a fundamentally different reality to East Asia’s earlier upgrading successes. As argued by Evans (1995) with regard to the Brazilian experience, disciplining transnational capital is trickier than disciplining domestic capital. Chen’s (2018) study reveals how different local bureaucracies in China compete with each other and shows that local departments of international commerce, in particular, are more likely to forge coalitions with foreign capital. As a result, the promotion of indigenous technologies, as prioritized by the central state, faces resistance from the interests emanating from these local bureaucracies-cum-foreign capital coalitions, and discipline becomes harder to achieve. When analyzing discipline over business, we incorporate this reality.

This Element has certain limitations. Space constraints prevent us from discussing important topics in more detail. This applies, first, to the role of external factors and transnational influences, including how the fear of external threats motivated Chinese national elites to consolidate power over society. Foreign direct investment (FDI), and its ambiguous role for economic development, is also only touched on briefly (but see Gallagher & Shafaeddin, 2010 on

⁹ Another important difference is the larger role for state-owned enterprises (SOEs), an aspect we cannot systematically tackle due to space constraints.