



Innovation with Chinese Characteristics: Theory and Practice

Journal:	<i>Chinese Management Studies</i>
Manuscript ID	CMS-01-2020-0001
Manuscript Type:	Editorial

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Manuscripts

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Abstract Purpose – This special issue of Chinese Management Studies aims to engage with debates on innovation in China and to provide new insights for innovation research in the context of China, seeking to develop a greater understanding of the concept of “innovation with Chinese characteristics”.

Design/methodology/approach – Review and reflection.

Findings –The nine articles that constitute this special issue present research on important aspects of innovation in China, ranging from the effectiveness of government subsidisation for innovation, the impact of fiscal decentralisation on innovation, the role of management behaviour in promoting (or discouraging) innovation and the effects of differing business models on innovation. These articles shed valuable new light on the theory and practice of innovation in China. The articles are discussed in the context of four primary arguments about innovation management in China identified from the broader literature in the field. These relate to the pattern of China’s innovation performance over time, the reasons for its effectiveness, the role of alliances and influences of indigenous factors. It is also shown that management of the internationalisation of innovation and of efficient internal innovation are two important directions for future research on Chinese innovation in an era of de-globalisation.

Originality/value – The studies presented here provide valuable contributions to theory building in innovation research, as well as some important ideas for directions of future research on innovation in China in the new era of de-globalisation.

Keywords Innovation, China, de-globalisation, internationalisation of innovation, R&D efficiency

Paper type Editorial paper

1. Introduction

When China embarked on its reform and opening-up drive in 1979, the country made modernisation of science and technology one of the four pillars of the new initiative. Forty years on, China has transformed itself from an impoverished, economically backward country into the world's second largest economy and, equally impressively, from a backwater of global innovation to a country recognised as the world's hub of science and innovation (Li & Wang, 2013). China's remarkable progress in innovation has been well-documented (e.g. Ding & Li, 2015; Fu, 2015). Yet, the characterisation of the Chinese approach to innovation management remains an area where arguments continue to be put forward and theories contested.

Over the years, four key primary arguments as to China's innovation management have emerged. First, Chinese innovation management is framed in terms of an evolutionary economics paradigm. This argument contends that Chinese innovation has followed a conventional catch-up pattern for latecomers to an economic field, in which that agent starts with learning from frontrunning countries before moving up the innovation ladder, as suggested by evolutionary economics theory (Nelson, 2008). Through this lens, it is argued that China's successful catch-up can be attributed to its institutions of knowledge creation and learning as well as its access to foreign knowledge (Li, Li & He, 2018). For example, Lee, Jee and Eun (2011) identify several elements of learning and access strategies of the Chinese catch-up model that are unique to China and not found in the corresponding models of Taiwan or Korea. These unique features include: (1) parallel (indirect) learning from foreign direct investment (FDI) firms, (2) "forward engineering" (a role performed by university spin-off firms) in contrast to reverse engineering adopted in Korea and Taiwan, and (3) acquisition of technology and brands through international mergers and acquisitions (M&As) and going global (*zouchuqu*) at an earlier stage of economic development. Along this line, Bound, Saunders, Wilsdon and Adams (2013) have referred to China as an "absorptive state" that has become increasingly adept at attracting and profiting from global knowledge and networks.

A second argument attributes Chinese innovation management to the country's ability to compete successfully on the elements of creativity and cost (Economist, 2010). This ability to make established products at dramatically lower cost is dubbed "frugal innovation" in broad terms (Zeschky, Widenmayer & Gassmann, 2011). In this model, innovation is primarily concerned with redesigning products, using existing technology in imaginative new ways, and applying mass production techniques across the value chain. Frugal innovation not only addresses the unmet or underserved market needs of customers at the bottom of the pyramid but it also provides an impetus for innovation in other forms that is made possible by the expansion of markets.

While the phenomenon of shanzhai innovation that emerged in China in the 1980s has been seen as part of the "frugal innovation" model (Economist, 2010), more recent studies consider shanzhai to be a much broader phenomenon than just the cheap copying of goods. For example, Zhu and Shi's (2010) research points out that shanzhai manufacturing is typified by the rapid production cycle of the products – concept to delivery is often achieved within weeks. Keane and Zhao (2012) view shanzhai innovation as an example of rapid prototyping. Liu, Xie and Wu (2015) emphasise the importance of modularisation and the evolution of value chains in shanzhai innovation that significantly lower the technological threshold of entering markets such as the mobile phone business, promote disruptive innovations, and accelerate latecomers' accumulation of knowledge and technology. In more specific terms, the evolution of value chains leads to an outcome in which some firms in possession of better technologies can refocus their business on the design and production of chipsets and software, while others with other

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3 advantages such as market information can reallocate their efforts towards cosmetic design,
4 differentiation, or marketing. For Maarten Beekers,¹ a US technology commentator, the
5 practice of shanzhai represents an open-source approach to manufacturing, which enables
6 factories to bootstrap new products and penetrate new markets, all in a highly efficient way.
7 This is made possible as manufacturing industries in China have developed, and traditional
8 contract manufacturers have also grown in size, mainly catering to multinational brands. Some
9 young entrepreneurs have seen this as an opportunity to start producing goods, in smaller
10 volumes, for small and medium enterprises (SMEs). As a result, during the 1990s in particular
11 a dense network of small manufacturing businesses emerged in China comprising component
12 producers, traders, design houses, vendors and assembly lines.
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16 A third interesting argument frames Chinese innovation management in accordance with the
17 model of ‘alliance capitalism’ (Higgins, 2015). This is defined as a strategic approach in which
18 government actors and firms develop embedded relational ties and collaborative R&D activity
19 with other firms and economic and technological actors in order to engage in innovative
20 upscaling and product development. The primary goal of such alliances is to anticipate future
21 market and ecosystem requirements and to use this information to build a critical network of
22 interdependent alliance partners that are focused on achieving technological “convergence”
23 and “interoperability” across the ecosystem platform.
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26 In conclusion, a fourth research approach explores the emergence of China’s indigenous
27 innovation capabilities as being driven by China’s ambitions in this field (Vinig & Bossink,
28 2015). Such research emphasises the development of Chinese innovation based on a view of
29 the country leading and developing innovation theory independently in its own right rather than
30 merely using and building on Western-centric innovation theory. Chinese innovation efforts
31 are strongly science-based and technology driven, aimed at moving China towards self-
32 sufficiency as an innovation-based economy. Relevant questions that arise in this context are:
33 should new theoretical approaches to theorising China-based innovation be considered? Should
34 the specific context of each activity China conducts itself be the basis of theorising? Is the
35 innovation system of China intrinsically and completely different from that of Western
36 countries, or do they share some fundamentals and differ on others?
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40 Despite the growing literature on Chinese innovation, consensus as to a unique model of
41 Chinese innovation management has yet to emerge. However, the papers collected in this
42 special issue seek to provide a number of new and important research frameworks relating to
43 various aspects of innovation in China and so shed further light on this topic and advance our
44 understanding of the concept of “innovation with Chinese characteristics”.
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48 **2. Overview of the special issue**

49 In terms of China’s economy, the year 2018 was celebrated as the 40th anniversary of China’s
50 embarkation on the process of reform and opening-up. To mark this significant milestone, Jilin
51 University and Amsterdam Business School joined together to convene the 5th Global
52 Entrepreneurship and Innovation Conference in Amsterdam on the theme of “Technology
53 Entrepreneurship - The Driving Force of Contemporary Business” on 11-12 October 2018. To
54 facilitate the dissemination of the outstanding research produced for this conference, Chinese
55 Management Studies (CMS) agreed to publish a special issue on the topic of “Innovation with
56 Chinese Characteristics: Theory and Practice”. The nine papers presented in this special issue
57 have been selected from 49 submissions and have been subject to the journal’s blind peer-
58 review process. The articles in this CMS special section on Innovation with Chinese
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3 Characteristics highlight a number of specific features of innovation in China and issues that it
4 involves. As such, the articles address issues ranging from the effectiveness of subsidisation of
5 innovation, the impact of fiscal decentralisation and the role of management behaviour to the
6 effects of different business models on this process.
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9 In the first article, Li, Zhou, Jung and Li provide an up-to-date review of the evolution of
10 policies and practices of innovation in China over the last 40 years and identify six practices in
11 particular that have underpinned the success of innovation in China over this period. Echoing
12 Ding and Li (2015), they argue that good practices in managing innovation have consisted of
13 formulating successive policies to encourage innovation and carrying out planning strategically,
14 thus allowing space for spontaneity of creativity and encouraging “grassroots innovation”,
15 while using both the “invisible hand” and the “visible hand” to support innovation. They also
16 argue that success for Chinese innovation has also resulted from the country’s effort to engage
17 state-owned and privately owned firms in collaborative innovation, so as to encourage
18 internationalisation of innovation under the principles of “going out” and “bringing in”, as
19 manifested in the latest steps in the Belt and Road Initiative (BRI), and to release the
20 entrepreneurial spirit of the Chinese people and to embrace the culture of “common destiny”
21 as a new win-win model in international relations and future innovation-driven development.
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25 The next three articles focus on government policies relating to subsidisation of research and
26 development (R&D) and fiscal decentralisation. Wang, Hu and Yang examine the effect of
27 government subsidies on China’s regional innovation performance, using the Bayesian model
28 averaging (BMA) method. Subsidies are shown to be an important policy tool as the authors
29 outline that China’s R&D subsidies for high-tech industries increased from CNY 3.910 billion
30 in 2006 to CNY 210.183 billion in 2015, an average annual growth rate of 43.8%. The authors
31 use the proportion of government funds in the internal expenditure of R&D funds to measure
32 the degree of government R&D subsidies for high-tech industries, and new product sales
33 revenue of high-tech industries to measure regional innovation performance. Their empirical
34 results show that government subsidies have a negative relationship with regional innovation
35 output. They interpret this result as evidence of the crowding-out effect, meaning that firms use
36 government subsidies to substitute for their own R&D investment.
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40 Taking a different approach, Wang, Li and Sun examine the effect of government R&D
41 subsidies on firm performance, using Chinese A-share listed company data from 2008 to 2016.
42 They find a positive impact of R&D subsidies on return on assets (ROA) after controlling for
43 a range of corporate characteristics, suggesting a positive effect for government R&D subsidies
44 on firm performance. They also find that the relationship between R&D subsidies and ROA is
45 non-linear, indicating that it is only when R&D subsidies are given within a moderate interval
46 that firms can perform better. The authors argue that R&D subsidies play a vital role in
47 enhancing firm performance mainly via two mechanisms, namely signal financing and
48 innovation incentives. Finally, they find evidence that suggests that the effect of government
49 R&D subsidies is greater in non-state-owned, more recently established, and large enterprises.
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53 Focusing on a novel issue in the field, Yang, Li and Li examine the impact of fiscal
54 decentralisation on city innovation performance in China, using a panel data of China’s 278
55 cities from 2003 to 2016. The authors use the ratio of city budgetary expenditure per capita to
56 the sum of central, provincial and city budgetary expenditure per capita to measure the degree
57 of fiscal decentralisation. They estimate a patent renewal model and aggregate the forecast
58 market value of the patent at the city level to construct an index of city innovation. Their
59 research finds that fiscal decentralisation has significantly inhibited city innovation and that
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3 this inhibiting effect demonstrates the characteristics of a “V” type variation. They argue that
4 the reasons behind this negative effect are twofold: fiscal decentralisation weakens the central
5 government’s ability to guide local governments to implement its innovation-driven strategy;
6 and fiscal decentralisation weakens the central government’s ability to restrain local
7 governments’ preference for self-interest in favoring investments emphasising production and
8 neglecting innovation. They further show that the influence of fiscal decentralisation on city
9 innovation presents clear spatial and temporal heterogeneity. Geographically, the inhibition of
10 fiscal decentralisation on city innovation in eastern China is significantly weaker than that in
11 central and western China. Temporally, after the implementation of China’s innovation-driven
12 development strategy in 2013, the negative impact of fiscal decentralisation on city innovation
13 disappeared.

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17 The focus of the next three articles shifts to firm behaviour and its impacts. Hai, Yin, Gao and
18 Chen analyse the impact of R&D volatilities on market value and the moderating effect of
19 executive overconfidence, employing a panel dataset covering 902 Shanghai and Shenzhen A-
20 share manufacturing listed firms. In this context, R&D volatilities indicate shifts in a firm’s
21 innovation strategies between exploratory innovation (positive shift) and exploitative
22 innovation (negative shift), as reflected by changes in R&D expenditure away from the firm’s
23 historic trend. The authors find that positive R&D volatilities have a significant positive impact
24 on market value, suggesting that the shift of innovation strategy to exploratory innovation helps
25 firms change the trajectory of technological development and acquire competitive advantage
26 which in turn enhances their market value. They also find that negative R&D volatilities have
27 a significant positive impact on market value, indicating that the shift from exploratory
28 innovation to exploitative innovation helps firms to consolidate competitive advantage and
29 achieve better performance. Finally, they report that the relationship between R&D volatilities
30 and market value is moderated by executive overconfidence.

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34 Dai and Taube explore the functionality of long tail markets (LTM) in new products and
35 business development through two Chinese cases: the Fintech sector and low-speed electric
36 vehicles (LSEV). They argue that the alternative approach of leveraging LTM for new business
37 models and technologies rather than competing head-on with powerful incumbents in the
38 mainstream markets promotes the introduction of new technologies and business models. Their
39 research identifies three strategies to explore LTM for businesses, i.e. identifying a specific
40 customer base, being aware of localisation products, and dealing skilfully with regulations.

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43 Focusing on a concept relevant to many aspects of China’s society and economy, Zhao and
44 Vinig investigate how guanxi and guanxi intensity may affect reward-based crowdfunding
45 success and project performance in the Chinese context, using research data on 989
46 crowdfunding projects collected from China’s largest reward-based crowdfunding platform
47 zhongchou.com over the one-year period January-December 2014. They find that project
48 developers’ guanxi-building behaviour displayed before launching their own projects, through
49 for example being supportive of other projects, is positively related to project success. In
50 addition, the intensity of guanxi-building behaviour positively influences project performance
51 in a significant way. Moreover, the establishment and maintenance of project developers’
52 guanxi with funders during the fundraising process are also positively associated with project
53 success and fundraising performance.

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57 The final two articles in this special issue turn to broader studies. Sun and Ai investigate the
58 effect of home political connections on the cost structures of Chinese multinationals. Framing
59 their research in terms of social exchange theory, the authors argue that the costs of home
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3 political connections arising from reciprocity commitments to the government in outbound
4 M&As of Chinese multinationals outweigh the benefits. The costs are higher for lower-level
5 political connections. Using a sample of 225 M&A deals, they test and confirm the negative
6 effect of home political connections on the internationalisation of Chinese multinationals. Also,
7 the negative impact of lower-level political connections is stronger than that of their higher-
8 level counterparts.
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11 Zhu and Fang provide a systematic review of the literature over the period 2000 to 2018, in
12 Chinese and English, presenting research on innovation performance. Based on the systematic
13 literature review, the authors identify three characteristics of the research in this specific
14 domain. First, the momentum of research on innovation performance in the English literature
15 has been increasing, whereas that in the Chinese literature has declined in recent years. Second,
16 research in both Chinese and English literature has covered similar streams such as “innovation
17 system/elements”, “innovation activity/ability” and “innovation network/social capital”. Third,
18 although the directions are the same, the specific contents of research have been different. The
19 “hot topics” in the English literature have been “sourcing knowledge” and “culture value” in
20 the “innovation system/elements” stream, “supply chain management” (SCM) in the
21 “innovation activity/ability” stream, and “licensed-knowledge attributes” in the “innovation
22 network/social capital” stream. By contrast, the “hot topics” in the Chinese literature have been
23 “technology transfer” in the “innovation system/elements” stream, “resource acquisition” and
24 “external innovation search” in the “innovation activity/ability” stream, and “cooperation
25 experiences” in the “innovation network/social capital” stream. Using insights obtained from
26 this review, the authors propose three directions for future innovation performance research:
27 expanding research in hot topics, connecting research streams to extend research scope, and
28 exploring new fields of innovation performance.
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34 **3. Some future research directions in the era of de-globalisation**

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36 Following the overview of the research in this special issue presented above, it is appropriate
37 to make a few brief observations here about the current international environment in which
38 innovation must take place at present, and some of the key research questions that this gives
39 rise to as to the most effective future path for China’s innovation efforts.
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42 The world has changed significantly since the global financial crisis of 2008. Slow global
43 economic growth has become the new normal, global trade protectionism is rising, cross-border
44 flows of trade, finance and investment are declining, global supply chains are disintegrating,
45 and the current rules of the world trading system are being challenged. This unfolding retreat
46 of globalisation is termed de-globalisation. The international trade policies that have headlined
47 the first three years of the Trump presidency in the US have brought about a spurt in the pace
48 of de-globalisation. These developments will necessarily affect both the nature and rate of
49 China’s innovation process. Specifically, the technology contest that is part of the US-China
50 trade war will have a far-reaching effect on Chinese innovation. As the Economist has noted,
51 the trade conflict that matters most between America and China is a 21st-century fight over
52 technology.² With the determination of the US to deter China’s rise to becoming a technology
53 leader and China’s resolve to move up the technology ladder, both countries could find it
54 difficult to reconcile their respective national interests. There is a real danger that the
55 technology contest could lead to the decoupling of science and technological innovation
56 between the world’s two largest economies, dividing the world’s R&D chain into two parallel
57 innovation ecosystems.³ The new era of globalisation and the economic and social problems
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3 behind it require critical review of, and reflection on, the theory, practice and policies of
4 innovation in China, and fresh thinking about new models of innovation.
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7 Despite the rise of nationalism and retreat of globalisation, the underlying factors favouring
8 open innovation in fact still hold. On the one hand, good ideas and innovation will undoubtedly
9 continue to flow as a result of the processes of connecting, fusing and recombining by economic
10 agents and policy-makers and established patterns and understandings will reinvent themselves
11 by crossing conceptual, organisational and national borders. On the other hand, no one can
12 establish supremacy in all fields in the light of the complexities of today's technologies and
13 supply chains. Hence, the ongoing technology contest between the US and China does not
14 support the argument that China should turn its back to open innovation by reverting to an aim
15 of self-sufficiency in technologies. The scale of China's home market may indeed provide
16 Chinese firms with an indispensable cushion against the damaging forces released from the
17 technology contest for the time being. However, by focusing innovation exclusively on the
18 home market Chinese companies could fall into the trap of cutting themselves off from the
19 wider world and the bigger ideas it contains.
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23 Nonetheless, the changing environment also suggests that the balance between internal and
24 external resources has shifted, because developing and possessing internal R&D capabilities
25 can be argued to be more important when there exists a heavy reliance on relationships with
26 other actors. This calls for a greater understanding of different forms and practices of openness.
27 In this context, management of internationalisation of innovation and management of efficient
28 internal innovation are two important directions for research on Chinese innovation going
29 forward.
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32 *3.1 Management of internationalisation of innovation*

33 The internationalisation of innovation by Chinese firms over the last decade has typically taken
34 one of three forms. The first was to use business joint ventures and setting-up of research
35 centres abroad to access and generate cutting-edge technologies from the host countries. For
36 example, Huawei has set up 36 joint innovation centres and 16 research centres worldwide.⁴
37 The second was to use mergers and acquisitions (M&As) to obtain technologies critical for
38 Chinese firms to advance in the value chain. The third was to use corporate venture funds to
39 invest in technology start-ups in the US and Europe in order to have a stake in emerging
40 technologies. Traditionally, a firm's collaboration with external partners has been seen to entail
41 two types of costs (Grant, 1996), i.e. the costs of coordination and competition. Costs of
42 coordination emerge from organisations that are different, where it may be difficult to bridge
43 organisational boundaries. Costs of competition emerge from the risk that one actor might act
44 opportunistically in bad faith. However, the US's recent ban on technology exports to Huawei
45 indicates another form of cost emerging from the firm's deep dependence on external core
46 technologies – costs of strategic control. Clearly, openness is beneficial only when the firm
47 chooses the correct and concomitant configuration of both the open and the closed resource
48 (Alexy, West, Klapper & Reitzig, 2018). In 2010, Dahlander & Gann asked: How open is
49 innovation? The question remains relevant today.
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54 In the face of the US ban, Huawei's response so far has been revealing. First, in spite of facing
55 being cut off from the American technology supply and being barred from joining the global
56 research chain (as shown, for example, by the fact that in the wake of the sanctions, Stanford
57 University and MIT in the US, and the University of Oxford in the UK, cut funding ties with
58 Huawei), the company maintained that it would still embrace American technologies so long
59 as they are made available to them. It was also determined to keep their innovation system
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3 open. In doing that, the company has reallocated its R&D investment globally to mitigate the
4 effect of US ban. For example, it was reported that in October 2019 Huawei had bought a stake
5 in Oxford Sciences Innovation that commercialises research at Oxford University, which
6 would give the company access to some of the most promising early stage technology
7 developed by academics in the UK.⁵ Second, the company quickly revealed that it had secretly
8 worked on its own proprietary operating system named as HarmonyOS for nearly ten years and
9 would install it in their smartphone products should the company's access to Google's android
10 system be blocked completely. Third, the company announced that it would invest USD 1.5
11 billion to support application developers world-wide to nurture the development of its own
12 innovation ecosystem.⁶
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16 The case of Huawei suggests a number of questions that future research on Chinese innovation
17 needs to tackle. What are the firm- or environmental-level factors that may moderate the effect
18 of openness on competitive advantage? How should firms in China balance generic, non-firm
19 specific R&D with strategic, firm specific R&D? What strategy could represent a win-win
20 approach to internationalising R&D? In terms of the internationalisation of R&D, how should
21 firms in China manage intra- and inter-regional geographic diversification? How should
22 Chinese firms develop innovation ecosystems? How could firms in China utilise government
23 support to deal with the challenges of de-globalisation? How could firms in China deal with
24 institutional pressures from host countries?
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27 *3.2 Management of efficient internal innovation*

28 The new era of de-globalisation compels firms in China to find a balance between a search for
29 external sources of innovation and the development of internal innovation capabilities. While
30 adapting the process of internationalisation of R&D to the new era of de-globalisation is
31 imperative, equally important for Chinese firms is to improve innovation efficiency. China's
32 innovation drive over the past several decades has been supported by the unprecedented level
33 of funding directed to R&D. For example, China spent over CNY 1.96 trillion (around USD
34 293 billion) on R&D in 2018, up 11.6 per cent compared with the level in 2017.⁷ In 2019,
35 China established a new state-backed semiconductor fund worth USD 28.9 billion in order to
36 advance its domestic semiconductor R&D and reduce its reliance on US technology.⁸ China's
37 incentive for injecting more resources into its innovation system to support R&D in general
38 and strategic industries in particular will be certainly strong if the technology contest lingers
39 on. Yet, the concern is that the productivity of R&D investment in China overall has been
40 unsatisfactory. There is consistent evidence pointing to the low R&D efficiency of firms in
41 China. As but one example, empirical research using data on 38 Chinese new energy
42 enterprises from 2009 to 2013 found that new energy enterprises are generally inefficient when
43 it comes to innovating (Wang, Hang, Sun & Zhao, 2016). It has also been found that state
44 ownership enables firms to obtain crucial R&D resources but makes them less efficient in using
45 those resources to generate innovation (Li & Li, 2014; Zhou, Gao & Zhao, 2017). As a result,
46 the level of inputs is not consistently translated into successful innovation outputs. Kennedy
47 (2017) characterises this economy characterised by low transformation of inputs into successful
48 high-tech advancement as a "fat" tech dragon. It is not a surprise that a recent meta-analysis of
49 the relevant literature on a large number of countries at different stages of economic
50 development found that the growth-enhancing effect of R&D spending in China has been
51 significantly weaker than that in other countries (Ljungwall & Tingvall, 2015).
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57 The underlying causes of innovation inefficiency in China are multifaceted. At the innovation
58 support system level, the problems relate to the duplication of science and technology (S&T)
59 projects, lack of transparency in S&T management, and low efficiency in fund use (Ding & Li,
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2015). At the regional level, the problems are found to be related to a mismatch between upstream public research organisation-centred research processes and downstream firm-centred commercialisation processes when the downstream commercialisation process plays a more important role in the innovation processes in the region as a whole (Chen & Guan, 2012). At the firm level, the problems are found to be linked with the low absorptive capacity for the potential outputs of the increasing R&D inputs and the inefficiency of the technology commercialisation processes (Han, Thomas, Yang, Ieromonachou & Zhang, 2017). Important research questions will be: how could government agencies work collaboratively to identify and support novel S&T projects? How could governments make the funding mechanism of S&T projects fair and transparent? How could S&T fund be used more efficiently? How could regional innovation systems align upstream public research organisation-centred research processes and downstream firm-centred commercialisation processes more closely? How could firms improve their absorptive capacity? How could firms enhance the efficiency of technology commercialisation processes?

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